Ms. Anne L. Mapes  
Bent Collins and Associates  
506 Coral Street  
Honolulu, Hawaii 96813

Dear Ms. Mapes:

Final EIS - The Ritz-Carlton Mauna Lani  
Determination of Acceptability

We have reviewed the Final EIS for the proposed Ritz-Carlton Mauna Lani Hotel.

Chapter 343, HRS, requirements were triggered by the proposed use of state-owned lands, and activities nearshore and shoreline areas that lie within the Conservation District.

We find that the Final EIS adequately addresses both the procedural and content requirements of Chapter 343, HRS. The document adequately disclosed and described significant impacts and responded satisfactorily to review comments. Thus, we have determined the EIS to be acceptable.

In accepting the EIS, we concur that the other issues that remain unresolved, as outlined in the Final EIS, Chapter VIII, will be resolved in the context of subsequent regulatory approvals.

Should you have any questions, please feel free to contact our office.

Sincerely,

[Signature]

ALBERT LONO LYMAN  
Planning Director

AK:aeb

cc: OCNOC  
The Ritz-Carlton Hotel Company
FINAL
ENVIRONMENTAL IMPACT STATEMENT

THE RITZ-CARLTON MAUNA LANI
MAUNA LANI RESORT SOUTH KOHALA, HAWAII
JULY 1987
FINAL
ENVIRONMENTAL
IMPACT STATEMENT

PREPARED FOR:
THE RITZ-CARLTON HOTEL COMPANY

PREPARED BY:
BELT COLLINS & ASSOCIATES

FOR SUBMISSION TO:
HAWAII COUNTY PLANNING DEPARTMENT

SUBMITTED BY:

JAMES R. BELL, PRESIDENT
BELT COLLINS & ASSOCIATES
HONOLULU, HAWAII
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CHAPTER I
CHAPTER I
INTRODUCTION AND SUMMARY

1.0 PURPOSE OF THIS DOCUMENT

This environmental impact statement has been prepared to accompany a Shoreline Setback Variance application and an amended Special Management Area permit application submitted by The Ritz-Carlton Hotel Company to the Hawaii County Planning Department. It is also being prepared to accompany a Conservation District Use Application (CDUA) submitted by The Ritz-Carlton Hotel Company to the State of Hawaii Board of Land and Natural Resources due to the proposed use of state-owned lands and activities nearshore and shoreline areas that lie within the Conservation District. The environmental impact statement is being prepared in compliance with the requirements of Chapter 343, Hawaii Revised Statutes and the regulation adopted pursuant thereto.

2.0 PROPOSED GOVERNMENTAL ACTION

The Ritz-Carlton Hotel Company is requesting that approval be granted for the above three applications to allow it to construct a 450-unit hotel with amenities, including shoreline improvements which would necessitate work in the 40-foot shoreline setback area.

3.0 PROJECT DESCRIPTION

The Ritz-Carlton Hotel Company proposes to construct a 450-unit luxury hotel on a 32-acre site at Paanoa Bay at Mauna Lani Resort. The concept plan focuses on two wings of guest rooms connected to the main lobby in the entrance building. The buildings will be six stories high and enclose a landscaped courtyard and swimming pool; structures will be of classical Hawaiian architectural design, reminiscent of buildings constructed in Hawaii during the early part of the century. As market demand dictates, up to 200 additional units will be added in low-rise clusters around a proposed water feature at the north of the hotel site.

Three projects are proposed for the shoreline and nearshore areas: (1) excavation of a seawater swimming lagoon; (2) restoration of the existing anchialine pond (Keanae Fishpond); and (3) expansion of the existing shoreline beach.

Construction of the 450-unit hotel and associated facilities, grounds, and shoreline improvements are expected to begin in late 1987 and be complete by late 1989 or the beginning of 1990. The additional 200 units will be built according to market demand, to be completed by 1998. A preliminary estimate of construction cost for the 450 units and associated amenities is $67,000,000. There is no budget for the 200 additional units, but an order-of-magnitude construction cost is about $20,000,000 in 1987 dollars.
4.0 NEED FOR THE PROJECT

The Ritz-Carlton Hotel Company's objective is to construct a world-class hotel in Hawaii which would maintain the high standards established by Mauna Lani Resort and those which characterize other Ritz-Carlton hotels. Given that successful luxury resort hotels in Hawaii have all been ocean-oriented developments with shoreline amenities, The Ritz-Carlton Hotel Company feels that it is absolutely essential to have shoreline amenities for its guests in order to compete with similar resort hotels in Hawaii. These amenities include cleanup of the beach area, an expanded shoreline beach, and a new safe swimming lagoon.

The shoreline fronting the hotel site, although attractive in its natural form, does not provide safe access to swimming areas and does not have the type of sand beach suitable for sunning. Development of the hotel with shoreline improvements is necessary for the economic viability of the Ritz-Carlton Mauna Lani in the luxury hotel category.

5.0 SUMMARY OF IMPACTS

5.1 PHYSICAL ENVIRONMENT

The project site has low value as agricultural land and thus the project site will not be lost to potential agricultural development. Construction of the Ritz-Carlton Mauna Lani will actually increase demand for locally grown agricultural products.

The project site will be transformed by grading, the importation of soil and landscaping.

5.2 NEARSHORE AND MARINE ENVIRONMENT

Construction of the three shoreline projects and excavation and embankment work required for the hotel and landscaping on the balance of the hotel site will affect ocean and anchial ine pond water. The primary effect of construction on ocean water quality is a temporary increase in turbidity. The effects of temporary loading of suspended and bedload sediment on the marine biological community are not expected to be significant because the community is already chronically subjected to high turbidity events. Construction activity will occur during a relatively short period of time and is expected to have some impact on marine organisms in general, but minor impact on endangered species (humpback whales and green sea turtles). Pumping of accumulated sediment from the fishpond will be accompanied by the release of gases and a high level of turbidity in the pond. Less mobile fauna will be sucked up by the dredge pump in the process.

Permanent impacts on the nearshore and marine environment include alteration of the shoreline, changes to the anichialine pond environment and increased recreational use of the bay. For the proposed swimming lagoon and beach expansion, material will be removed, sand will be brought in, new beach front will be added, and a safe swimming area will be created. The shoreline area will be upgraded through cleanup and expansion of its use.
5.3 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Historic preservation reviews with the State Historic Preservation Office, Department of Land and Natural Resources, are ongoing. One site, E1-305, has been assessed by the Office as being "no longer significant". Sites E1-304, E2-32 and E2-33 are deemed to be significant solely for their information content. There is a "no adverse effect" (or "beneficial effect") determination for Keanapou fishpond, contingent on proper restoration. The State Historic Preservation Office's proposed mitigation plan, as approved by the Hawaii County Planning Department, will be implemented by the applicant.

5.4 SOCIOECONOMIC CONSIDERATIONS

The average daily visitor census at the 450-unit hotel is expected to be about 600 guests; with the additional units, it is expected to be about 865 guests.

Both construction period and operational period employment will be generated as a result of hotel development. There would be an average of 240 on-site workers during construction of the 450-unit hotel and 80 on-site workers during construction of the additional 200 units. There would also be indirect and induced employment generated off-site. Initial staffing of the hotel calls for about 630 full-time jobs plus 66 part-time or casual jobs. Because of the need for immigrants to fill some of the positions, population on-island will increase (employees and their families). Workers new to the island would need housing; because of their household income, some would require assisted housing.

The revenue-cost ratio is favorable: $3.20 of revenue for every $1.00 of cost to the State and County of Hawaii.

5.5 TRANSPORTATION FACILITIES

The roadway system will be impacted by the hotel development. There will be increased traffic due to vehicular trips by visitors and residents (employees and their families). The effect due to hotel construction and operation is expected to be minor; however, the cumulative effect of resort and residential development in the West Hawaii region is expected to be significant.

5.6 AIR QUALITY AND NOISE

The greatest impact on air quality will be from increased traffic, both during the construction and operational phases of development. Due to the small scale of the Ritz-Carlton Mauna Lani project, increased air pollution due to the project is not expected to be substantial. Noise impacts are likewise to be temporary or minimal.

5.7 PUBLIC SERVICES AND FACILITIES

Development of the hotel project will increase the demand for public services and facilities, mostly by new residents to the region. It is expected that most of this demand can be met within planned facilities.
5.8 **VISUAL CHARACTER**

The visual character of the project site will be transformed from a sparsely vegetated lava field to a developed landscaped area with six-story structures. Views of the site from public places will change. From Queen Kaahumanu Highway, the hotel will be over a mile and a half away. From the shoreline, the hotel will be visible, but framed against the gently sloping land behind it.

6.0 **SUMMARY OF PROPOSED MITIGATION MEASURES**

Mitigation measures to reduce potential significant environmental effects to insignificant levels will be taken both in the short-term during construction and in the long-term during operation of the hotel. The most important of these measures are summarized below.

- A mitigation plan proposed by the State Department of Land and Natural Resources will be implemented if significant sites are to be impacted. This plan and significance assessments need approval of the Hawaii County Planning Department or County Planning Commission.

- Offshore waters will be monitored for any potential adverse impacts due to construction of shoreline improvements. Precautions will be taken during construction to minimize impact on the marine environment, including endangered species. If required, silt screens will be used to contain excavation materials and particulates. If used, blasting will be done in a way to minimize impacts on the marine environment.

- The applicant will implement an appropriate monitoring program for offshore waters after construction as well as during construction, according to government permit conditions.

- Mauna Lani Resort, Inc. is working with governmental agencies on a housing plan to provide employee housing for those Ritz-Carlton Mauna Lani operational period employees in need of assistance.
7.0 SUMMARY OF ALTERNATIVES

In addition to the proposed alternative, several other alternatives were considered but rejected as not meeting the objectives of the action: to construct a world-class hotel in Hawaii with amenities essential to its success:

- No development at the project site, which would not allow the Mauna Lani Resort master plan to be implemented.
- Other use of the hotel site for higher density resort use or for use by facilities other than a hotel.
- Development of the hotel without shoreline improvements.
- Development of the site as proposed plus partially filling in the fishpond.
- Alternative lagoon design with two narrow openings.
- Location of the swimming lagoon elsewhere at Pauoa Bay.

8.0 SUMMARY OF UNRESOLVED ISSUES

- Impact of shoreline modifications on Pauoa Bay waters.
- Impact of shoreline modifications on marine species, including endangered species.
- Parameters of a shoreline area monitoring program.
- Availability of adequate employee housing.
- Location of off-site population growth and facilities.
- Transportation improvements required.
- Traffic study assumptions.

9.0 SUMMARY OF COMPATIBILITY OF LAND USE POLICIES AND PLANS

The project is basically consistent with State and County land use plans and policies.
### 10.0 NECESSARY APPROVALS AND PERMITS

Several approvals and permits are required for the project to proceed. These include plan approval; subdivision approval; building permit; grubbing, grading, excavation, and stockpiling permit; outdoor lighting permit; sign permit; and water system approval; all from agencies of the County of Hawaii. Also needed is drinking water system approval from the State Department of Health.

The major approvals needed are listed below:

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CHAPTER II
CHAPTER II
DESCRIPTION OF THE PROPOSED PROJECT

1.0 REGIONAL SETTING

The 32-acre site (identified by Tax Map Key as TMK 6-8-22:08, pors. 07, 09, 10 and 11) of the proposed Ritz-Carlton Mauna Lani fronts the shoreline at Paunia Bay and is located at the northwestern corner of the Mauna Lani Resort. The existing Mauna Lani Bay Hotel is situated approximately 2,400 feet south of the project site. In general, the 1,432-acre master planned Mauna Lani Resort is located between the Puako Beach Lots and the Waikoloa Beach Resort on the South Kohala coast of the Island of Hawaii (see Figure II-1). South of the Waikoloa Beach Resort, the coastline remains mostly undeveloped for many miles; Hapuna Beach State Park and Mauna Kea Beach Resort are to the north of the Puako Beach Lots. Kawaihae Harbor, West Hawaii’s major port facility, is six miles north of Mauna Lani Resort. Waimea, the Kohala district commercial center, is approximately 12 miles to the northeast.

The South Kohala coastline, from the district boundary north to Kawaihae Harbor, has long been recognized as a desirable location for the development of large-scale resort activities. It has been designated by the State of Hawaii and the County of Hawaii in their various plans as a major resort region. The Hawaii County General Plan, adopted in 1971 and updated three times since, designates Puako, including the Mauna Lani Resort site, as a "Major Resort Area", a "self-contained resort destination area which provides basic and support facilities for the needs of the entire development".

Substantial investments have been made in the public infrastructure needed to stimulate and support resort development in the West Hawaii Resort Region. These include the construction of the Queen Ka'ahumanu Highway, Keahole Airport and the Laiamilo Water System, as well as improvements to Kawaihae Harbor. In conjunction with these government-sponsored efforts, private landowners have prepared and begun implementation of plans for large resort complexes along the South Kohala coastline. Aggregate private expenditures on infrastructure for the resorts far exceed $100-million to date.

Mauna Kea Beach Resort was the first of the three major resort projects to establish its presence in South Kohala. The world famous Westin Mauna Kea (formerly the Mauna Kea Beach Hotel) and golf course were constructed in the mid-1960's, and 65 single-family house lots (The Fairways North and South) and 40 condominium units (the Villas) have subsequently been developed. As is Mauna Lani Resort, Mauna Kea Beach Resort is designated as a major resort in the County General Plan. The owner of Mauna Kea Resort, UAL, Inc., is currently seeking final County approvals to develop a separate resort, to be called South Kohala Resort, on its State urban designated lands south and mauka of the existing Mauna Kea Resort. South Kohala Resort will include a 350-room hotel and 700 to 1,000 single-family and multifamily resort-residential units on both sides of Queen Ka'ahumanu Highway.
The third major resort in the Kohala Coast Resort Region, the Waikoloa Beach Resort, is being developed by Transcontinental Development Co., which has been responsible for construction of the resort's infrastructure and provision of common recreational facilities such as the resort golf course. Individual hotel and resort condominium projects are developed on parcels within the resort by separate business entities. The resort includes the 543-room Sheraton Royal Waikoloa hotel and the 114-unit "Shores at Waikoloa" resort condominium project. Under construction is the 1,250-room Hyatt Regency Waikoloa Hotel at Waikoloa Bay, which is slated to open by the end of 1986.

2.0 HISTORY OF MAUNA LANI RESORT

Mauna Lani Resort, Inc. views the development of Mauna Lani Resort as a long-term commitment to create a preeminent world-renowned, luxury destination resort at Kalahuipua'a. Envisioned is a very low density, low profile development which incorporates hotel, residential, recreational and support facilities into an integrated high-quality resort community. Mauna Lani Resort, Inc. is carrying forward and refining the original version of a master planned luxury resort residential community first conceived by Francis I'i Brown in the late 1960's.

In 1972, Orchid Island Resorts (the predecessor of Mauna Loa Land, Inc., in turn the predecessor of Mauna Lani Resort, Inc.) acquired fee title to 3,200 acres of land along the South Kohala coast, 175 acres from Francis I'i Brown and the balance of 3,025 acres from Signal Properties (former Parker Ranch land). Also in 1972, Orchid Island Resorts assumed the lease of 775 adjacent acres of State-owned land from Signal Properties.

When the resort property was acquired by Orchid Island Resorts, only 164.5 acres of land immediately surrounding the Kalahuipua'a fishponds were in the State Urban District. In December 1974, the State Land Use Commission reclassified 614 acres slotted for resort use to the Urban District. More recently, in 1986, the Commission reclassified an additional 654 acres from Agriculture and Conservation to Urban, which allows Mauna Lani Resort to move forward with development according to its revised master plan (see Figure B-2). We request for rezoning to accommodate the revised master plan is currently being processed by the Hawaii County Planning Department.

Completed to date are the 351-room Mauna Lani Bay Hotel, the 80-unit Mauna Lani Terrace condominium project, and 116 Mauna Lani Point condominium apartment units. Also part of the existing resort are the award winning Francis I'i Brown championship golf course, golf clubhouse, beach club, racquet club, and other recreational amenities. Various archaeological features and refurbished Hawaiian fishponds are integrated into the overall design of the resort.

Near future plans for development at Mauna Lani Resort include the construction of the Ritz-Carlton Mauna Lani hotel and shoreline improvements at Pa'aua Bay, a second golf course, and a public shoreline park north of Pa'aua Bay; as well as the construction of the next increment of residential units or lots.

II-3
3.0 DEVELOPMENT CONCEPT

3.1 STATEMENT OF OBJECTIVE

The Ritz-Carlton Hotel Company proposes to develop a luxury-class hotel at Pauoa Bay which would be an integral part of Mauna Lani Resort as well as an integral part of the Ritz-Carlton family of hotels. The Ritz-Carlton Hotel Company is recognized in the travel and hotel industry as the successful operator of the finest hotels in each of its chosen localities. Ritz-Carlton Mauna Lani will serve the luxury resort market and reflect the relaxed, comfortable ambience characteristic of Ritz-Carlton hotels, be they urban or resort facilities.

3.2 DESCRIPTION OF PROPOSED DEVELOPMENT

3.2.1 Hotel Concept Plan

The Ritz-Carlton Mauna Lani concept plan focuses on two wings of guest rooms, each perpendicular to the shoreline and connected to the main lobby in the entrance building which will be fronted by a porte cochere. The hotel wings will be six stories and enclose a landscaped courtyard and swimming pool area. Parking will be landscaped and located near the hotel entrance. Amenities at the hotel will include retail shops, tennis courts, health club, luau area, banquet and meeting rooms, swimming pool, a landscape water feature, and a swimming lagoon and swimming area (see Figures II-3 to II-7).

The buildings will be of classical Hawaiian architectural design, reminiscent of buildings constructed during the early part of the century, such as the Honolulu Academy of Arts, the Alexander & Baldwin building, and the Dillingham Transportation building. These buildings successfully integrate both Oriental and European elements into an overall design particularly suited to the Hawaii environment. The proposed Ritz-Carlton Mauna Lani will also reflect this unique blend of design elements in a classical Hawaiian design with strong visual appeal.

Initially, 450 units will be constructed in the two wings of the hotel. As market demand dictates, 200 additional units will be built in low rise clusters around the landscape water feature. Facilities such as restaurants and shops to serve the guests in the additional units will be located in the main hotel buildings. It is anticipated that the additional units will be built 5 to 8 years after completion of the initial construction.

Successful luxury resort hotels in Hawaii are almost without exception water-oriented, that is to say they are built near the shoreline and most often sandy beach areas. The Ritz-Carlton Mauna Lani site presents a natural setting particularly well suited to resort development. Although the shoreline is rocky, it is visually spectacular and portions can be improved to provide the water amenities necessary for a successful Hawaii development aimed toward the first class to luxury market. To enhance the natural environment and to provide beach recreational areas, Ritz-Carlton proposes to excavate a seawater swimming lagoon, restore an adjacent anchialine pond (a historic fishpond as assessed by the State Department of Land and Natural Resources), and expand and improve an existing shoreline beach. The
anchialine pond and beach improvement area are partially off the Ritz-Carlton Mauna Lani site and on land owned by Mauna Lani Resort. The shoreline and nearshore improvements are described in detail in Section 3.2.2 of this chapter.

Vehicular access to the Ritz-Carlton Mauna Lani site will be from a landscaped entry drive which will turn off from the main resort road from Queen Kaahumanu Highway, Mauna Lani Drive.

Public access exists along the shoreline of the project site by way of an unimproved pedestrian pathway which extends along the entire Mauna Lani Resort shoreline from Honokaope Bay to north of Pauoa Bay. The shoreline path at the Ritz-Carlton Mauna Lani site will be improved to enhance traversability and will be rerouted around the swimming lagoon. Since it is the applicant's intent to keep the pedestrian shoreline trail as natural looking as possible, improvements will involve mostly cleaning and raking. Public parking will be available at the public shoreline park to be developed by Mauna Lani Resort on a parcel adjacent to the Ritz-Carlton Mauna Lani site. The park parcel will also include holes 9 and 10 of the new resort golf course (see Figure II-8). Park facilities will include a comfort station and showers, picnic facilities, and parking for 29 vehicles (12 stalls to be built initially). In addition to providing a link to the shoreline trail which passes through the Ritz-Carlton Mauna Lani site, the public park and parking will also improve access to the Puako petroglyph fields, north of the park.

3.2.2 Shoreline and Nearshore Improvements

Three projects are proposed for the shoreline and nearshore area: (1) excavation of a seawater swimming lagoon; (2) restoration of the existing anchialine pond; and (3) expansion of the existing shoreline beach. Although described separately below, these projects are contiguous and have been designed as an integrated improvement for the southwest corner of the site.

3.2.2.1 Seawater Swimming Lagoon

The seawater swimming lagoon would be excavated into the land area behind the existing beach to form an arcuate-shaped embayment of suitable depth for swimming. Its dimensions and design features are shown on Figures II-9 and II-10 and include:

- a 360-foot long crescent beach with 1.1 acres of sand above mean sea level;
- a relatively flat (9:1) beach slope from the bottom of the lagoon at -6.0 feet (msl) to the top of the beach slope at 6.0 feet;
- a 0.8 acre inland swimming area with a flat, sand bottom at -6.0 feet;
- a 110-foot wide opening to Pauoa Bay through the existing shoreline;
- a 50-foot wide flushing channel excavated toward the center of Pauoa Bay to a depth of -6.0 feet;
- and basalt armor stone installed on both sides of the lagoon opening to ensure stability of the existing shoreline.
The size of the opening and configuration of the lagoon have been designed to allow sufficient penetration of wave energy to maintain the beach slope, enhance circulation, and remove suspended fines from the lagoon. The flushing channel is an important part of this design. It will also allow access for swimmers to deeper water in the bay.

Total excavation will amount to approximately 18,000 cubic yards. Only 1,600 cubic yards of this will be seaward of the certified shoreline. (For the purposes of this report, the area seaward of the certified shoreline is considered to be State owned land and the area inland to be privately owned land.) Also, 5,000 cubic yards of imported, calcareous beach sand will be required, 300 cubic yards to be placed seaward of the shoreline and the balance inland. The armor stone for the lagoon entrance is likely to be obtained from the material excavated from the lagoon. However, there are other sources of rock within the Mauna Lani Resort property. Construction is likely to proceed as follows:

- excavation of the inland lagoon, leaving the existing shoreline intact as a barrier to prevent loose material from escaping into the bay;
- pumping of all settled fines from the excavated area into a temporary settling basin on the Ritz-Carlton site, away from archaeological sites, in preparation for its ultimate land disposal;
- removal of the natural shoreline berm and excavation of the flushing channel;
- construction of the rubble masonry wall around the perimeter of the anchialine pond;
- and placement of the imported clean beach sand on the bottom of the lagoon and on its beach.

Based on experience gained during construction of the Mauna Lani Bay Hotel and beach at Makena Bay, it is expected that most of the excavation can be accomplished by bulldozers equipped with rippers. Some blasting is likely to be required, however. As this is a more expensive construction method, its use would be dictated by necessity. If needed, small 10 to 15-pound explosive charges will be used as a last resort to fracture hard spots which resist breakage by hydraulic ram. Hydraulic shovels would then be used to continue ripping and grading.

The source of sand for the lagoon's beach has not been chosen yet. Specifications will require clean, calcareous, medium to coarse grained sand which is free of fines, organic, and terrigenous material. It is likely that the sand will come from off-island, perhaps Makaleia on Oahu or from Molokai, although unlikely from Hoomoni on Molokai. In the final analysis, economics including the cost of permitting will dictate the source of sand.

3.2.2.2 Anchialine Pond Restoration

Work to restore the anchialine pond (the Keanapou fishpond) would consist of removing the surrounding, thick growth hau trees, sedges, and
coconut trees and pumping out the accumulated sediment in the pond itself. Other tasks related to historic site restoration and preservation are described in Section 1.7.3 of Chapter IV. The pond is actually a series of depressions in a large, elliptical shaped depression which is approximately 200 by 100 feet. Due to the present accumulation of sediment, only a small part of the pond currently has free standing water.

Excavation of the adjacent swimming lagoon will bring the seawater shoreline closer to the pond. The present shoreline is approximately 100 feet from the seaward edge of the pond. The swimming lagoon shoreline would be 45 feet from the edge of the pond. A possible result is an increase of salinity in the pond. The salinity is currently quite low, varying from 2.0 to 4.0 parts per thousand (ppt) seasonally. If it increases above 10 ppt as a result of the lagoon excavation, curtain grouting would be undertaken to reduce the extent of salinity intrusion. Closely spaced holes would be drilled along a line midway between the lagoon and pond and cement grout would then be pumped into these holes (see Figure II-11). Work would proceed in a controlled manner so that the effects can be monitored. The objective would be to achieve a pond salinity of below 10 ppt.

3.2.2.3 Expansion of the Shoreline Beach and Creation of a Swimming Area

The existing beach is limited in size, is bisected by a lava outcrop and grouted rock wall, and is fronted by a shallow, rocky bottom. To improve its appearance and recreational potential, work would include removal of the rock wall and the outcrop on which it is built, excavation of a swimming area and flushing channel in front of the beach, and importation of sand to cover the bottom of the swimming area and the backshore area behind the beach.

The beach improvement is designed to take advantage of the lava outcrops on and offshore which provide protection against waves and wave-driven currents, thereby creating the conditions necessary for beach stability. The swimming area would be deeper than the immediately adjacent areas in the bay, thereby acting as a trap for sand which may be eroded from the beach during occurrences of high waves. However, the flushing channel is also required to aid circulation and to remove silt and clay-sized particles which would otherwise accumulate during normal wave conditions.

The expanded beach would have a 300-foot long shoreline, 1.0 acre of beach area, and a 0.7-acre swimming area with a depth of 6.0 feet. Construction is likely to proceed as follows:

- if required, installation of a silt curtain around the perimeter of the offshore excavation area;
- removal and stockpiling of the existing beach sand;
- excavation of the offshore swimming area and flushing lagoon;
- shaping of the basement rock beneath the beach to a flatter, 9:1 slope;
pumping of accumulated fines in the swimming area to a temporary onshore settling basin preliminary to its ultimate land disposal (avoiding archaeological sites); and

placement of sand on the beach and in the swimming area.

As with the lagoon project, it is expected that most of the excavation can be accomplished with bulldozer and ripper. Low level blasting may also be required but its use would be limited. Total excavation would be approximately 6,000 cubic yards; 5,000 cubic yards of this will be from areas seaward of the certified shoreline. Sand for the project will amount to 4,200 cubic yards, an estimated 2,300 cubic yards of which will have to be imported from off-island. About 65 percent of the total sand amount will be placed seaward of the shoreline and the balance will be placed inland. The balance of the sand will come from the existing beach.

3.3 NEED FOR THE PROJECT

In conjunction with Mauna Lani Resort, Inc.'s request for State land use reclassification in 1985, Ming Chew Associates prepared a market analysis of the demand for resort facilities at Mauna Lani Resort. Assumptions and conclusions of the market study were used in refining the conceptual land use plan for the resort, which encompasses the Ritz-Carlton Mauna Lani project site. Given the relative abundance of beachfront and oceanfront sites at Mauna Lani Resort and the diminishing number of comparable sites elsewhere in the resort region, Ming Chew Associates estimated the demand for transient units at 2,000 units by 1990, 1,100 units by 1995, and 1,600 to 2,000 units by 2000 (Ming Chew Associates, 1984:p. 42). Ming Chew Associates anticipated that the next hotel to be built at Mauna Lani Resort would be in the same luxury category as the existing Mauna Lani Bay Hotel.

The proposed Ritz-Carlton Mauna Lani will be targeting a market similar to that of Mauna Lani Bay Hotel. Also, it is anticipated that additional demand will be created by visitors who have been guests at other Ritz-Carlton hotels and who seek Ritz-Carlton accommodations in a Hawaiian setting.

The Ritz-Carlton Hotel Company operates several world-class urban and resort hotels. Given that successful luxury resort hotels in Hawaii have all been oceanfront developments with shoreline water amenities, The Ritz-Carlton Hotel Company finds it essential to have shoreline amenities for its guests in order to compete with similar resort hotels in Hawaii. Moreover, other Ritz-Carlton resort hotel projects have swimming beaches and The Ritz-Carlton Hotel Company wishes to maintain the consistency.

The shoreline fronting the hotel site, although attractive in its natural form, does not provide safe access to swimming areas and does not have the type of sand beach suitable for sunning. Development of the hotel with shoreline improvements is vital for the economic viability of the Ritz-Carlton Mauna Lani in the luxury hotel category. The hotel must provide what is perceived to be a "Hawaii experience" to attract guests for the first time. Providing ocean experiences is necessary to ensure that the hotel will develop a following of guests who will return to the Ritz-Carlton Mauna Lani year after year.
3.4 PROJECT SCHEDULE AND CONSTRUCTION COST

Construction of the 450-unit hotel and associated facilities, grounds, and shoreline improvements are expected to begin in late 1987 and be complete by the end of 1989 or the beginning of 1990. There is no current budget for the construction of the 200 additional units, given the uncertainty of future costs and economic and market conditions. A rough cut estimate for the additional units is on the order of magnitude of $20,000,000 in 1987 dollars.

A preliminary estimate of construction cost for the first increment is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel (450 rooms)</td>
<td>$61,000,000</td>
</tr>
<tr>
<td>Landscape, hardscape, decks, beaches</td>
<td>$ 6,000,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$67,000,000</strong></td>
</tr>
</tbody>
</table>
CHAPTER III
CHAPTER III
ALTERNATIVES TO THE PROPOSED ACTION

1.0 INTRODUCTION

Chapter 200 of Title II, Department of Health Environmental Impact Statement Rules, states that "The draft EIS shall contain any known alternatives for the action. These alternatives which could feasibly attain the objectives of the action (emphasis added) — even though more costly — shall be described and explained as to why they were rejected". The Ritz-Carlton Hotel Company's objective is to construct a world-class hotel in Hawaii with amenities which it considers to be essential to the successful operation of such a facility. Various alternatives were considered, but rejected. They were all either not feasible from an engineering viewpoint or did not meet the client's stated objective.

2.0 ALTERNATIVES CONSIDERED

2.1 PROPOSED ACTION: DEVELOPMENT OF HOTEL WITH SHORELINE AMENITIES AS DESCRIBED

The proposed action is described in detail in Chapter II of this report and includes the construction of a luxury hotel and improvements in the shoreline area. The latter consist of excavating a seawater swimming lagoon with a 110-foot wide opening and a 50-foot wide flushing channel, restoring an existing anchialine pond (Keenapou Fishpond), and expansion of an existing shoreline beach. This action is thought to be the optimal solution in meeting the development objective while minimizing the long-term impact to the environment. No significant adverse impacts are expected; at the same time, with such amenities, the project is expected to be an economically viable one.

2.2 NO PROJECT ALTERNATIVE: NO DEVELOPMENT AT PROJECT SITE

This alternative precludes any development at the project site, leaving the parcel in its natural state. No further expenditures by the resort developer, hotel operator, or public agency would be required. The nearshore waters and archaeological sites would be undisturbed. At the same time, any economic benefits that would be derived from the development of the site would not be realized.

The alternative of no development at the project site was rejected because it does not allow the Mauna Lani Resort master plan to be implemented. The master plan has been approved by government agencies and Mauna Lani Resort is committed to moving forward with the plan, which includes development of the project site by a hotel operator.
2.3 OTHER USE OF PROJECT SITE

2.3.1 Higher Density Resort Use

County zoning allows development of the project site at much higher density than proposed. Higher density hotel development would not be in character with existing development at Mauna Lani Resort, nor would it be appropriate for the type of luxury facility with which The Ritz-Carlton Hotel Company is associated. This alternative was rejected as not being a viable, marketable economic solution.

2.3.2 Use of Site for Facilities Other Than Hotel

The Ritz-Carlton Mauna Lani could locate to another site at Mauna Lani Resort planned for hotel development. The Pa'aua Bay parcel, under V-1.25 zoning, would be permitted by the County zoning ordinance to be put to other uses. These include residential development, open-air theaters, and tourist information facilities and offices. Mauna Lani Resort had considered other uses for the beachfront property during its original planning prior to the 1980's and has since determined that a resort hotel is the most suitable use for the property. The current master plan designates the subject parcel for hotel use. Further, given the choice of other Mauna Lani Resort development parcels, the Ritz-Carlton Hotel Company found the proposed Pa'aua Bay site to best suit its development needs for an ocean-oriented luxury resort hotel.

2.4 ALTERNATIVES WITH DIFFERENT SHORELINE TREATMENT

2.4.1 No Shoreline Improvements

With this alternative, a hotel would be developed at the project site and no improvements made to the shoreline area. All of the shoreline at the Pa'aua Bay site would remain in its natural state. Although no significant long-term impacts are expected as a result of the proposed improvements to the shoreline area, without them there would be no impacts except for those associated with increased use of the natural shoreline area by hotel and resort guests and the general public.

Under this alternative, however, public shoreline access would not be improved and there would be no safe swimming area and sandy beach areas for guest and public use. Moreover, the Ritz-Carlton Hotel Company's overall concept for a luxury resort hotel at the Pa'aua Bay site includes shoreline improvements which it sees as essential to ensure its competitiveness with similar oceanfront resort hotels in Hawaii, and to maintain consistency with other Ritz-Carlton resort hotel projects. The Ritz-Carlton Hotel Company would not undertake the development of the Pa'aua Bay site without improving the shoreline area. The alternative of no shoreline improvements was thus rejected as infeasible with The Ritz-Carlton Hotel Company as hotel developer and operator. This alternative might be possible with another hotel operator, but is not likely to be. It should be noted that Mauna Lani Resort has signed an agreement with The Ritz-Carlton Hotel Company to develop the Pa'aua Bay site, which precludes consideration of other hotel proposals.
2.4.2 Partially Fill In Fishpond

This option is essentially the same as the proposed action modified by filling in half of Keanaopu Fishpond. The result would be a slightly larger swimming lagoon and beach area — 1.3 acres of sand beach above the shoreline as opposed to 1.1 acre, and 1.1 acre of swimming area below the shoreline as opposed to 0.8 acre. This alternative would entail excavating 24,500 cubic yards of material versus 18,000 cubic yards, and importing 6,100 cubic yards of sand versus 5,050 cubic yards according to the proposed action. Partially filling in the fishpond would also be more costly.

This alternative was rejected because the anchialine pond, Keanaopu Fishpond, is considered by the State Department of Land and Natural Resources (DLNR) to be significant for its information content and as a good example of a site type. DLNR states that there would be a beneficial effect, a "no adverse" effect if the fishpond is restored properly (Ralston Nagata, April 13, 1987).

Essentially the same result of providing a safe swimming area and attractive sandy beach area, although at a somewhat smaller scale, would be achieved with the proposed action rather than this alternative, without sacrificing the aesthetic and recreational values of the swimming lagoon.

2.4.3 Swimming Lagoon with Two Openings

After detailed engineering study, the alternative originally proposed and described in the EIS Preparation Notice has since been rejected in favor of the proposed action as described in this report. The earlier design concept included two openings from a 1.3-acre lagoon to the ocean — a 30-foot opening and a 50-foot opening — with pedestrian bridges. Also part of this alternative was a wall near the lagoon to be installed to pump salt water into the inland water feature to aid the natural tidal exchange between the lagoon and ocean.

The engineering study ascertained that the two openings were too narrow to allow sufficient penetration of wave energy to maintain the beach slope, enhance circulation and remove suspended fines from the lagoon. There would be no flushing channel to allow swimmers access to the deeper bay water.

Given the disadvantages of this alternative, the shoreline improvements were redesigned to optimize hotel guest and public use of the shoreline while presenting a viable engineering solution to providing water related amenities with minimal long-term effect.

2.4.4 Swimming Lagoon Elsewhere at Pauoa Bay

After engineering evaluation of the hotel site, it was concluded that the proposed location of the swimming lagoon is the only location feasible for constructing and maintaining such a lagoon. At a location further north along the shoreline, there are no natural features where rocks could be installed on both sides of the lagoon opening to ensure stability of the existing shoreline. These natural features are present at the proposed lagoon site. Also, further north, a sandy beach would have to be created to provide a shoreline
beach, whereas at the proposed site, an existing beach would be improved. The location of the existing beach and the presence of the shoal area directly offshore would ensure stability of the beach, which would not be the case further north at the project site.

The overriding design concern is the stability of sand beaches, which led to the rejection of this alternative and the recommendation to construct the proposed improvements as described in this report.
CHAPTER IV
DESCRIPTION OF THE AFFECTED ENVIRONMENT
AND PROBABLE ENVIRONMENTAL CONSEQUENCES

1.0 PHYSICAL ENVIRONMENT

1.1 PHYSIOGRAPHY, GEOLOGY, SOILS AND CLIMATE

1.1.1 Existing Conditions

1.1.1.1 Physiography

Mauna Lani Resort is situated on the South Kohala coast of the island of Hawaii at the base of a gradually rising plain surrounded by four volcanoes: the Kohala Mountain (5,480 feet), Mauna Loa (13,677 feet), Mauna Kea (13,796 feet), and Hualalai (8,271 feet). The 32-acre Ritz-Carlton project site is located at Pauoa Bay in the northwestern portion of the Mauna Lani property, in an area that slopes gently seaward. The overall slope of the land is generally less than 10 percent. Its topographic relief results from the layering and buckling of successive lava flows rather than from erosion. Construction of the existing Mauna Lani Bay Hotel, its adjoining golf course, the Mauna Lani Terrace and Mauna Lani Point condominiums, various roadways, and additional site improvements, have contributed to the modification of the natural topography in the general resort area.

1.1.1.2 Geology

All of the surrounding mountains are of volcanic origin. Kohala Volcano is considered by many to be extinct, not having erupted for at least 10,000 to 15,000 years. Mauna Kea, the next oldest, has not erupted in historic times, but there is evidence that it has been active within the past 5,000 years. Hualalai last erupted during 1800-1801 and will probably erupt again within the next two hundred years according to geologist Richard Moore of the Hawaiian Volcano Observatory; however, due to the general topography of the surrounding area, none of the more recent Hualalai flows have come within five miles of the Mauna Lani Resort site.

There have been 36 historic eruptions of Mauna Loa, the last multi-phased eruption occurring in 1985. Of these, however, only the 1859 eruption flowed to the South Kohala coastline via the Hualalai-Mauna Kea saddle. This flow reached the sea just south of 'Anaeho'omalu Bay, some three miles south of the Mauna Lani Resort. Most of the more recent flows from Mauna Loa have been either to the west toward the South Kona District or to the east toward Hilo (Mullineaux and Peterson, 1974; Stearns, 1946; and MacDonald, 1970).

The pre-historic Mauna Loa flows, which cover about two-thirds of the Mauna Lani Resort parcels, are all basaltic lava; they have not been weathered to any appreciable extent and have little or no soil cover. The most prominent of these flows is the prehistoric Kaniku Flow, which covers nearly the entire portion of the parcel south of Makaiwa Bay. It is estimated to be nearly 1,000 years old.
The only exposed lava on the site that is not from the Mauna Loa volcano is also the oldest. It is an extensive pahoehoe flow from the Mauna Kea volcano, that reached the sea from Makaiva Bay on the south to at least Puako Bay on the north. The entire Ritz-Carlton project site is set in this flow.

The United States Geological Survey (USGS) has assessed the relative risk from volcanic hazards for most areas of the Island of Hawaii (Mullineaux and Peterson, 1974). Its classification includes six degrees of risk, with "A" being the lowest and "F" the highest. Because it is on the flank of Mauna Loa, the island's second most active volcano, the southern portion of the Mauna Lani Resort property is in zone "E". Mauna Kea, which has a very low probability of erupting, protects the northern portion of the Mauna Lani Resort site from Mauna Loa eruptions. As a result, that portion is in zone "B".

The fact that the zones distinguish only between differences in relative risk must be emphasized. In reality, data from the historical period indicates that the probability of flows from Mauna Loa damaging development within the Mauna Lani Resort is slight, although such an occurrence cannot be completely discounted.

1.1.1.3 Soils

As suggested by its geologic history, soils on the Ritz-Carlton site are thin and poorly developed. Two different soil and land types have been identified on the site by the U.S. Department of Agriculture Soil Conservation Service (SCS) (December 1973). Neither is agriculturally significant. Although not identified on the SCS map, sand is present at the Pauoa Bay boundary of the project site.

(1) Pahoehoe Lava Flows: Pahoehoe lava flows (rLW), a miscellaneous land type with meager soil covering, extends over nearly the entire hotel site. The surface of the pahoehoe lava is generally much smoother than that of adjacent a'a lava flows, but it is also broken and pockmarked by numerous pressure domes, cracks, and lava tubes. The only soil in this land type is generally found in these cracks and depressions, having been transported there by wind and storm water runoff. However, the aged pahoehoe flows on the Ritz-Carlton site have slowly eroded over time, and are now almost entirely covered by fountain grass. In addition, a dense Kame forest covers the northeastern portion of the site.

(2) Rock Land: Also a miscellaneous land type, rock land (rRO) consists of pahoehoe bedrock covered in places with a thin layer of transported soil. Lava outcrops are exposed over 50 to 90 percent of the surface. The little soil that is present is generally confined to holes and cracks in the bedrock. Rock Land covers a small portion of the Ritz-Carlton property extending northeast from the rear property line into the Mauna Lani Resort.

(3) Beach Areas: Pauoa Bay is the seaward boundary of the project site and contains a sand lined beach (BH) area interrupted by lava outcrops. The sand is coarse-grained and well sorted, with a "salt and pepper" appearance, indicative of its mix of particles of marine origin and black basalt chips. The northern portion of the bay's shoreline is covered with an accumulation of coral rubble washed ashore during periodic storm wave activity.
1.1.1.4 ALISH Classification

Three classes of agriculturally important lands have been established within the Agricultural Lands of Importance to the State of Hawaii (ALISH) system: (1) Prime Agricultural Land, (2) Unique Agricultural Land, and (3) Other Important Agricultural Land. None of the land within the proposed project site is classified in the ALISH classification system due to its unsuitability for agricultural use.

1.1.1.5 Climate

The Ritz-Carlton resort site has a hot, arid, savanna-like climate. Close to the shoreline, sea breezes serve as a moderating influence on temperature. Mean annual temperature in the area is about 78 degrees F., with relatively small daily and seasonal fluctuations. Daytime temperatures above 90 degrees F. or nighttime lows below 63 degrees F. are extremely rare. Average summer temperatures are only four degrees higher than those in winter.

The Mauna Lani Resort area is one of the driest on the island and within the State. Average annual rainfall at the Weather Bureau’s Funko gauge is about nine inches. Most of this rainfall typically occurs during a few storms in the October-to-April winter season, with one or two unseasonable rains at other times. Intense storms along the Kohala coast are rare.

Airflow is most commonly onshore from mid-morning until just before sunset and offshore from early evening until the following morning. This diurnal pattern contrasts with the relatively constant northwest tradewinds prevalent in most other areas of the State. The average wind velocity is also less — 7 to 8 mph for the land-to-sea breeze compared with 12 to 14 mph for the tradewinds. However, gusty winds blowing through the saddle between the Kohala and Mauna Kea mountains do reach the shoreline under certain atmospheric conditions.

Relative humidity is generally low, commonly under 40 percent during the late morning and afternoon hours of warm, cloudless days. The humidity is also relatively constant year-round, showing a significant smaller summer-winter difference than is common elsewhere.

1.1.2 Physiographic Changes

The land on which development will occur is relatively flat, and the mass grading that will be required will be related to fill activities. Although the surface of pahoehoe, as opposed to a'a, is generally smoother, reshaping it by rough grading for building pads, roadways, and landscaped areas may pose some problems at the Ritz-Carlton site. In general, at Mauna Lani Resort, in some places the lava is too tough to be bladed or ripped by bulldozers or graders; there are many bulbous upheavals and depressions; and there are a number of lava tubes, some of which have already collapsed and others which will collapse under the weight of earth-moving equipment. To the extent that similar conditions are encountered at the Ritz-Carlton site, reshaping the terrain will be more or less difficult.
It is assumed that excavation of the swimming lagoon and shoreline beach swimming area will be accomplished with a bulldozer and ripper. This is described further in a following section of this chapter.

There is insufficient soil cover on the project site to support the proposed hotel grounds landscaping. Because of this, the importation of soil, most likely from elsewhere on Mauna Lani Resort's property, will be required.

It is likely that crushed a'a cobbles will be used as fill material for the hotel development on pahoehoe; they were used at the Mauna Lani Bay Hotel site. The existing golf course was constructed using crushed lava from the Waikoloa quarry and soil excavated from the Puako Flats area of the Mauna Lani Resort site. It is likely that the same sources of soil and crushed rock would be used for landscaping within the development area. The soil from the Puako Flats area is Kamakoa sandy loam. This soil is adequate for landscaping uses, but in its natural extremely dry condition, it could create a potential dust problem when being transported. Moistening the soil prior to moving it would reduce the potential problem.

1.1.3 Impact on Soils and Their Use for Agricultural Activities

None of the land at the project site has agricultural potential, nor has it been known to have been used for agricultural purposes. Hence, development of the proposed hotel would have no impact on the actual or potential agricultural productivity of the site.

Construction of the Ritz-Carlton Hotel within the Mauna Lani Resort may actually increase agricultural production elsewhere on the Island of Hawaii due to increased demand for local agricultural products such as fruit, nuts, vegetables, meat and fish. The Mauna Lani Bay Hotel makes regular purchases of the above local products and it is expected that the Ritz-Carlton will do likewise.
1.2 TSUNAMIS AND FLOOD HAZARD

1.2.1 Existing Conditions

Development along the South Kohala coastline must take into account the possibility that a tsunami will strike. Because tsunamis occur infrequently and due to the paucity of shoreline development on that coastline until recent years, reliable tsunami runup information for the area is scarce. However, of the 85 tsunamis that have been observed in Hawaii since 1813, the one occurring in 1946 was the largest. It reached an elevation of approximately 12 feet above mean lower low water (MLLW) at Kawaihae, a few miles to the north of the Mauna Lani Resort.

The Ritz-Carlton property shoreline lies within the special flood hazard area as indicated in the Flood Insurance Rate Map for the area (Federal Emergency Management Agency; May 3, 1982). The flood insurance rate maps, which define hazard areas, are based on the Federal Flood Insurance Administration's scientific and engineering report, The Flood Insurance Study for the County of Hawaii, dated February 1, 1982. A seaward portion of the project site lies within the flood hazard boundary for the 100-year coastal flood (see Figure IV-1). The 100-year tsunami elevation at the project site is eight feet at the shoreline and declines slightly with distance inland. The 100-year flood has a one percent chance of being equalled or exceeded in any given year.

The coastal area of the property falls into designated zone V15. Areas zoned V1 to V30 (the "V" stands for velocity — a measure of wave action) are termed "coastal high hazard" (tsunami) zones, or V zones, in the County Code, and structures to be built within these zones must meet specified construction standards.

As shown in Figure IV-1, most of the Ritz-Carlton property is in Zone C, defined as an area of minimal flooding.

1.2.2 Probable Impacts

Resort structures on the property will be sited taking into consideration hazardous coastal zones. Should a facility be in a hazard zone, design will comply with all County requirements applicable to structures in the coastal high hazard area. The engineering evaluation study of the Ritz-Carlton site (Salt Collins & Associates, 1986:27) recommends a conservative tsunami height of 12 feet for habitable structures. This was the maximum height in Kawaihae Bay during the 1946 tsunami and also the highest recorded in the region.

The coastal hazard emergency siren warning system is operated by the County of Hawaii. It has been learned through the Hawaii County Planning Department that the County Civil Defense is in the process of formalizing procedures for emergency management. As a mitigation measure, the hotel operator and Mauna Lani Resort will coordinate with County Civil Defense to implement the procedures.
1.3 SURFACE WATER AND DRAINAGE

1.3.1 Existing Conditions

There are no streams or natural drainageways crossing the subject property. The characteristic buckles and fissures interrupting the otherwise smooth and relatively level pahoehoe lava surface prevent any significant surface runoff from occurring.

1.3.2 Probable Impacts

Landscaping at the Ritz-Carlton site will require irrigation with the water being drawn from new brackish water wells located on Mauna Lani Resort property. Withdrawal of water from a new well may affect the flow of ground-water toward the coastline and has the potential to affect salinity levels. Should a new well be required, its design will incorporate measures to preserve the integrity of the brackish water source.

Surface water runoff from the development will be altered slightly. The extent of change will depend upon the amount of paving and other impermeable surfaces that will occur within the proposed hotel site, and the configuration of the storm drainage system that will be installed. The design intent of the drainage system will be to avoid stormwater runoff to the shoreline and handle what runoff there is on-site. Surface water will be handled by the natural porous lava terrain and perhaps by a dry well, if needed.
1.4 NEARSHORE AND MARINE ENVIRONMENT

1.4.1 Existing Conditions

This summary description of nearshore and marine environmental conditions is primarily drawn from "Engineering Evaluation of Ocean and Shoreline Conditions at the Ritz-Carlton Site, Pauoa Bay, South Kohala" (Belt Collins & Associates, 1986) and "Baseline Assessment of the Marine Environment at Pauoa Bay, South Kohala, Hawaii" (Steven Dollar, 1986). The reports are included as appendices to this environmental impact statement.

1.4.1.1 Coastal Morphology

Pauoa Bay is approximately 850 feet wide at its mouth and is a 650-foot indentation from the general northeast to southwest trend of the South Kohala coastline. Unweathered lava flows from Mauna Kea volcano create the form of the shoreline and ocean bottom within and outside the bay. Nearshore physical features are illustrated on Figure IV-2. Shoreline elevations and bathymetric contours are depicted on Figure IV-3.

1.4.1.2 Sand Deposits and Other Littoral Material

Wave-deposited material occurs all along the bay's shoreline. Along the northern third of the bay, this material consists of wave-abraded boulders and cobbles of basalt and coral. Stone size is indicative of focusing of wave energy which occurs there. Shorelines of the central and southern thirds of the bay consist of sand deposited on emerged and partially submerged lava outcrops. In three short sections of this portion of the shoreline, the sand extends below water level into the wash zone of typical, prevailing waves.

The floor of the bay is generally devoid of sand-sized material except for limited quantities in well protected depressions and in the naturally occurring central channel which leads offshore. Occurrences of strong wave surge and wave-driven currents move coarse sand and gravel onto the shoreline beaches and finer sand offshore beyond the 50-foot depth contour. Fine sand covers the entire ocean floor in deeper water.

1.4.1.3 Prevailing Waves

Islands to the northwest and the land mass of Hawaii island itself provide substantial shielding from waves, limiting the direct wave exposure of Pauoa Bay to the sector from bearing 225° to 300°. For this exposure, only relatively small segments of the spectrum of North Pacific swell and Kona storm waves can reach the bay without significant loss of height and energy (see Figure IV-4). Data on the actual waves off Pauoa are not available but hindcasting and wave measurements done for the OTEC coldwater pipe testing program off Keahole Point provide data which are reasonably indicative of prevailing conditions. Tables IV-1 and IV-2 summarize the Keahole hindcasting and waverider buoy information.

The waverider buoy data, although missing the incident direction and based on only one year of measurement, are considered to be most indicative of actual conditions. Wave heights less than two feet occurred 47 percent of the time, wave heights less than four feet for 94 percent of the time, and higher
Adapted from Moberly and Chamberlain (1964)

Figure IV-4
WAVE EXPOSURE OF PAUOA BAY
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
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IV-12
TABLE IV-2
Summary of Waverider Data in 130-Foot Deep Water
Off Keahole Point, June 1984 to May 1985
(Adapted from Edward K. Noda and Associates, 1986)

<table>
<thead>
<tr>
<th>Wave Period (Seconds)</th>
<th>Percent Occurrence of Significant Wave Heights (Feet)</th>
<th>Total For All Heights</th>
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<td>12 to 14</td>
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<tr>
<td>14 to 16</td>
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<td>.1</td>
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<tr>
<td>&gt;16</td>
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</tr>
<tr>
<td>Total</td>
<td>.3</td>
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</table>

IV-13
waves for the remaining six percent of the time. Wave periods were generally
less than 12 seconds. Shorter periods are typical of waves generated by local
winds. Since Keahole Point has a wider exposure than Pauoa Bay to both the
north and south, conditions at Pauoa are even calmer than Tables IV-1 and IV-2
indicate.

1.4.1.4 Storm Waves

Storm waves approach Pauoa Bay on occasion in winter and very infrequently
in other seasons. Storm wave heights and frequencies of occurrence as
listed in previous studies of this area are summarized below. For Pauoa,
North Pacific swells from west-northwest are considerably more significant
than Kona storm waves. Their expected heights for a given recurrence interval
are greater and localized effects of refraction provide less protection than
for Kona storm waves.

Summary of Storm Wave Heights and Frequencies of Occurrence

<table>
<thead>
<tr>
<th>Return Period (Years)</th>
<th>WWN Swells (Feet)</th>
<th>Kona Storm (Feet)</th>
<th>WWN Swells (Feet)</th>
<th>Kona Storm (Feet)</th>
<th>Rocheleau (1977) All Deepwater Waves (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
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<tr>
<td>100</td>
<td>23.8</td>
<td>17.5</td>
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<td></td>
<td>36.5</td>
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</table>

Refraction and shoaling analyses of these deepwater storm waves indicate
that there is a pronounced convergence or focusing of wave energy at each
point of the bay and a divergence or diminishing of wave energy in the center
of the bay. The highest waves break outside the bay or on its points. Smaller
waves and reformed waves which break offshore can penetrate the central third
of the bay to a collapsing or surging break at or near the shoreline. Calcula-
tions indicate that wave setup during high waves concurrent with high tide
can raise the bay's water level to between four and five feet above mean sea
level (msl). Wave runup above this level on the beach may reach 8 to 10 feet
(msl), overtopping the natural beach berm. This condition occurred in
February 1986. Debris lines indicating the upper wash of these waves are
still visible almost a year later.

1.4.1.5 Prevailing Currents

Net current drift is depicted on Figure IV-5. Outside the bay, there is
a persistent, relatively slow (0.5 knot or less) northeast to southwest drift
parallel to the trend of the shoreline. It occurs during both ebb and flood
tides but may vary in strength with tidal phase. Within the bay, water
movement is dominated by the prevailing wave condition. Breaking of waves on
the north and south points of the bay and subsequent translation along the

IV-14
Notes:
1. Currents within the bay are driven by the wave break. In calm conditions, currents in the bay are negligible.
2. The NE to SW drift outside the bay prevails during flood and ebb tides.

Figure IV-5
TYPICAL CURRENTS IN PAUOA BAY
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
shoreline toward the center of the bay set up a rip current out the bay through its central channel. For breaking wave heights of three to five feet, the rip current velocity exceeds one knot.

1.4.1.6 Ocean Water Quality

State water quality standards for ocean water are specified in Chapter 56 of Title 11, Administrative Rules of the Department of Health. The bay is Class AA Open Coastal Water. (The objective of Class AA waters is that they remain as close to their natural pristine state as possible.) It is not considered an embayment as the ratio of its volume to cross sectional entrance area is just 150, substantially less than the 700 or greater ratio required for this classification. It is also a "wet" coastal area, meaning that it is one which receives more than 3.0 million gallons per day (MGD) of freshwater discharge per coastal mile. Surface runoff to the ocean is virtually nil in this area, even during infrequent rainstorms. However, groundwater discharge has been estimated at between 3.0 and 7.0 MGD in the several hydrologic evaluations done for the region.

Analyses of water samples collected within and outside the bay have been completed. Results can be compared with the State standards for nine parameters. Figure IV-6 identifies the sample locations and Table IV-3 is a tabulation of the resulting parameter concentrations. Most of the concentrations are at or below the standard's geometric mean values not to be exceeded. The exceptions are nitrate and nitrite nitrogen for samples within the bay, and chlorophyll a and turbidity for all of the samples. The relatively high inorganic nitrogen concentration is likely due to the substantial groundwater discharge into the bay. The chlorophyll a concentration may be a biologic response to this input. Most of the material contributing to turbidity has organic origin. Prevailing wave conditions create substantial variations in this parameter.

1.4.1.7 Groundwater

Groundwater along the South Kohala coast occurs as a basal lens in hydraulic continuity with the ocean. Calculations of the total groundwater flow have established a probable range of from 3.0 to 7.0 MGD per coastal mile. At distances of four or more miles inland of the shoreline, groundwater is of potable quality and wells have been developed to supply the domestic water requirements of the coastal region. Closer to the shoreline, groundwater is brackish but a number of wells have been successfully developed for golf course irrigation. Around the periphery of the bay, there is a pond and several other small holes where groundwater can be directly sampled. Salinities were measured at 3.8 to 4.5 parts per thousand (ppt), about one tenth the 33 to 35 ppt of ocean water.

Shoreline discharge of groundwater tends to concentrate at cracks and other small scale, localized fissures. At Pa'aua, three such locations occur in the center of the bay (refer back to Figure IV-2). The discharge is noticeable by temperature difference and visually by the refraction effects. Measured salinities at the surface of the bay's waters has varied from 10 to 33 ppt depending on distance from the three concentrated discharge points and the prevailing wind and wave mixing mechanisms. When the baywater is extremely calm, brackish groundwater can form a one- to two-foot thick surface layer over the inner third of the bay.
### TABLE IV-3

Water Quality Results for Nine Sampling Stations Within and Outside Pauoa Bay, South Kohala

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<th>Units</th>
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<th>Geometric Mean</th>
<th>Geometric Mean</th>
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<td>ug/l</td>
<td>3.5</td>
<td>8.5</td>
<td>15</td>
<td>22</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Nitrate and Nitrite Nitrogen</td>
<td>ug/l</td>
<td>5.0</td>
<td>16</td>
<td>25</td>
<td>23</td>
<td>17</td>
<td>12</td>
<td>17.1</td>
<td>17</td>
</tr>
<tr>
<td>Orthophosphate Phosphorous</td>
<td>ug/l</td>
<td>7</td>
<td>12</td>
<td>17</td>
<td>16</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>ug/l</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>50</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Light Extinction Coefficient</td>
<td>E-units</td>
<td>0.20</td>
<td>0.50</td>
<td>0.85</td>
<td>0.65</td>
<td>0.33</td>
<td>0.47</td>
<td>0.38</td>
<td>1.10</td>
</tr>
<tr>
<td>Chlorophyll a</td>
<td>ug/l</td>
<td>0.30</td>
<td>0.90</td>
<td>1.70</td>
<td>0.72</td>
<td>0.05</td>
<td>0.12</td>
<td>0.17</td>
<td>0.06</td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>0.50</td>
<td>1.25</td>
<td>2.00</td>
<td>0.25</td>
<td>0.83</td>
<td>0.48</td>
<td>1.32</td>
<td>0.97</td>
</tr>
<tr>
<td>Nonfilterable Residue</td>
<td>ug/l</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>25</td>
<td>3.2</td>
<td>5.6</td>
<td>3.5</td>
<td>9.4</td>
</tr>
</tbody>
</table>

**Notes**

1. Light extinction (in E, units) was measured in situ using a Licor integrating photometer. All other parameter values are laboratory analyses by AECOS Environmental Laboratory. Samples were collected during small to moderate northwest swell wave conditions.

2. Shallow depths and wave surge within and just outside Pauoa Bay prevented measuring the Light Extinction Coefficient at Stations 1 through 6. The measurement requires access with a boat.
1.4.1.8 Marine Biological Community

The survey and analysis in Dollar (1986) utilizes corals as the keystone to evaluating the biological community. Corals provide reef structure and habitat. As they are immobile, they must adapt to the prevailing water quality and wave stress or die. They tend to have high tolerance to short-term fluctuations of water quality but provide definite indications of longer term changes.

Dollar (1986) utilizes a detailed survey of 12 two-hundred-foot long transects to quantitatively assess the coral community. Figure IV-7 locates these transects and Table IV-4 summarizes the quantitative results. The tabulated values identify the several habitat zones which occur within and outside Pauoa Bay. The floor within the bay (profiles PC-7, PC-11, and PC-8) consists of a shallow limestone and basalt pavement with substantial coverage by rubble and boulders. The extent of coral cover is low (an average of just 3.6 percent of the area). Boring sea urchins and a fine algal turf are the most prominent biota. This biologic community is typically found in areas chronically stressed by wave surge and scour.

Outside the bay, there are three distinct reef zones which are roughly parallel with bathymetric contours. The most shoreward zone is a basaltic-limestone terrace with scattered boulders (transects PN-15, PC-15, and PS-13). Limestone exists as a veneer on the basalt basement. Coral cover is low compared to the seaward zones. *Pocillopora meandrina*, a species which flourishes in a high wave energy environment, is dominant. Differences in the 15-foot depth transects illustrate the local effects of wave refraction. PN-15 is in the area of highest wave-focused energy; it has the lowest coral cover, fewest coral species, and greatest amount of rubble. In contrast, PC-15, directly outside the bay, benefits from dispersion of wave energy. Coral coverage and species diversity are greater.

The second reef zone is 200 to 400 feet wide and lies between depths 15 and 50 feet (transects PN-30, PC-30, and PS-30). Due to reduced wave scour energy, coral coverage is higher than in the shoreward zone. *Porites lobata*, in massive lobed colonies, is the dominant coral species. Further seaward, the third zone is the reef slope zone (PN-60, PC-60, PS-60). The typical dominance of the relatively fragile *Porites compressa*, or finger coral, shows clearly in transect PS-60, an area of low wave energy. PN-60, on the other hand, is an area of high wave energy. It shows the effects of the February 1986 storm waves which reduced the *Porites compressa* there to rubble. The PN-60 and PS-60 transects were surveyed in both 1983 and 1986. Coral cover increased in the south transect over the three-year period but was significantly reduced along the north transect:

<table>
<thead>
<tr>
<th>Transect</th>
<th>1983 Survey</th>
<th>1986 Survey</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN-60</td>
<td>70.4</td>
<td>51.4</td>
<td>-19.0</td>
</tr>
<tr>
<td>PS-60</td>
<td>72.5</td>
<td>85.0</td>
<td>+12.5</td>
</tr>
</tbody>
</table>
### TABLE IV-4

Substrate Cover and Coral Species Within and Outside Pauoa Bay (from Dollar, 1986:22)

#### Percentages of Substrate Cover

<table>
<thead>
<tr>
<th>Type of Substrate Cover</th>
<th>PN-15</th>
<th>PN-30</th>
<th>PN-60</th>
<th>PC-7</th>
<th>PC-11</th>
<th>PC-8</th>
<th>PC-15</th>
<th>PC-30</th>
<th>PC-60</th>
<th>PS-15</th>
<th>PS-30</th>
<th>PS-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral</td>
<td>16.8</td>
<td>26.1</td>
<td>51.4</td>
<td>1.1</td>
<td>4.5</td>
<td>5.3</td>
<td>56.0</td>
<td>49.1</td>
<td>50.9</td>
<td>8.4</td>
<td>48.4</td>
<td>85.0</td>
</tr>
<tr>
<td>Limestone</td>
<td>34.1</td>
<td>68.3</td>
<td>0.0</td>
<td>21.6</td>
<td>42.0</td>
<td>10.0</td>
<td>42.4</td>
<td>41.0</td>
<td>0.0</td>
<td>28.3</td>
<td>31.6</td>
<td>12.0</td>
</tr>
<tr>
<td>Rubble</td>
<td>0.0</td>
<td>0.0</td>
<td>46.4</td>
<td>44.8</td>
<td>25.4</td>
<td>84.7</td>
<td>0.0</td>
<td>2.0</td>
<td>48.9</td>
<td>36.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Sand</td>
<td>0.0</td>
<td>5.6</td>
<td>2.2</td>
<td>0.0</td>
<td>0.0</td>
<td>1.6</td>
<td>3.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Basalt</td>
<td>49.1</td>
<td>0.0</td>
<td>0.0</td>
<td>32.5</td>
<td>28.2</td>
<td>0.0</td>
<td>4.1</td>
<td>0.0</td>
<td>28.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

#### Percentages of Coral Cover by Species

<table>
<thead>
<tr>
<th>Coral Species</th>
<th>PN-15</th>
<th>PN-30</th>
<th>PN-60</th>
<th>PC-7</th>
<th>PC-11</th>
<th>PC-8</th>
<th>PC-15</th>
<th>PC-30</th>
<th>PC-60</th>
<th>PS-15</th>
<th>PS-30</th>
<th>PS-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porites lobata</td>
<td>5.3</td>
<td>23.6</td>
<td>31.9</td>
<td>0.4</td>
<td>3.9</td>
<td>4.7</td>
<td>39.0</td>
<td>33.2</td>
<td>39.7</td>
<td>6.4</td>
<td>27.8</td>
<td>35.9</td>
</tr>
<tr>
<td>Porites compressa</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.4</td>
<td>5.8</td>
<td>14.2</td>
<td>9.3</td>
<td>17.9</td>
<td>46.3</td>
<td>0.1</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Pocillopora meandrina</td>
<td>10.9</td>
<td>0.7</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
<td>0.5</td>
<td>6.8</td>
<td>0.3</td>
<td>1.3</td>
<td>1.0</td>
<td>0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Montipora verrucosa</td>
<td>0.3</td>
<td>0.3</td>
<td>1.0</td>
<td>0.1</td>
<td>0.5</td>
<td>0.7</td>
<td>0.4</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Montipora patula</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>3.6</td>
<td>0.5</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Pavona varians</td>
<td>0.2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Cyphastrea ocellina</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptastrea purpurea</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungia scutaria</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total for Coral</td>
<td>16.8</td>
<td>26.1</td>
<td>51.4</td>
<td>1.1</td>
<td>4.5</td>
<td>5.3</td>
<td>56.0</td>
<td>49.1</td>
<td>50.9</td>
<td>8.4</td>
<td>48.4</td>
<td>85.0</td>
</tr>
<tr>
<td>Number of Coral Species</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>
Dollar (1986) also contains survey information of the reef fish community. Along transects outside the bay, species and counts of individuals were typical for undisturbed locations along the West Hawaii coast. Both reef fish and "food fishes" were observed during the survey. The latter included schools of goatfish (weke), opelu, and bluelined snapper (tsape), as well as numbers of squirrelfish (u'u). Other food fishes seen were jacks (papio), parrotfishes (uhu), goatfishes (moana kea), grand-eyed porgys (mu), and groupers. The reasonable abundance of food fishes is indicative of low fishing pressure. Inside the bay, however, fish diversity and number were found to be markedly impoverished.

In December 1986, a National Marine Fisheries Service biologist made an underwater site inspection of Pauoa Bay, including the nearshore area which consists of a scoured limestone platform with few live coral colonies. Large numbers of juvenile reef fish (particularly parrotfish and surgeonfish) were observed in schools foraging on the fine algal turf.

Three species of marine animals that are known to seasonally inhabit Hawaiian waters (off this coastline in particular) are on the Federal threatened or endangered list. They are the threatened green sea turtle, which occurs commonly along the Kona Coast, the endangered hawksbill turtle, and the endangered humpback whale. During the survey, a single green sea turtle was seen. Pauoa Bay is not known as a hawksbill sea turtle resting, breeding or aggregating area.

1.4.1.9 Anchialine Pond

An anchialine pond, Keanaou fishpond, which has been used as a fishpond for mullet, exists in a natural lava depression along the southern part of the bay (refer back to Figure IV-3). The pond was apparently first surveyed in 1972 (Maciolek and Brock, 1974). Recently it has been examined again (Brock, 1985 and Dollar, 1986). Surrounding vegetation, which was a heavily overgrown in 1972, now completely hides the pond. The accumulation of sediment and detrital organic material in the pond has also significantly increased.

Based on the paucity of shrimp, fish, and mollusks in the pond, it appears that the anaerobic (reducing) environment is now toxic to biota. In the Dollar (1986) survey, no shrimp and only two types of fish which are representative of anchialine ponds were seen. Only two types of mollusks were observed. No encrusting algae or vascular plants were seen.

Despite its present condition, the pond has the high natural values of size, relatively freshwater (2 to 4 ppt), potential aesthetic appearance, and potential habitat for endemic aquatic life such as small red shrimp and encrusting algae.

Keanaou fishpond was examined by a State Department of Land and Natural Resources staff archaeologist as part of historic preservation review on May 18, 1987. The pond was confirmed to be a good example of a site type, significant for its information content. It was determined that there would be "beneficial effect" if the pond is properly restored. Recommended tasks are described in Section 1.7 of this Chapter of the EIS.
1.4.2 Probable Impacts and Mitigating Measures

1.4.2.1 Temporary Effects of Construction

Construction of the three shoreline projects and excavation and embankment work required for the hotel and landscaping on the balance of the Ritz-Carlton site may affect ocean and anchialine pond water quality. These effects and mitigating measures that will be employed are discussed below.

1.4.2.1.1 Temporary Effects on Ocean Water Quality

The primary effect of construction on ocean water quality will be a temporary increase in turbidity. Sources of turbidity will be the excavation in nearshore waters for the shoreline beach, swimming lagoon, and flushing channels and wind-borne material during earthwork activities on the remainder of the Ritz-Carlton site. No siltation by stormwater runoff is anticipated as the shoreline berm is higher than the adjacent ground and there are no drainageways through the shoreline berm.

During construction of the swimming lagoon, dispersion of particulate material will be minimized by delaying breakthrough at the shoreline until excavation within the lagoon is completed and loose material on the bottom of the lagoon has been pumped to settling basins. If required as a condition for permit approval, during excavation in the nearshore waters for the flushing channel and shoreline beach, silt screens will be used to retard dispersion of particulate material. Loose material would be pumped from the excavated area prior to removal of the silt screens.

Even with these mitigating measures, substantial temporary increases in turbidity will occur. Based on experience in constructing the beaches at Makaia Bay and Nanuku Inlet at the Mauna Lani Resort, virtually all of the finer particulate material (fine silt, clay, and colloidal sized particles) will remain in suspension and be dispersed offshore in 24 hours or less, particularly in view of the far greater flushing action that prevails at Fauoa than at Makaia or Nanuku. Sand-sized sediment particles will take longer to be moved offshore. The wave surge and wave-driven current transport mechanisms will move this material offshore through the bay's central channel.

1.4.2.1.2 Effects on the Marine Biological Community

Construction activities, including dredging and blasting (if used), and other construction activities, are expected to have a temporary effect on the marine environment in Fauoa Bay. It is possible that some reef fish and other marine organisms will be destroyed during construction, but most fish will be able to swim away to other nearby areas of the ocean with similar habitat, and thus be only temporarily dislocated.

The effects of temporary loading of suspended and bedload sediment on the marine biological community are not expected to be significant for the following three reasons: (1) the marine community within the bay is extremely limited in diversity and abundance; (2) the community is already chronically subjected to high turbidity events caused by wave suspension and is thus limited to species of high tolerance; and (3) the rapid flushing in the bay and directly outside will limit the duration of the sediment loading. In
other words, the effects of construction will not be significantly different than natural events and, as such, are within the limits of tolerance of the marine community.

Construction activity will occur during a relatively short period of time and is expected to have a negligible impact on endangered species. Humpback whales are not prone to swim in areas of shallow limestone shelves such as are found in Pauoa Bay. Green sea turtles may potentially be exposed to impacts of construction activity. To mitigate impacts, no blasting would be done if endangered species or major marine animals are within view of the shoreline. Pre- and post-blast surveys will be conducted to ensure that protected marine species are cleared from the area and to determine whether any are injured as a result of blasting. If used, blasting will be restricted to periods of low tide to reduce the likelihood of the presence of endangered species. It will not be done during the migratory season of the humpback whale (from December through April). Controlling the size of detonation charges and how they are used can mitigate the potential impact of blasting on marine life. Smaller charges can be detonated prior to the main charge, as a means of dispersing marine life in the immediate area.

Excavation and grading will be done by bulldozers and backhoes and hard spots will be worked with hydraulic rams to break the material. The applicant is aware of the potential adverse impacts due to the use of explosives in the nearshore area and intends to avoid the use of explosives as much as possible. Only as a last resort, if hard spots resist breakage by hydraulic ram, will small 10 to 15-pound explosive charges be used to fracture the rock. The rock would then be ripped and removed by hydraulic shovels. This would minimize potential adverse effects due to blasting.

1.4.2.1.3 Effects on Anchialine Pond Water Quality and Biota

Pumping of accumulated sediment and detrital organic matter from the pond will be accompanied by the release of gases and a high level of turbidity in the pond. Less mobile fauna will be sucked up by the dredge pump in this process. Pumping will be continued until all sediment has been removed and the clarity of the pond water has been restored, a period estimated to be one to several days long. These temporary effects are unavoidable if the natural aquatic and aesthetic values of the pond are to be restored. Present conditions severely limit the area of free standing water and have created a reducing environment which is apparently toxic to much of the endemic biota.

1.4.2.2 Permanent Impacts

Permanent impacts on the nearshore and marine environment will include alteration of the shoreline, changes to the anchialine pond environment, and increased recreational use of the bay. These effects are discussed below.

1.4.2.2.1 Shoreline Alteration

The proposed swimming lagoon and beach expansion projects in the southern half of the bay will create the following changes along the shoreline:

- 24,000 cubic yards of material will be permanently removed, approximately 6,600 cubic yards of which will be from seaward of the State-certified shoreline;
7,300 cubic yards of medium to coarse grained carbonate sand will be brought in to supplement the 1,900 cubic yards on-site for a total sand volume of 9,200 cubic yards;

2,950 cubic yards of the sand will be placed seaward of the State certified shoreline and the balance will be inland;

430 feet of new shoreline beach frontage will be added to the existing 230 feet;

1.6 acres of beach area will be added to the existing 0.5 acre; and

1.5 acres of safe swimming area will be created along the shoreline.

The overriding design concern is the stability of the new sand beaches. This concern dictates project location, excavated slope of the basement rock on which the beach sand will be placed, grain size of the imported carbonate sand, width of the lagoon opening, use of existing bathymetric relief to establish the limits of the excavated swimming area, and the addition of flushing channels. These choices are particularly critical in view of the prevailing transport mechanisms in the bay. If sand is eroded from the beaches and deposited beyond the excavated swimming areas or flushing channel, it may be permanently removed from the inner bay via its central channel to the reservoir of sand in deeper water beyond the reef zone. On the other hand, since the swimming areas will be deeper than adjacent areas in the bay, they are potential traps for silt and other undesirable fine particulate matter. Flushing channel dimensions are chosen to achieve sufficient velocity to move these fines without disturbing the coarser, beach sand deposits.

1.4.2.2.2 Changes to the Anchialine Pond Environment

The area of free standing water in the pond will be increased substantially, sediment will be permanently removed, and aerobic conditions in the water column and on the bottom of the pond will be restored. Another less obvious potential change is an increase in pond salinity due to excavation of the swimming lagoon. Some change is probable although its extent is virtually impossible to predict. Movement of groundwater and its mixing with seawater close to the shoreline occurs in localized cracks and fissures which cannot be detected.

Currently, the pond’s salinity of 2 to 4 ppt is at the extreme fresh end of the range of anchialine pond salinity. The approach that will be used for this project will be to monitor pond salinity during and after excavation of the swimming lagoon. If the salinity rises above 10 ppt, a change which is beyond that which is expected but still in the mid-range for anchialine pond, measures would be implemented to limit the salinity increase. Holes would be drilled along a line between the pond and lagoon and grout pumped into these holes. Work would be controlled by constant monitoring of salinity. The objective would be to keep the pond’s salinity at or below 10 ppt. The number of holes to be drilled is currently unknown. If salinity rises above the acceptable level, a determination of the number of holes to be drilled will be made based on the results of salinity monitoring and the engineer’s recommendations. The appropriate number of holes would then be drilled and filled with grout.
Once all work has been completed, the typical biological community of shrimp, fish, mollusks, vascular plants, and encrusting algae is expected to establish itself. Shrimp will be the first to appear in a matter of days or weeks and the remainder of the community will be established more slowly over several years.

1.4.2.2.3 Long-Term Changes to Ocean Water Quality and Resulting Biological Response

Minor long-term nutrient loading of water in the bay may occur. Sources of the nutrient loading will be fertilizer. Landscaping around the hotel and a second, 18-hole golf course will be added to the resort, in part due to the demand of the Ritz-Carlton project. Percolating irrigation water may enter the basal lens and ultimately be discharged into the ocean at the shoreline. A number of processes will be at work to reduce the rate of nutrient loading. Nutrient uptake by grass and other vegetation is the most significant. In the soil layer, cation exchange, fixation, denitrification, and absorption will also limit the nutrient concentration in percolating irrigation water.

Biological response to the small nutrient increase in shoreline-discharged groundwater is expected to be nil. Such an outcome has been demonstrated previously along the West Hawaii Coast at the Mauna Lani Bay Hotel, Kailua-Kona, and the Keahou Resort. The lack of biologic response is primarily attributed to the small rate of loading and its rapid dilution and dispersion. Within and just outside Pa'auilo Bay, there is another critical factor. The impact of breaking waves and resulting wave surge restricts the biologic community to the few species of relatively low abundance which can survive in this physically harsh environment.

Although some impact to nearshore waters are anticipated due to shoreline construction activities and operation of the hotel and resort amenities, there may be others unknown at present. Mitigation measures such as precautions to be taken during construction and operation may need to be supplemented by others. In order to ascertain what these mitigation measures might be, some form of monitoring during construction and afterwards might be appropriate. Monitoring could range from simple visual inspection to a systematic program of testing and analysis.

1.4.2.2.4 Potential for Movement of Beach Sand

Existing conditions in that portion of the bay proposed for the construction of lagoon/beach improvements include an existing very stable sand beach which does not move seasonally, either in and out or laterally. Contributing factors of stability are the orientation of the embayment, the relatively shallow water in the bay, and the extensive emerged and submerged outcrops which will not be modified during construction. All work will be done inside, thus leaving the outcropping in place to ensure stability. The existing beach is actually a full-scale prototype of a stable beach and it is expected that sand imported to supplement the existing sand likewise will not move to any significant degree.
1.4.2.2.5 Monitoring Program

The applicant and its consultants have been discussing monitoring measures with governmental agencies during the ongoing permitting process. Agencies include the County Department of Planning, the State Department of Land and Natural Resources, the State Department of Health, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service. The applicant intends to implement appropriate monitoring measures, as required by conditions to permits issued by any of these agencies.

Based on anticipated potential impacts, a monitoring plan might include measuring water salinity and surface elevation in the fishpond; monitoring nearshore water turbidity before, during, and after construction; performing a benthic survey; monitoring sand movement; measuring salinity profiles in the bay; and following procedures should blasting be necessary, including restricting the period when blasting is permitted. State Department of Health water quality concerns will be addressed in the monitoring program.

1.4.2.2.6 Changes to Shoreline Access and Recreational Use

By previous agreement between Mauna Lani Resort and the County of Hawaii, a 10-foot wide public access easement runs parallel to the shoreline of the Resort, including the shoreline of the Ritz-Carlton hotel site. The alignment is generally mauka of the October 23, 1986 certified shoreline, just inland of the naturally occurring shoreline berm on privately owned land. The trail is part of the Kawaihae-Kiholo shoreline trail, legally described on Land Court Map #7, Land Court Application 1785 (September 5, 1984) as Easement "B". The reader is referred to Figure IV-7a for the following discussion.

With the creation of the swimming lagoon, a portion of the easement on private land (the shoreline trail) once accessible to the public will be submerged and will no longer be traversable by foot. Public land now seaward of the certified shoreline which is non-submerged will become submerged and likewise be made inaccessible to the public. The existing pedestrian right-of-way will be bisected by the lagoon and the public on the southern segment of the path will be able to join the northern segment by swimming across the lagoon opening. Alternatively, the public will have shoreline access through a proposed right-of-way around the periphery of the lagoon on the sand.

The applicant currently does not intend to ask for recertification of the shoreline after completion of shoreline improvements, including the lagoon construction. The certified shoreline would thus remain that which was certified by the Director of the State Board of Land and Natural Resources on October 23, 1986. Areas mauka of the certified shoreline, including submerged lands in the lagoon, would remain privately owned. The public, however, will have access to the waters within the lagoon and the sand beach as well as access around the lagoon by way of a continuous public shoreline trail.

In accordance with zoning conditions, Mauna Lani Resort, Inc. is required to provide perpetual public lateral shoreline access at the resort and has provided this access by way of the easement described above. After completion of the project, including shoreline improvements, The Ritz-Carlton
Hotel Company will provide public access around the lagoon to ensure continuous lateral access. A legal right will be granted to the public for perpetual use of this right-of-way. The applicant will comply with any procedures required by the State to convey this public right-of-way.

Some fishing in the general area occurs off the shoreline north and south of the bay, but there is virtually no fishing within the bay itself, where fish communities are limited due to the rigorous conditions brought about by wave and sediment stress. The Ritz-Carlton Mauna Lani hotel and shoreline improvement project is not anticipated to substantially affect this pattern of use, although improved shoreline access, including the development of the public shoreline beach park north of the project site — which is expected to be developed at the same time as the hotel project — will improve access to the shoreline north and south of the bay.

The lagoon and beach expansion projects will significantly expand the recreational potential of the bay for swimming, snorkeling, and sunbathing. Due to limited access, use of the bay for these activities is currently quite minimal. It will increase substantially with the presence of hotel guests and greater use by the general public. Improved access will also be beneficial to surfers who surf, not in the by itself, but off the points both north and south of the bay.
1.5 TERRESTRIAL FLORA

1.5.1 Existing Conditions

Existing plant life at the Mauna Lani Resort area was described in the 1975 Environmental Impact Statement, prepared prior to development at the resort. Since then, a golf course, hotel, condominium projects and associated resort amenities have been developed. In general, the earlier description of terrestrial flora remains valid, supplemented by the introduction of other species associated with resort landscaping.

In April 1984, Earthwatch, environmental resource investigators, undertook a botanical survey of the areas to be added to the resort master plan. The purpose of the survey was to list existing vegetation types and to search for endangered plant species, in order to assess the probable impacts of development on the existing flora. The results of this survey covering the additional lands are described below.

Results of the botanical field survey indicated the presence of three major vegetation cover types within the vicinity of Ritz-Carlton project area:

Kiawe Scrub Rockland. This cover type is characterized by smoother, older lava surfaces, usually pahoehoe. Vegetation is sparse, usually less than 50 percent, but definitely more abundant than that found on barren a'a lava. Scattered kiawe shrubs form the dominant cover, although ilima, hi'aloha (Waltheria indica var. americana) and sixweeks threawn (Aristida adscensionis) were also observed. Other species found in Open Scrub Grassland, described below, also occur here, but less frequently.

Open Scrub Grassland. This cover type is characterized by level to gently rolling grasslands with scattered forbs, shrubs and trees. In the northern sections of the Mauna Lani Resort area, the cover type becomes more dense in the tree layer and grades into Kiawe Woodland. Exotic perennial grasses typical of the grasslands (and of dry leeward grasslands throughout the islands) are buffelgrass (Cenchrus ciliaris), feathery pennisetum (Pennisetum setosum) and stinkgrass (Eragrostis ciliaris). Native plant species observed were the indigenous ilima, hi'aloha and alena (Boerhavia diffusa), and the endemic blue-seeded portulaca of 'ihi (Portulaca oyanseppsoni).

Coastal Strand. The shoreline of the proposed project area exhibits a variety of physical forms and features. Pa'aua Bay is characterized by a rocky lava coast with a narrow cobble beach consisting of smoothed basaltic lava and coralline fragment mixtures. Few plants occur on this substrata, but among those found were two endemic species, the native caper (Capparis sandwichiana var. zoharyi) and 'aheheha (Chenopodium oahuense); and two indigenous species, beach naupaka (Scaevola taccada) and pohuehue or beach morning glory (Ipomea brasiliensis). Tree heliotrope (Moseschmidia argentea) is also found at Pa'aua Bay beach.

During the 1984 Earthwatch survey, no proposed, listed or candidate endangered or threatened plant species were observed within the proposed Ritz-Carlton Mauna Lani development area.
The list of plant species encountered in the survey area is shown in Table IV-4a.

1.5.2 Probable Impacts and Mitigation Measures

Development of the proposed Ritz-Carlton Hotel would entail clearing, grading, construction of buildings and related hotel amenities, and landscaping resulting in an increase in the extent and density of vegetative cover, with change in species composition. This increase would provide additional habitat and food sources for birds and other small animals. At the same time, fauna that are adapted to the naturally arid conditions would be displaced by species better able to take advantage of opportunities in urban and semi-urban environments.

Although extensive earthwork will accompany construction of facilities, it is anticipated that portions of the hotel site will be left intact where feasible, allowing incorporation of natural landscape elements, including endemic species, into the proposed development, particularly along the coastline north of the swimming lagoon and swimming beach.

None of the plant species observed appear to be restricted to the project area, and most are exotic species common throughout Hawaii. Nearby lands seem to be characterized by the same vegetation cover types observed. None of the plant species observed are proposed, listed, or candidate endangered or threatened species. However, the vegetation survey team noted that some are part of sensitive ecosystems worthy of preservation to the extent possible.

In its 1984 study, Earthwatch recommended the mitigation measures listed below as a means of lessening any adverse impacts on existing vegetation that is part of an unusual ecosystem. Ritz-Carlton Nauna Lani intends to follow these guidelines where possible.

Recognize and protect unique or sensitive ecosystems. Shoreline areas surveyed include environmentally sensitive cover types that have already been disturbed. Attempts should be made to enhance such diminishing natural resources through appropriate design and pedestrian orientation.

Conservation of limited resources. Drought-resistant plants with low moisture requirements can be incorporated into landscape design, to better conserve limited water resources.

Unify design elements harmoniously with existing natural ones. Barren lava landforms can be left unvegetated and thus remain valuable cultural and geologic resources. Attempts at vegetation should be appropriate to the rugged landscape's essential character.

Use of native species. Some of the native species observed could be replanted, replaced or incorporated into the landscape rather than being removed completely from the environment. These include prickly poppy, native caper, beach morning glory, 'ahe 'ahe, and beach naupaka.
**TABLE IV-4a**

*Plant Species Checklist - Mauna Lani*

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name(s)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MONOCOTYLEDONAE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GRAMINACEAE (Grass Family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aristida adscensionis L.</td>
<td>Sixweeks threeawn</td>
<td>X</td>
</tr>
<tr>
<td>Cenchrus ciliaris L.</td>
<td>Buffelgrass</td>
<td>X</td>
</tr>
<tr>
<td>Chloris diversicata R.Br.</td>
<td>Stargrass</td>
<td>X</td>
</tr>
<tr>
<td>Cynodon dactylon (L.) Pers.</td>
<td>Bermuda Grass; manieni</td>
<td>X</td>
</tr>
<tr>
<td>Eleusine indica (L.) Gaertn.</td>
<td>Wiregrass; manieni-sli'i</td>
<td>X</td>
</tr>
<tr>
<td>Eracrostis ciliatissima (All.) Will.-Lut.</td>
<td>Stinkgrass</td>
<td>X</td>
</tr>
<tr>
<td>Eracrostis tenella (L.) Beauv. ex R. &amp; S.</td>
<td>Japanese lovegrass</td>
<td>X</td>
</tr>
<tr>
<td>Pennisetum setaceum (Forsk.) Chiov.</td>
<td>Fauntsinggrass</td>
<td>X</td>
</tr>
<tr>
<td>Pennisetum setosum (Sw.) L. C. Rich in Pers.</td>
<td>Feathery pennisetum</td>
<td>X</td>
</tr>
<tr>
<td>Rhynecheltrum repens (Willd.) C. E. Hubb</td>
<td>Natal redtop</td>
<td>X</td>
</tr>
<tr>
<td>Setaria verticillata (L.) Beauv.</td>
<td>Bristly foxtail</td>
<td>X</td>
</tr>
<tr>
<td><strong>DICOTYLEDONAE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MORACEAE (Mulberry Family)</strong></td>
<td>Ficus spp.</td>
<td>---</td>
</tr>
<tr>
<td><strong>CHENOPODIACEAE (Goosefoot Family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atriplex semibaccata R.Br.</td>
<td>Australian saltbush</td>
<td>X</td>
</tr>
<tr>
<td>Chenopodium album L.</td>
<td>Lamb's quarters; 'aleha</td>
<td>X</td>
</tr>
<tr>
<td>Chenopodium carinatum R.Br.</td>
<td>Keeled goosefoot</td>
<td>X</td>
</tr>
<tr>
<td>Chenopodium murale L.</td>
<td>Nettle-leaved goosefoot</td>
<td>X</td>
</tr>
<tr>
<td>Chenopodium oahuense (Meyen) Aellen</td>
<td>'Aleha</td>
<td>E</td>
</tr>
<tr>
<td>Salsola pestifer A. Nels.</td>
<td>Russian thistle</td>
<td>X</td>
</tr>
<tr>
<td><strong>AMARANTHACEAE (Amaranth Family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amaranthus spinosus L.</td>
<td>Spiny amaranth; pakai-kuku</td>
<td>X</td>
</tr>
<tr>
<td>Amaranthus viridis L.</td>
<td>Slender Amaranth; pakai</td>
<td>X</td>
</tr>
<tr>
<td><strong>NYCTAGINACEAE (Four o'clock Family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boerhavia diffusa L. var. diffusa</td>
<td>Alena</td>
<td>I</td>
</tr>
<tr>
<td>Boerhavia diffusa L. var. tetrandra (Forst. f.) Heimer</td>
<td>Alena</td>
<td>I</td>
</tr>
<tr>
<td>Bougainvillea spp.</td>
<td>Bougainvillea</td>
<td>X</td>
</tr>
<tr>
<td><strong>PORTULACACEAE (Purslane Family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portulaca oleracea L.</td>
<td>Blue-seeded portulaca; 'ihi</td>
<td>E</td>
</tr>
<tr>
<td><strong>CARYOPHYLLACEAE (Pink Family)</strong></td>
<td>Spergula spp.</td>
<td>---</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name(s)</td>
<td>Status</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>PAPAVERACEAE (Poppy Family)</td>
<td>Prickly poppy; pua-kala</td>
<td>E</td>
</tr>
<tr>
<td>Argemone glauca Pope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPPARACEAE (Caper Family)</td>
<td>Native caper; pua-pilo</td>
<td>E</td>
</tr>
<tr>
<td>Capparis sandwichiana var. zoharyi</td>
<td>Wild spider flower; honohina</td>
<td>X</td>
</tr>
<tr>
<td>Deg. &amp; Deg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gynandropsis gynandra (L.)Brig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEGUMINOSAE (Pea Family)</td>
<td>Mesquite; kiawe</td>
<td>X</td>
</tr>
<tr>
<td>Leucusa Leucocephala</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosopis pallida (Humb.&amp;Bonpl. ex Willd.)HBK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUPHORBIACEAE (Spurge Family)</td>
<td>Garden spurge; koko-kahiki</td>
<td>X</td>
</tr>
<tr>
<td>Euphorbia birta L.</td>
<td>Graceful spurge</td>
<td>X</td>
</tr>
<tr>
<td>Euphorbia glomerifera (Mill.sp.)</td>
<td>Prostrate spurge</td>
<td>X</td>
</tr>
<tr>
<td>L.C. Wheeler</td>
<td>Castor bean; koli</td>
<td>X</td>
</tr>
<tr>
<td>Euphorbia prostrata Ait.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ricinus communis L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALVACEAE (Mallow Family)</td>
<td>False mallow; hauou</td>
<td>X</td>
</tr>
<tr>
<td>Malvastrum coromandelianum L. Garcke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sida spp.</td>
<td>Ilima; 'ilima papa</td>
<td>I</td>
</tr>
<tr>
<td>Sida fallax Walp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUCURBITACEAE (Gourd Family)</td>
<td>Wild spiny cucumber</td>
<td>X</td>
</tr>
<tr>
<td>Cucumis dipscacus Ehrenb. ex. Spach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STERCULIACEAE (Cocoa Family)</td>
<td>Waltheria; hi’aloha; ‘uhaloa</td>
<td>I</td>
</tr>
<tr>
<td>Waltheria indica var. americana (L.)R.Br.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONVOLVULACEAE (Morning glory Family)</td>
<td>Beach morning glory; pohuehue</td>
<td>I</td>
</tr>
<tr>
<td>Ipomoea brasiliensis (L.)Sweet</td>
<td>Hairy merremia; koali-kua-hulu</td>
<td>X</td>
</tr>
<tr>
<td>Merremia aegyptia (L.)Urban</td>
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<td></td>
</tr>
<tr>
<td>BORAGINACEAE (Heliotrope Family)</td>
<td>Tree heliotrope</td>
<td>X</td>
</tr>
<tr>
<td>Messerschmidia argentea (L.f.) Johnston</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOODENIACEAE (Naupaka Family)</td>
<td>Beach naupaka; naupaka-kahakai</td>
<td>I</td>
</tr>
<tr>
<td>Scaevola taccada (Gaertn.) Roxb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPOSITAE (Sunflower Family)</td>
<td>Ageratum maile-honono</td>
<td>X</td>
</tr>
<tr>
<td>Ageratum conyzoides L.</td>
<td>West Indian beggar’s tick</td>
<td>X</td>
</tr>
<tr>
<td>Bidens cynaphifolia HBK.</td>
<td>Beggar’s tick; ko'oko'olau</td>
<td>X</td>
</tr>
<tr>
<td>Bidens pilosa var. pilosa L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gnaphalium peregrinum Fern.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE IV-4a
(Continued)

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name(s)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOSITAE (Sunflower Family) - (continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picris hieracioides L.</td>
<td>Hawksweed</td>
<td>X</td>
</tr>
<tr>
<td>Fluehea odorata (L.) Cass.</td>
<td>Pluchea; sourbush</td>
<td>X</td>
</tr>
<tr>
<td>Sonchus oleracea L.</td>
<td>Sow thistle; pua-lele</td>
<td>X</td>
</tr>
<tr>
<td>Taraxacum officinale (L.) Weber in Wiggers</td>
<td>Dandelion; lau-lele</td>
<td>X</td>
</tr>
<tr>
<td>Wedelia trilobata (L.) Hitch.</td>
<td>Wedelia</td>
<td>X</td>
</tr>
<tr>
<td>Zinnia pasciflora L.</td>
<td>Wild Zinnia; pua-pihi</td>
<td>X</td>
</tr>
<tr>
<td>Unidentified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unidentified (island record)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Families are arranged according to St. John (1973). Genera and species are listed alphabetically within each family. Taxonomy and nomenclature generally follows St. John except where more commonly accepted names are listed.

For each species the following information is provided:

1. Scientific name with author citation.
2. Common English name and/or Hawaiian name, when known.
3. Status of the species:
   - E = Endemic to the Hawaiian Islands; occurring naturally nowhere else in the world.
   - I = Indigenous: native to the Hawaiian Islands but also occurring naturally elsewhere in the world.
   - P = Polynesian Introduction: plants brought by the Polynesian immigrants prior to contact with the Western World.
   - X = Exotic: plants of accidental or deliberate introduction after contact.
1.6 BIRDS AND WILDLIFE

1.6.1 Existing Conditions

Observations made at the time of the 1975 Environmental Impact Statement for the Mauna Lani Resort lands, within which the Ritz-Carlton project is located, led to the conclusion that the more common species of birds were to be found at the resort area. It was stated that the shoreline and brackish ponds of the area did not provide the wetlands suitable for nesting of rare native birds, such as are found in wetlands to the south of the Mauna Lani Resort. Larger mammals sighted were mongooses and feral goats. These observations were in general reconfirmed in two surveys performed by Philip Bruner, the first in 1979 and the second in 1984 and a subsequent site visit to the Ritz-Carlton site in March 1987 by Belt Collins staff.

1.6.1.1 Birds

The only indigenous (native) species of bird recorded during the 1984 survey was the Pacific Golden Plover (Pluvialis fulva), a migratory species of shorebird that typically forages in open short grassy terrain (Johnson, Johnson and Bruner, 1981). A substantial increase in such habitat has occurred with the building of the Francis I'i Brown golf course. Prior to the existence of these golf courses, plovers were probably not common in this area (Bruner, 1984:2). See Table IV-4b for a listing of exotic birds observed during the 1984 survey.

During the 1979 study, three additional shorebird species, all introduced species, were observed: Wandering Tattler (Heteroscelus incanus), Ruddy Turnstone ( Arenaria interpres), and Bristle-thighed Curlew (Numenius tahitiensis). Also recorded during the 1979 survey was the indigenous Black-crowned Night Heron ( Nycticorax nycticorax).

1.6.1.2 Mammals

A total of 11 mongooses were seen during the 1984 survey of the area of the Mauna Lani Resort and evidence in the form of scats indicated the relative abundance of this mammal, especially in the grassland habitat and around developed structures. One feral cat was observed in the coastal woods at the Fauoa Bay end of the resort.

Herds of feral goats ( Capra hircus linnceus) ranging in size from as few as 3 or 4 animals to as many as 20 to 30 reportedly roamed the general area prior to its development as a resort (Belt Collins & Associates, 1975). Although a few years later a study concluded that feral goats were "relatively uncommon in the drier, lower elevation areas," three were sighted during an August 1984 Belt Collins field trip to the Mauna Lani Resort site and nearly a dozen were spotted on a similar trip in March 1987.

The endangered Hawaiian hoary bat ( Lasiurus cinereus semotus) occurs on the island of Hawaii. Most sightings have been recorded in Hilo and in relatively wet forests at higher elevations. However, on September 24, 1984, a dead specimen was found on the grounds of the Sheraton Royal Waikoloa Hotel. Since then, there have been no reports of Hawaiian hoary bats having been seen in the general Mauna Lani Resort and Fauoa Bay area.
### TABLE IV-4b

Relative Abundance and Habitat Preference of Exotic (Introduced) Birds
Mauna Lani Resort

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Relative Abundance</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray Francolin</td>
<td>Francolinus pondicerianus</td>
<td>C</td>
<td>G,K,E,P</td>
</tr>
<tr>
<td>Japanese Quail</td>
<td>Coturnix coturnix</td>
<td>U</td>
<td>G,P</td>
</tr>
<tr>
<td>Spotted Dove</td>
<td>Streptopelia chinensis</td>
<td>C</td>
<td>P,G,E</td>
</tr>
<tr>
<td>Zebra Dove</td>
<td>Geopelia striata</td>
<td>A</td>
<td>G,P,E,K</td>
</tr>
<tr>
<td>Mockingbird</td>
<td>Mimus polyglottos</td>
<td>R=9</td>
<td>P,K</td>
</tr>
<tr>
<td>Japanese White-eye</td>
<td>Zosterops japonica</td>
<td>C</td>
<td>K,P,E</td>
</tr>
<tr>
<td>Northern Cardinal</td>
<td>Cardinalis cardinalis</td>
<td>U</td>
<td>K,P</td>
</tr>
<tr>
<td>Common Myna</td>
<td>Acridothes tristis</td>
<td>C</td>
<td>K,P,E</td>
</tr>
<tr>
<td>House Sparrow</td>
<td>Passer domesticus</td>
<td>R=27</td>
<td>K,P</td>
</tr>
<tr>
<td>Warbling Silverbill</td>
<td>Lonchura malabarica</td>
<td>A</td>
<td>G,P,E</td>
</tr>
</tbody>
</table>

**Key to Table:**

- **Relative Abundance** = Number of times observed during survey or frequency on eight-minute counts.
  
  - A = Abundant (average on 8-minute count: 10+)
  - C = Common (average on 8-minute count: 5-10)
  - U = Uncommon (average on 8-minute count: less than 5)
  - R = Recorded but not on 8-minute count. Number that follows is the actual number seen or heard.

- **Habitat** = Area most frequented. Order of most preferred or utilized begins at left.
  
  - C = Grassland (open fields)
  - K = Kiawe thickets
  - P = Parkland (mixed grassland and scattered trees)
  - E = Edge of roads or other breaks in the vegetation
  - S = Shoreline (exposed rocky shelf)

**Source:** Phillip Bruner (1984)
1.6.2 Probable Impacts

Development of the hotel would result in considerable changes in the avian and mammal communities. The change in vegetation and a more urban environment would lead to the gradual increase in the number of exotic and introduced birds. The Common Mynah would probably increase, as would the introduced House Sparrow and the Nutmeg Mannikin. No major change in feral animal population is expected. The increased human presence, particularly in the food handling areas, may lead to some increase in the number of mice, rats, and mongooses.

The development of landscaped areas on the open lava flows would create increased habitat for the Pacific Golden Plover and other species. Bruner expects that the disruption of the present dry parkland and wooded coastal habitats in favor of a more ordered and invariably wetter landscaped vegetation will decrease population densities for some species, notably those that prefer a drier habitat: Japanese Quail, Gray Francolin, and Warbling Silverbill. To retain these species on-site, patches of "native" vegetation can be retained.

In a letter addressed to the U.S. Army Engineer District (February 22, 1983) on the subject of impacts on the Hawaiian hoary bat as a result of proposed resort development at Waikoloa Beach Resort, the Fish and Wildlife service of the U.S. Department of the Interior stated its biological opinion:

Impacts of the Hawaiian hoary bat would not be expected to seriously harm the bat population on the island of Hawaii. It does not seem likely that the construction and operation of the resort complex would change the environment to the bats' detriment unless insecticides are used heavily. If such pesticides are used, bats may be affected due to decrease in their food supply and, possibly, secondary poisoning. Such negative impacts would not likely to jeopardize the continued existence of the species as a whole.

The type of development planned for Waikoloa Resort is similar to that for Mauna Lani Resort and the Ritz-Carlton Hotel. Thus a similar conclusion can be drawn regarding its potential impacts on the Hawaiian hoary bat.
1.7 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

1.7.1 Existing Conditions

Mauna Lani Resort is situated at Kalahuipua'a, an ili of Waikolos. A complex of large and productive fishponds provides a focal point for Kalahuipua'a (Kirch, 1979:11). The area is rich in historic resources and archaeological remains and has been the subject of numerous surveys. Mauna Lani Resort, Inc. has adopted an interpretive and management plan to preserve and display these resources in an orderly manner (Science Management, Inc., 1982). None of the sites so targeted in the plan are in the Ritz-Carlton Mauna Lani project area.

It should be noted however, that there are a number of known sites at Mauna Lani Resort which are not scheduled for interpretive preservation, but which still contain significant information on the prehistory of the area. These sites need to be protected during development or undergo appropriate data recovery prior to construction.

As discussed earlier, the 32-acre project site is dominated by grass-covered pahoehoe lava flows. Aside from the proximity of the property to Pa'aua Bay, its only other significant topographical feature is an anchialine pond situated in the southwest corner of the project site just inland of the shoreline berm.

1.7.1.1 Historical Setting

A detailed discussion of the general historical settlement of the Kalahuipua'a district, in which the project site is located, is contained in the EIS for the Revised Master Plan for Mauna Lani (1985). This discussion was based upon a number of archaeological investigations conducted in the Kalahuipua'a area. The first research in 1955 involved examination of sites near the Kalahuipua'a fishponds and the petroglyph field, with excavation of various sites. In 1964, the B.P. Bishop Museum carried out a major examination of the Puako petroglyph field, including mapping (Welch:5). The most extensive work was conducted by Patrick Kirchon 4,000 acres in the Puako and Kalahuipua'a areas between 1973 and 1975, with the final report published in 1979. The research included intensive survey in 1973, an aerial survey in 1974 and an intensive survey and salvage excavation in 1975 (ibid:6). The following discussion of archaeological sites identified on the project site is based largely upon the findings of the 1979 Kirch report.

1.7.1.2 Findings of the 1973-75 Survey and Excavation

The 1979 Kirch report indicates that five separate sites are located on the Ritz-Carlton Mauna Lani and shoreline improvement project sites (see Figure IV-8):

Site 1: EL-304 - C-Shaped Structures. A triple C-shaped structure is about 30 meters south of the survey corner for State of Hawaii General Lease 3-4141, just seaward of the edge of the lava flow. The structure is about 7 meters long by 3 meters wide. Each C-shaped section is about 2 meters wide and the walls are about 50 centimeters high. There is a "cupboard" in the south end of the structure, and a fair amount of shell midden occurs on the surface.
Site 2: EI-305 - Alignment. This small alignment encloses the entrance of a shallow lava tube. Made of loosely placed lava cobbles and measuring 1 meter high by 1.5 meters wide, it partially obscures the cave's 1-meter-wide entrance. The cave extends only about 1 meter. No midden or artifacts were found during the survey.

Site 3: E2-32 - Petroglyphs, C-Shaped Structures, Abrader Manufacturing Area, Oval-Shaped Structure. This cluster of features is located on the edge of a pahoehoe lava flow, bordering a thick growth of kiawe. Feature A is a series of four unusual petroglyphs. The most prominent of these is a stick figure, about 30 cm tall by 30 cm wide, with two large, deeply packed eyes. Just to the north of this feature are several smaller figures.

Feature B includes about 10 roughly formed C-shapes. Averaging about 2 to 3 meters long by 1 to 1.5 meters wide, they are all built directly on pahoehoe lava. Most are roughly built of lava cobbles with alignments rising no more than 1 meter high. In some cases, natural lava outcroppings were used to form part of the structure.

Feature C is an oval-shaped enclosure with a significant midden deposit. Measuring 4.5 meters long by 2.5 meters wide, it has a 75-cm-high lava cobbles alignment incorporated into its natural lava sides. The enclosure is oriented north to south and has some soil on its lava floor. Midden noted includes Cypreaa sp., Nerita picae Reclus, Echinometra mathaei Blainville, coral, fishbone, and waterworn pebbles; basaltic glass was also noted. Another low alignment was found below this feature.

Feature D consists of the numerous abrader manufacturing depressions found throughout the site.

The area on which Site E2-32 is located comprises a 50-meter-long stretch of pahoehoe lava. All features were found in this area. There were no surface artifacts.

Site 4: E2-33 - Shelter Cave. This is a 1-meter by 60-cm-high shelter cave with a small C-shaped located about 4 meters north of its entrance. The cave is about 3 meters deep and has sparse midden on its lava floor. The C-shape faces south, has an alignment of loosely piled lava cobbles, and measures 2 meters long. The sparse midden deposit found in and around these two features includes basaltic glass and Cypreaa sp. There were no surface artifacts.

Site 5: Keanaou Fishpond. The pond appears to have been formed from the collapse of a lava tube and appears as an elliptical-shaped depression which is approximately 200 by 100 feet. Presently, it is surrounded by a dense growth of beach plants, hau trees and palm trees. Standing water in the pond varies in quantity depending upon the tides from a very small area of approximately 30 square feet to an area of several thousand square feet. This pond has been traditionally identified as Keanaou Fishpond. Sources at the Mauna Lani Resort have commented that the existing anchialine pond may have been altered in the 1930's by Francis I'll Brown to enable the raising of mullet. There are some indications of concrete masonry work at the south end of the pond, as observed in a 1987 field trip by Belt Collins staff.

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A May 1987 fieldcheck by a Department of Land and Natural Resources staff archaeologist showed that the following two sites are caves attached to the pond:

**EI-306 - Shelter Cave Complex:** This site is a series of several lava-bubble chambers alongside Keanaupou Pond. There is some structural modification inside the caves, as well as scattered midden. Outside the caves, on the pahoehoe surface, are two petroglyphs and numerous abrader manufacturing depressions.

**EI-307 - Shelter Cave:** This lava-bubble cave is c. 10 to 15 meters deep and 4.5 meters wide inside; the entrance is small and was partially damaged by bulldozing prior to 1975. There is some midden deposit on the damp floor. Several waterworn cobbles were noted inside the cave. The roof of this lava bubble is pahoehoe; the upper surface has several abrader manufacturing depressions and scattered midden — predominately Cypraea caputserpentis L., with some Drupa ricina L. and Nerita picea Recluz. Unmodified coral (Porites sp.) and a fragment of scoriaceous lava abrader were also seen.

1.7.1.3 Significant Assessment

Historic preservation review of sites in the project area by the Historic Sites Section of DLNR is ongoing. The significance of the archaeological sites at the project site has been determined by the Historic Sites Section, according to the criteria of the National and Hawaii Registers of Historic Places. The significant assessments were offered in an April 13, 1987 letter from DLNR to the applicant's consultant, Belt Collins & Associates, and later reaffirmed in a letter of June 17, 1987 from DLNR to Belt Collins, following a May 18, 1987 fieldcheck of these significant historic sites in the project area by a Historic Sites Section archaeologist. (Chapter XIII of this EIS contains copies of these letters.)

The Historic Sites Section's evaluation is that there are four significant historic sites in the hotel parcel and in the shoreline improvement area, and one site which is no longer significant:

**EI-305:** "No longer significant". This site did contain some information significant on the history of the area, but this information was inadequately recorded by Kirch (1979:28).

**EI-304, E2-32, E2-33:** Significant solely for their information content. These are small sites with some shallow and spatially restricted deposits (Kirch 1979). The significant information in these sites includes the architectural data and information contained in the deposits (including dates).

**Keanaupou Fishpond:** Significant for its information content (architectural details and possible fishpond sediments) and as a good example of a site type, a fishpond established in an anchialine pond.

The applicant agrees with the above evaluations and will check with the County Planning Department for its concurrence.
1.7.2 **Probable Impacts**

The impacts on the three significant sites, El-304, E2-32 and E2-33, have yet to be determined. The applicant intends to perform archaeological data recovery to recover the significant information in the sites, according to the mitigation plan proposed by the Historic Sites Section (see section 1.7.3 following). If the archaeological data recovery is acceptable, the Historic Sites Section states that there would be "no adverse effect".

The Historic Sites Section has also determined that there will be a "beneficial effect", if the fishpond is restored properly. The applicant intends to restore the pond as part of its shoreline improvement projects.

The County Planning Department will be consulted as to the effects to the above significant sites.

In addition, should new sites be uncovered during construction, all activity in the immediate area will cease and the appropriate State and County agencies notified. It is expected that at that time a collective decision will be made as to what action should be taken.

1.7.3 **Mitigation Measures**

The applicant is committed to acceptable mitigation treatments for each significant site. The fishpond will be properly restored and preserved and archaeological data recovery will be conducted for the three inland sites. The Historic Sites Section agrees with this and the County Planning Department will be consulted.

The following mitigation plan proposed by the Historic Sites Section will be the basis for the applicant's treatments. Later, detailed restoration and archaeological data recovery plans will be submitted to the County Planning Department and the Historic Sites Section for review and approval. The applicant expects the same two offices to verify acceptable completion of these plans.

MITIGATION PLAN AS PROPOSED BY
HISTORIC SITES SECTION, DLNR, JUNE 17, 1987

Kaanapou Fishpond. The following tasks are recommended to ensure proper restoration. Items 2-5 must be done by a professional archaeologist.

1. Clearing of vegetation. This does not need an archaeologist present, as long as no heavy machinery is taken to the edge of the pond. It probably will be desirable not to clear out all the trees; for example, coconuts and others probably can be left for shade and scenic effect.

2. Locate any additional archaeological features (such as abrader grinding basins) on the pahoehe on the very edge of the pond. This is a very easy task which should take no more than a few hours.

3. Map the fishpond's borders, including sites El-306 and -307 and any archaeological features found on the edge of the pond.
4. Document the appearance of the pond, with photographs.

5. Take 2 cores of the sediments, analyze the sediments, and attempt to radiocarbon date the initial use of the pond for aquaculture.

6. Produce an archaeological report documenting the archaeological work.

7. Remove sediments as desired, with heavy equipment allowed only where archaeological features are not present and with care to have such vehicles not scar the pahoehoe edge of the pond.

8. Restore the pond to operating conditions with care not to damage the archaeological remains and with care not to alter the visual integrity of the site.

INLAND SITES

The information in these sites will be applicable to a few general research questions on the prehistory of Kalahupua'a. Such research questions need to be clarified before fieldwork. And it should be clear just what information will be gathered from these sites to answer these questions.

1. El-304 -- Triple-C-shaped Enclosure. Data recovery should include:
   a. A scale map of the site.
   b. Representative collection of archaeological remains on the surface (shell midden, artifacts, manufacturing debris, volcanic glass, etc.).
   c. Test excavation of 3 m² (15%) if deposits are present. Stratigraphic profiles, with soil descriptions of each layer, must also be given.
   d. Laboratory analysis and description of food remains, artifacts, etc. -- including radiocarbon and/or volcanic glass hydration dating.
   e. Interpretations.

2. E2-32 -- Complex with 4-5 C-shaped enclosures, an oval enclosure and terrace, petroglyphs and grinding basins. Archaeological data recovery should include:
   a. Scale map of the site and its features.
   b. Detailed map of the oval enclosure and its associated terrace.
   c. Scale drawings of each petroglyph.
   d. 3 m² of excavations in the oval enclosure (c. 20% sample). Stratigraphic profiles, with soil descriptions of each layer, must also be given.
e. Representative test excavations in C-shaped enclosures which include deposits to further establish the range of time over which this site was used.

f. Laboratory analysis and description of food remains, artifacts, etc. — including radiocarbon and/or volcanic glass hydration dating.

g. Interpretations.

3. F2-33 — Cave with external walled area. Data recovery at this site should include:

a. Scale map of the site.

b. 20% excavation sample of the cave and test excavation outside. Stratigraphic profiles, with soil descriptions of each layer, must also be given.

c. Laboratory analysis and description of food remains, artifacts, etc. — including radiocarbon and/or volcanic glass hydration dating.

d. Interpretations.

A concluding section in the archaeological data recovery report should discuss the findings of the data recovery work related to the general research questions. This must at least refer back to an evaluation of Kalahuipua'a-wide patterns.
2.0 SOCIODEMOCNOMIC CONSIDERATIONS

2.1 PAST AND PRESENT SOCI-ECONOMIC CONDITIONS

2.1.1 Island of Hawaii

The Island of Hawaii contains over 4,000 square miles of land area, representing 62% of the total area of the State. The U.S. Census Bureau reports that the island's resident population was 92,691 as of 1980. The estimated population for mid-1985 had grown to 109,159, an 18% increase (Hawaii State Department of Planning & Economic Development, 1986). In general, the economy of Hawaii has been on the upswing. During 1986, gross business receipts and tax collections showed gains over the previous year. The total labor force and the number of people employed also saw substantial increases of 10% and 9%, respectively (First Hawaiian Bank, September/ October 1986). As a result, the number of jobs in the county jumped up by 8% during the year. The monthly average unemployment rate during 1986 was 7.8%.

2.1.1.1 Economic Activities

Tourism is quickly becoming the major economic factor on the Island of Hawaii. After several years of decline, the industry has made significant progress since 1985 and the future appears to be even brighter. Total visitor expenditures reached $285.9 million in 1985, an increase of 60% since 1981. The total inventory of hotel and resort condominium units in February 1986 was 5,226 and 2,041, respectively. During 1985, the monthly average hotel occupancy rate was 57.6%. The most recent figures (November 1986) show that the occupancy rate had risen to 64.4% (Pacific Business News, January 12, 1987, p. 9).

The result of the closing of the Puna Sugar Co. in September of 1984 was an 18% decrease in the island's production of sugar during 1985. The three remaining companies, Hamakua Sugar, Hilo Coast Processing Co., and Ka'u Agribusiness Co., are hoping for improvements in the sugar price support levels in order to maintain stable operations. In the meantime, they are exploring alternative activities such as the production of electricity, sugar cane syrups, macadamia nuts, and cattle feedlot operations (Hawaii Business, November 1986, p. 34).

In contrast to sugar production, diversified crops continued to increase in overall production and value. The $79.1 million value of production in 1985 represents a 16% increase over the previous year. The livestock industry has remained stable during the 1980’s, with production totaling over $22 million in 1985 (Ibid, p. 36).

The importance of high tech industries to the county's economy is evidenced by the expansion of existing operations and the introduction of new ones. New observatories are under construction atop Mauna Kea, and additional support facilities are underway in Waimea and Hilo. The Natural Energy Laboratory of Hawaii (NELH), adjacent to the Keahole Airport, is increasing the commercialization of aquaculture projects that have until recently been generally experimental in nature. Successful operations are expected to move or expand into the neighboring Hawaii Ocean Science Technology (HOST) Park, which began construction at the end of 1986.
These economic activities, plus others such as retail sales, construction, and the production of energy from alternative energy sources, all combine to form a broad foundation for the island's economy, although tourism remains clearly dominant.

2.1.1.2 Settlement Patterns

Hawaii Island is dominated by five large shield volcanoes (Mauna Kea, Mauna Loa, Hualalai, Kohala, and Kilauea), which create a great diversity in climate. This diversity has strongly influenced the settlement of the island. The eastern, or "windward", slopes of the island are wet, with rainfall exceeding 300 inches per year in some areas. The western, or "leeward", side of the island is largely very dry, with some locations considered to have true desert conditions.

With irrigation less of a requirement, agricultural lands on the windward side of the island became widely used for sugar production. The natural deep-water harbor at Hilo had for many years made the area a center of population on the island. Hilo became the natural port for the shipment of sugar to the west coast and the town grew along with the expansion of the industry. By 1980, Hilo's population of 35,269 represented nearly 40% of the entire county total. Many small communities along the windward side, from North Kohala all the way to the southern part of the island in Ka'ū, originated due to the influence of sugar production.

The dry conditions in leeward Hawaii create an ideal situation for ranching activities. Such activities have indeed played a major role in the area and are responsible for growth in the Waima area. To the south in the Kona area, the production of coffee was a major force for settlement patterns until the 1960's when the area began to experience a tourist industry "boom".

2.1.1.3 Demographic and Housing Data

Tables IV-5 through IV-8 provide detailed demographic and housing data from the U.S. Census Bureau for years 1970 and 1980. Information is shown for the entire County of Hawaii and for individual districts or census tracts that are used for determining the primary and secondary study areas. Some noteworthy characteristics or changes that occurred during the decade of the 1970's in the county include the following:

- The ethnic composition of the island's population made some relatively large changes during the 10-year period. The number of Hawaiians as a percentage of the total population increased from 12 to 19 percent, while the percentage of Caucasians increased from 29 to 35 percent. The percentage of Japanese in the population decreased from 38 to 27 percent.

- The percentage of the population with four or more years of college doubled.

- The percentage of families living below the poverty level rose slightly to over 10 percent.

IV-46
<table>
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<th>Table IV-5</th>
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<tr>
<td><strong>Total Population and Demographic Breakdown:</strong> County of Hawaii, and Primary and Secondary Study Areas, 1970 and 1980</td>
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<th>COUNTY OF HAWAII</th>
<th>SOUTH KOHALA</th>
<th>NORTH KOHALA</th>
<th>NORTH KONA</th>
<th>SOUTH KONA</th>
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<td>TOTAL POPULATION</td>
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<td>9.3</td>
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| Median age (yr.) | 28.9 | 29.4 | 28.1 | 29.3 | 27.3 | 31.9 | 28.4 | 28.9 | 29.7 | 29.7 | 31.6 | 32.2 |

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<td>0.7</td>
<td>NC</td>
<td>3.1</td>
<td>NC</td>
<td>3.0</td>
<td>NC</td>
<td>1.2</td>
<td>NC</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EDUCATION* (selected-people aged 25+)</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
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<tbody>
<tr>
<td>0-8 years only</td>
<td>37.2</td>
<td>29.1</td>
<td>24.1</td>
<td>8.6</td>
<td>44.2</td>
<td>29.0</td>
<td>28.9</td>
<td>8.0</td>
<td>26.1</td>
<td>23.6</td>
<td>45.7</td>
</tr>
<tr>
<td>HS school only</td>
<td>31.6</td>
<td>35.5</td>
<td>34.2</td>
<td>37.0</td>
<td>30.0</td>
<td>39.0</td>
<td>66.0</td>
<td>40.9</td>
<td>21.9</td>
<td>33.8</td>
<td>27.3</td>
</tr>
<tr>
<td>College, 4+ yr.</td>
<td>7.5</td>
<td>15.2</td>
<td>13.1</td>
<td>21.8</td>
<td>9.1</td>
<td>6.8</td>
<td>19.8</td>
<td>6.4</td>
<td>12.6</td>
<td>5.3</td>
<td>9.8</td>
</tr>
</tbody>
</table>

Notes: **Figures based on 15% sample; hence, numbers represent estimate.**

*Including persons born in U.S. territories, and persons born abroad or at sea to American parent/s.

**NC** = 1970 categories or bases "Not Comparable" to 1980. 1970 Census kept a "non-response" category, while 1980 Census allocated non-responses to other categories shown.

Table IV-6

Family Characteristics and Income Levels: County of Hawaii, and Primary and Secondary Study Areas, 1970 and 1980

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>as % of total population</td>
<td>N/A</td>
<td>81.7%</td>
<td>N/A</td>
<td>4.1%</td>
<td>N/A</td>
<td>2.8%</td>
</tr>
<tr>
<td>NUMBER OF FAMILIES</td>
<td>14,533</td>
<td>22,625</td>
<td>533</td>
<td>1,204</td>
<td>741</td>
<td>826</td>
</tr>
<tr>
<td>HEAD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Husband/wife</td>
<td>87.1%</td>
<td>82.1%</td>
<td>90.1%</td>
<td>79.7%</td>
<td>88.0%</td>
<td>84.0%</td>
</tr>
<tr>
<td>Male only</td>
<td>5.2%</td>
<td>5.2%</td>
<td>3.6%</td>
<td>7.6%</td>
<td>6.7%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Female only</td>
<td>7.7%</td>
<td>12.7%</td>
<td>6.4%</td>
<td>12.7%</td>
<td>5.3%</td>
<td>9.8%</td>
</tr>
<tr>
<td>WITH OWN CHILDREN UNDER 18</td>
<td>57.4%</td>
<td>52.7%</td>
<td>63.2%</td>
<td>51.6%</td>
<td>58.0%</td>
<td>52.2%</td>
</tr>
<tr>
<td>Female head</td>
<td>4.0%</td>
<td>7.4%</td>
<td>4.5%</td>
<td>9.1%</td>
<td>2.2%</td>
<td>5.9%</td>
</tr>
<tr>
<td>BELOW POVERTY LEVEL</td>
<td>9.7%</td>
<td>10.3%</td>
<td>11.8%</td>
<td>5.7%</td>
<td>10.6%</td>
<td>12.2%</td>
</tr>
<tr>
<td>1980 MEDIAN FAMILY INCOME</td>
<td>$19,132</td>
<td>$17,924</td>
<td>$15,719$</td>
<td>$21,100$</td>
<td>$19,128$</td>
<td>$19,107$</td>
</tr>
</tbody>
</table>

Notes: All figures (except "Population in Families") based on 10% sample; hence, numbers represent estimates. "N/A" = "Not Available" in published form. However, other published 1970 and 1980 census data lead to the conclusion that families generally comprised a smaller percentage of Hawaii's 1970 population than of the 1980 total.

Sources: U.S. Bureau of the Census, 1970 Census of Population and Housing—Census Tracts—Honolulu, Hawaii, PHC(1)-89;
### Table IV-7

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL EMPLOYED</strong></td>
<td>25,100</td>
<td>39,150</td>
<td>912</td>
<td>1,978</td>
<td>1,330</td>
<td>1,230</td>
</tr>
<tr>
<td><strong>CIVILIAN LABOR</strong></td>
<td>25,100</td>
<td>41,506</td>
<td>751</td>
<td>2,110</td>
<td>1,355</td>
<td>1,335</td>
</tr>
<tr>
<td>% unemployed</td>
<td>5.7</td>
<td>7.0</td>
<td>1.1</td>
<td>6.3</td>
<td>1.9</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>OCCUPATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>service</td>
<td>16.3</td>
<td>16.5</td>
<td>15.9</td>
<td>10.0</td>
<td>23.9</td>
<td>34.2</td>
</tr>
<tr>
<td>manager/professional</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>technical, sales</td>
<td>NC</td>
<td>20.0</td>
<td>NC</td>
<td>20.6</td>
<td>NC</td>
<td>15.2</td>
</tr>
<tr>
<td>&amp; administers</td>
<td>NC</td>
<td>26.1</td>
<td>NC</td>
<td>19.2</td>
<td>NC</td>
<td>13.7</td>
</tr>
<tr>
<td>farming/fishing/forestry</td>
<td>NC</td>
<td>10.5</td>
<td>NC</td>
<td>14.0</td>
<td>NC</td>
<td>14.2</td>
</tr>
<tr>
<td>precision, draft,</td>
<td>NC</td>
<td>12.7</td>
<td>NC</td>
<td>16.5</td>
<td>NC</td>
<td>9.7</td>
</tr>
<tr>
<td>repair</td>
<td>NC</td>
<td>14.4</td>
<td>NC</td>
<td>11.8</td>
<td>NC</td>
<td>12.9</td>
</tr>
<tr>
<td>operators, fabricators, laborers</td>
<td>NC</td>
<td>14.4</td>
<td>NC</td>
<td>11.8</td>
<td>NC</td>
<td>12.9</td>
</tr>
<tr>
<td><strong>INDUSTRY (selected)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agriculture, forestry</td>
<td>12.5</td>
<td>11.2</td>
<td>N/A</td>
<td>16.8</td>
<td>N/A</td>
<td>8.1</td>
</tr>
<tr>
<td>construction</td>
<td>10.6</td>
<td>9.1</td>
<td>13.6</td>
<td>12.3</td>
<td>2.2</td>
<td>5.0</td>
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<tr>
<td>manufacturing</td>
<td>15.0</td>
<td>8.3</td>
<td>2.3</td>
<td>5.1</td>
<td>29.3</td>
<td>8.1</td>
</tr>
<tr>
<td>retail trade</td>
<td>14.8</td>
<td>17.5</td>
<td>15.9</td>
<td>13.8</td>
<td>2.9</td>
<td>7.0</td>
</tr>
<tr>
<td>financial/insurance</td>
<td>2.8</td>
<td>5.7</td>
<td>3.5</td>
<td>7.6</td>
<td>1.1</td>
<td>2.3</td>
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<td>real estate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>personal, entertain</td>
<td>11.2</td>
<td>10.9</td>
<td>N/A</td>
<td>16.0</td>
<td>N/A</td>
<td>31.4</td>
</tr>
<tr>
<td>&amp; recreation services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>health/educ/professional</td>
<td>14.1</td>
<td>16.7</td>
<td>15.9</td>
<td>14.0</td>
<td>14.7</td>
<td>20.5</td>
</tr>
<tr>
<td>public admin.</td>
<td>6.8</td>
<td>7.3</td>
<td>3.1</td>
<td>2.1</td>
<td>3.5</td>
<td>6.1</td>
</tr>
<tr>
<td><strong>COMPUTE TO WORK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 minutes + (%)</td>
<td>N/A</td>
<td>6.0</td>
<td>N/A</td>
<td>13.9</td>
<td>N/A</td>
<td>22.6</td>
</tr>
<tr>
<td>mean travel (min.)</td>
<td>N/A</td>
<td>16.3</td>
<td>N/A</td>
<td>21.7</td>
<td>N/A</td>
<td>24.1</td>
</tr>
</tbody>
</table>

Notes: All figures based on 10% sample; hence, numbers represent estimates.

**N/A** = "Not Available" in published form. "NC" = 1970 categories or base "Not Comparable" to 1980 Census.

Sources: U.S. Bureau of the Census, 1970 Census of Population and Housing—Census Tracts—Honolulu, Hawaii, PC(1)-DB1
<table>
<thead>
<tr>
<th>Table IV-8</th>
<th>Housing Stock and Characteristics: County of Hawaii, and Primary and Secondary Study Areas, 1970 and 1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL YEAR-ROUND HOUSING UNITS</td>
<td>10,939</td>
</tr>
<tr>
<td>vacant (total)</td>
<td>%</td>
</tr>
<tr>
<td>vacant for sale</td>
<td>0.6</td>
</tr>
<tr>
<td>vacant for rent</td>
<td>2.0</td>
</tr>
<tr>
<td>TOTAL YEAR-ROUND OCCUPIED UNITS</td>
<td>17,260</td>
</tr>
<tr>
<td>TENURE</td>
<td>%</td>
</tr>
<tr>
<td>owner-occupied</td>
<td>56.9</td>
</tr>
<tr>
<td>renter-occupied</td>
<td>43.1</td>
</tr>
<tr>
<td>SELECTED CONDITIONS lacking some or all plumbing</td>
<td>17.1</td>
</tr>
<tr>
<td>1.5 or more persons/room</td>
<td>6.5</td>
</tr>
<tr>
<td>PERSONS/HOUSEHOLD</td>
<td>3.61</td>
</tr>
<tr>
<td>1980 MEDIAN RENT (renter-occupied)</td>
<td>$223</td>
</tr>
<tr>
<td>1980 MEDIAN VALUE (owner-occupied)</td>
<td>$70,300</td>
</tr>
</tbody>
</table>

Notes: * Median values are for non-condominium housing units.
The size of the civilian labor force grew by more than 15,000, representing a 58 percent increase.

The inventory of year-round housing units grew from 18,939 to 33,954, an increase of 79 percent.

Home ownership increased during the decade and the percent of units with sub-standard conditions was reduced significantly.

2.1.2 Primary Study Area

The primary study area (North Kohala and South Kohala Districts) is comprised of a single mountain forming a large peninsula on the northern side of the island. The mountain divides the area into a "dry side" on the western slope and a "wet side" to the east. Although ancient Hawaiian society inhabited both portions of the terrain, modern residents have until very recently located most economic and residential activities in the "wet side", which is more suitable for agriculture. The population of the area in 1980 was 7,856. By 1985 it had increased by nearly 25 percent to an estimated 9,761. The increase in tourist activity is generating a growing economy, while creating some strains on the area's infrastructure. The 1986 average unemployment rate in the area was 8.3 percent (Hawaii State Department of Labor and Industrial Relations).

2.1.2.1 Economic Activities

Largely during the last decade, the region's economy has been undergoing a transition from agriculture to tourism. This transition is specific to the South Kohala area, which has an economy very different from that in North Kohala. South Kohala's economy is experiencing rapid growth, while in North Kohala the growth is very limited.

Ranching continues to be a dominant factor shaping the physical character of the primary study area, but tourism has surpassed cattle operations as the leading economic activity during the 1980's. Three hotels along the South Kohala coastline — the 310-room Mauna Kea Westin, the 543-room Sheraton Royal Waikoloa, and the 351-room Mauna Lani Bay Hotel — incorporate the great majority of hotel rooms in the area. According to the Hawaii Visitor Bureau's Visitor Plant Inventory of February 1986, there were a total of 1,383 hotel and condominium units in North and South Kohala. A significant proportion of the $285.9 million generated by the tourist industry in 1985 can be attributed to facilities located in the primary study area.

Diversified agricultural operations play an important role in the economy throughout the primary study area. In North Kohala, the cattle industry utilizes the bulk of the land area and represents a significant source of income for the area. The production of macadamia nuts has recently begun to utilize lands laid fallow with the closing of the sugar plantation in the mid-1970's. Today, there are several hundred acres of macadamia nuts in the area. Flower and nursery products, and to a lesser degree vegetables, are also produced in the area.
Parker Ranch maintains approximately 223,000 owned and leased acres of ranch land and 50,000 head of cattle. Waihe'e is the most productive area in the State for vegetable crops. Approximately 1,000 acres are used for production in the Lalamilo Homestead area. Major commodities include cabbages, celery, lettuce, daikon (turnip), peppers, broccoli, and carrots. Waihe'e is also a major producing area of roses.

Kawaihae Harbor is a commercial deep water harbor located in South Kohala. The facility handles receipts and shipments of general cargo, shipments of bulk raw sugar, molasses, lava cinders, petroleum products, and bulk fertilizers. In 1985, the harbor handled 449 million tons of cargo (personal communication, Clement Uemura, Planner, Hawaii State Department of Transportation, August 27, 1986).

The construction industry has grown in the primary study area during recent years. The release of marginal lands by the Parker Ranch has opened the way for residential subdivisions on both the eastern and western sides of Waihe'e. The availability of Hawaiian Homestead lands has also generated growth. The construction of the HALEIWA Belt Highway, the new highway between Kawaihae and Mahukona, and the Queen Ka'ahumanu highway to North Kona have all increased the accessibility throughout the entire primary study area.

Other diverse elements of the area's economy include the basecamp for the Canada-France-Hawaii Telescope Corporation, which operates an observatory on Mauna Kea, and the Hawaii Preparatory Academy.

2.1.2.2 Settlement Patterns

Until 1975, North Kohala was dominated by activities related to the cultivation and processing of sugar cane. The area is actually comprised of six villages (Hawi, Kapaa, Halaula, Makapala, Halsawa, and Niulii) and during the past one hundred years hosted a number of sugar mills. As was the case with most sugar plantations throughout Hawaii, waves of immigrants were brought in to cultivate the cane in North Kohala, resulting in today's ethnically varied population.

South Kohala encompasses the high plains area of the Kohala mountains, extending down to the dry coastal region which includes the small residential communities of Pu'ukohola, Kawaihae Village, and Waikoloa Village. South Kohala is dominated by the Parker Ranch, which creates a ranching lifestyle that is still evident in the area, especially in the town of Waihe'e (also known as Kamuela).

Founded by John Palmer Parker in the early 1800's, the ranch grew under the supervision of Parker's descendants. Featuring a paternalistic provision of human services such as housing and health care similar to the sugar plantations in North Kohala, the ranch spawned a relatively homogeneous community in Waihe'e. This homogeneity was perpetuated by the relative absence of imported ethnic groups, other than the Spanish cowboys (Paniolos) originally brought to the ranch by its founder. In recent years, this homogeneity has been altered by an influx of second home owners, young professional families, resort workers, and Hawaiian homesteaders.
2.1.2.3 Demographic and Housing Data

During the 1970's, the most noticeable changes in the character of the primary study area occurred in South Kohala. The following list provides examples of some of the more important observations as seen in Tables 2.1 to 2.4:

- While the resident population of South Kohala nearly doubled, the population in North Kohala actually declined slightly.
- As observed in the county as a whole, Caucasian and Hawaiian populations grew significantly faster than other ethnic groups, while the Japanese population declined substantially.
- The percentage of South Kohala's population having four or more years of college rose to over 20 percent, much higher than the County average or other areas of the West Hawaii region.
- The percentage of families below the poverty level increased slightly in North Kohala, but significantly decreased in South Kohala. The 1980 median family income in both areas was well below that for the County as a whole.
- The entire area experienced a 77 percent increase in year-round housing units between 1970 and 1980. A large proportion of this was in South Kohala, where a sizeable increase in home ownership was also observed.

2.1.3 Secondary Study Area

The secondary study area is comprised of two physically and characteristically distinct regions. North and South Kona are located to the south of the primary study area, and Honokaa is located to the east. During the 1970's, the North Kona District had the highest growth rate (185 percent) in the County. South Kona also showed significant growth (48 percent). These increases were due to the visitor industry "boom" which centered on the town of Kailua-Kona. Construction of new hotels is moving northward but Kailua-Kona continues to grow as West Hawaii's major economic center. The 1986 average unemployment rate in North and South Kona was 6.0 percent (Hawaii State Department of Labor and Industrial Relations, 1987).

Honokaa is on the "wet" side of the island and strongly dependent on agricultural operations, primarily sugar. The population grew marginally during the 1970's (an increase of only 458), reflecting the general situation of the sugar industry. Unemployment in the area in 1986 was 6.0 percent.

2.1.3.1 Economic Activities

The town of Kailua-Kona in North Kona is the island's major tourist attraction and visitor destination area. It is characterized by an abundance of visitor-oriented activities and related support services for both visitors and residents. According to the Hawaii Visitor Bureau, there were 4,489 hotel and condominium units in the Kona area as of February 1986 (personal communication, Aqua Miga, Research Specialist, February 19, 1987). Recent growth has also occurred at the Keauhou resort complex south of Kailua.
The Kona region (both North and South districts) has long been recognized for coffee production in its "coffee belt" areas. The value of coffee sales during the 1984-85 season totaled $4.8 million, down from $6.3 million during the previous season. Despite this decrease, the future prospects of the industry in Kona appear to be promising. Macadamia nuts have become a significant factor in South Kona's economy. A majority of the island's 15,460 acres in crop in 1984 were located in the Honomalino area (Hawaii State Department of Agriculture, 1985). Other major agricultural activities in Kona include cattle ranching, the growing of fruits/citrus crops (avocados, bananas, oranges, and tangerines), and vegetable farming (particularly winter tomatoes).

The Natural Energy Laboratory of Hawaii (NELH) is a major research facility located on 328 acres of waterfront land adjacent to Keahole Airport. It is the only research facility in the world offering both warm and deep cold ocean water for ocean thermal energy conversion (OTEC) research. Several years ago, cold water brought to the surface for OTEC systems was tested to determine if it could be used for growing abalone. The success of these tests led to the initiation of a major commercial demonstration project at NELH. More recently, the Cyanotech Corporation has begun the commercial production of algae for use as food supplements, fertilizers, and pharmaceuticals. Product sales amounted to $93,000 in 1985. This figure is expected to rapidly increase in the coming years.

Transportation is an important economic activity in Kona. The Keahole Airport, which receives direct scheduled passenger flights from the U.S. mainland, is planned for expansion to facilitate accommodation of return flights overseas and to the mainland. The number of aircraft operations (arrivals and departures) during 1984 totaled 83,320, handling over one million passengers.

In Honokaa, sugar remains the primary economic activity, although an overall smaller source of employment due to mill consolidations and increased mechanization.

Macadamia nut growing and processing has also become an important agricultural activity in the area. The Hamakua Sugar Co. has also recently opened a feed lot on former sugar land for the production of cattle. Secondary wage earners (e.g., housewives) are also believed to commute to resort jobs in Kohala, although the proportion of the labor force in the Honokaa Kukuihaele census tract which was engaged in service occupations actually declined from 20 percent in 1970 to 11 percent in 1980 (see Table 2.3).

The town of Honokaa has, in recent years, undergone a revitalization of commercial activity. Although quantitative data are not readily available, it would appear that employment opportunities created by both an expanding visitor industry and the new "mac nut" operations, coupled with residential growth in the area, have injected new life into the economy.

2.1.3.2 Settlement Patterns

Before the growth of tourism during the 1960's, the Kona region of the Big Island was primarily agricultural in both character and economy. A majority of all working persons were directly involved in agriculture and most
other were employed in agricultural support services. Principal activities included coffee production and cattle ranching. Smaller fruit and produce operations also were important in the area.

Wide fluctuations in the world coffee market endangered the stability of the area until the introduction of tourism. Hotels flourished in North Kona, while the neighboring district of South Kona has remained primarily agricultural and little-populated.

The Honokaa-Kukuhihaele area is the most populous along the Hamakua coast. Honokaa is the principal urban area, marking the northern end of what was once considered the gold coast of the Big Island. The cultivation of sugar has dominated life in this region from the mid-1900's to the present. The construction of the Hamakua ditch in 1876-77 ensured that water from Kohala's "wet side" would be available to irrigate land on the eastern slopes of Mauna Kea. Completion of the irrigation system, together with the development of an elaborate railway network along the Hamakua coast, secured the area as one of the prime cane production regions in the Hawaiian islands.

Similar to plantation in Kohala, waves of immigrant laborers followed, contributing to the multi-ethnic composition of today's population. Also, as with the Kohala plantations, sugar production started becoming less profitable due to falling prices on the world market. However, unlike the Kohala plantations which eventually went out of business, operations on the Hamakua coast consolidated as mills began to close. Out of approximately a dozen mills, only two remain.

2.1.3.3 Demographic and Housing Data

Significant demographic characteristics in the secondary study area in 1980 (as shown in Table 2.1 to 2.4) include:

- Changes in the ethnic makeup of the population were similar in the Kona region as in the primary study area. The North Kona district, in particular, became more than 50 percent Caucasian by 1980.

- The North Kona population in particular became characterized by a high degree of transience. Nearly one-third had been living off-island in 1975. In contrast, only 18 percent of residents in South Kona and 15 percent of those in Honokaa had been living off-island in 1975.

- Although there was improvement during the 1970's, the educational level of residents in Honokaa remained low compared to the County average.

- The residents of North Kona enjoyed the island's highest median income.
2.2 PROBABLE SOCIO-ECONOMIC IMPACTS

2.2.1 Introductory Statements

Most of the following socio-economic impact sections were prepared on a subcontract basis for Belt Collins & Associates by Community Resources, Inc. Their work is based on data sources available as of April 1, 1987. Environmental Capital Managers, Inc. prepared an analysis of fiscal impacts, which is summarized in Section 2.2.9.

2.2.1.1 Methodological Requests from County of Hawaii

This socio-economic impact assessment uses a number of new methodological approaches, based on several requests from the Hawaii County Planning Department.

Standardized County Methods: The County Planning Department recently contracted with Decision Analysts Hawaii, Inc. (1986) to recommend standard methodological approaches for estimating West Hawaii resort development impacts on employment, population, and housing. The Department requested that the Decision Analysts Hawaii, Inc. (DAHI) approach be utilized in this EIS unless reasons for alternative approaches could be justified.

DAHI has generally followed this new DAHI approach for on-site population and islandwide employment estimates. As noted in later sections, variations of the DAHI approach are used for off-site population and housing impacts.

Cumulative Impacts Over Ten Years: The Planning Department also requested that impact work related to the Ritz-Carlton Mauna Lani be conducted in a cumulative context, taking into account other West Hawaii resort developments (and new non-resort development) projected to start up during the ten-year period from 1988 to 1998.

At the present time, resort developer schedules are available only for the Ritz-Carlton, the South Kohala Resort, and the Hyatt Regency Waikoloa. A great number of other projects are planned and proposed, but the long lead time required for resort developments (related to governmental permitting, architectural programming and design, and financial factors) makes it unlikely that many other hotels will open during the initial half of the ten-year timeframe. However, it is probable that one other West Hawaii hotel in the first class to luxury category will become operational during the first five years of impact analysis. For analysis purposes, a 500-unit luxury "Hotel X" is assumed to come on-line in July 1991, between the Ritz-Carlton and South Kohala Resort hotel openings. Accordingly, only these projects which are more likely to be built than others, were included in the analysis for the first five years.

For the second five years, CRI utilized official Hawaii State Department of Planning and Economic Development (1984) forecasts for Big Island resort development to generate a scenario for other new West Hawaii resort openings in the middle and late 1990's. The exact procedure is described in a technical document which has been submitted to the County (Community Resources, Inc., 1987). This method was used for the second five years because, with the exception of the South Kohala Resort residential units and the additional 200 Ritz-Carlton hotel units, resort developer schedules are lacking.
Table IV-9 summarizes the assumed cumulative West Hawaii resort development for the 1988-98 period. It should be noted that the scenario for 1994-98 (based on the official State figures) suggests a sustained level of new resort construction such as the Big Island has never actually historically experienced. This means that impacts for this period may well be overestimated in this report -- i.e., it is in some ways a "worst-case" scenario.

**Joint Impact Assessment:** Because Belt Collins and Associates (and subcontractor CRI) are preparing assessments for the proposed nearby South Kohala Resort as well as for Ritz-Carlton, it was suggested that a cumulative impact assessment using similar methods would naturally lead to a joint study for both clients. Therefore, many of these socio-economic calculations will appear in both EIS's.

### 2.2.1.2 Original Research Conducted for this Report

**Hotel Employee Survey:** Community Resources, Inc. (and Datametric Research, 1987) surveyed employees in the existing two South Kohala luxury hotels -- the Mauna Lani Bay Hotel and the Westin Mauna Kea. Results of this survey (referred to as the "Employee Survey") will be used here to address issues such as housing impacts and social factors related to hotel employment. A copy of the survey report has been filed with the County Planning Department.

**Micro-Computer Modeling:** CRI has developed a number of inter-related new models in response to the County requests for new methods and a cumulative context. These models include population projection methods, employment forecasts, labor supply/demand analyses, and on-site housing impacts. Key features of each model will be briefly discussed in appropriate following sections, but more complete descriptions of the models are contained in a technical document submitted to the County Planning Department (Community Resources, Inc., 1987).

**Social Data for West Hawaii:** In Section 2.2.7, CRI presents results of an original analysis of data on social indicators (e.g., crime rates) vs. resort development, in order to indicate possible relationships.

### 2.2.2 On-Site Population

On-site population includes both visitors and permanent residents of resort condominium and single-family units. The reason for addressing on-site population separately from off-site population (i.e., new employees and their families) is that the DAHT method requested by the County begins by calculating both on-site population and numbers of permanent jobs from a set of common assumptions about use of resort units (for visitors vs. residents), occupancy rates, and average party size.

These basic assumptions are presented in Table IV-10. The following Table IV-11 provides an example of the exact methods for calculating resort population (a procedure which also produces some information required for calculating total employment, which will be discussed in a later section). Finally, Table IV-12 contains projections of on-site population, both for the Ritz-Carlton and for all cumulative new resort development.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ritz-Carlton</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single-Family</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Other Identified Projects</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hurai Waikoloa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single-Family</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>South Kohala Resort</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single-Family</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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<td><strong>Assumed Other Projects</strong></td>
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<tr>
<td>Hotel Units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single-Family</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1260</td>
<td>0</td>
<td>450</td>
<td>500</td>
</tr>
<tr>
<td>Hotel Units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single-Family</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note: Opening date schedules are likely to be more reliable for 1988-93, whereas the schedule for 1994-1998 is more theoretical, based on CHI interpretation of official State forecasts.*
Table IV-10
Assumptions About Resort Unit Use, Occupancy, Party Size, and Employment Multipliers

<table>
<thead>
<tr>
<th></th>
<th>Hotel</th>
<th>Condominium</th>
<th>Single-Family</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERCENT OF UNITS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IN VISITOR USE</strong></td>
<td>100%</td>
<td>50%</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Occupancy Rate</strong></td>
<td>70%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Average Party Size</strong></td>
<td>1.9</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>On-Site FTE Jobs/Unit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>—Ritz Add-On</strong></td>
<td>1.2</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>—Other Luxury Units</strong></td>
<td>1.4</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>—Non-Luxury Units</strong></td>
<td>1.0</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Luxury Adjustment Factor (jobs/unit, applicable to luxury units only)</strong></td>
<td>0.35</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>PERCENT OF UNITS IN PART-TIME RESIDENT USE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Occupancy Rate</strong></td>
<td>0.0%</td>
<td>25%</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Average Party Size</strong></td>
<td>0.0</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>On-Site FTE Jobs/Unit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For use in estimating on-site employment when no other information is available. For the initial 450-unit phase of the Ritz-Carlton, however, on-site employment figures are given in Table IV-15.*
### Table IV-11:

**Example of Procedures for Calculating On-Site Population**

**(Example of Initial Ritz-Carlton 450 Units)**

<table>
<thead>
<tr>
<th>Units</th>
<th>Party Size</th>
<th>Peak Population</th>
<th>Average Occupancy</th>
<th>Average Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Source: calculated from assumptions in Table 2.6]</td>
<td>[A: from Table 2.6]</td>
<td>[B: from Table 2.6]</td>
<td>[C: equals A x B]</td>
<td>[D: from Table 2.6]</td>
</tr>
<tr>
<td><strong>RESORT RESIDENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominiums, Part-Time Use</td>
<td>0</td>
<td>2.0</td>
<td>N/A*</td>
<td>25%</td>
</tr>
<tr>
<td>Condominiums, Full-Time Use</td>
<td>0</td>
<td>2.0</td>
<td>N/A*</td>
<td>95%</td>
</tr>
<tr>
<td>Single-Family House, Part-Time Use</td>
<td>0</td>
<td>2.5</td>
<td>N/A*</td>
<td>25%</td>
</tr>
<tr>
<td>Single-Family House, Full-Time Use</td>
<td>0</td>
<td>2.5</td>
<td>N/A*</td>
<td>95%</td>
</tr>
<tr>
<td><strong>DAILY VISITORS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Rooms</td>
<td>450</td>
<td>1.9</td>
<td>655</td>
<td>70%</td>
</tr>
<tr>
<td>Condominiums, Visitor Use</td>
<td>0</td>
<td>2.1</td>
<td>0</td>
<td>50%</td>
</tr>
<tr>
<td>Single-Family House, Visitor Use</td>
<td>0</td>
<td>2.5</td>
<td>0</td>
<td>25%</td>
</tr>
<tr>
<td><strong>TOTAL VISITORS AND RESIDENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>655*</td>
<td></td>
<td>599</td>
</tr>
<tr>
<td><strong>Weighted Averages:</strong></td>
<td></td>
<td></td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>Adjusted Islandwide Employment Multiplier</td>
<td>1.75 x (70%/65%) x (1.90/1.85) = 1.84**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

* Resident population based only on average, since fluctuations would be minor. "Peak Total" thus is sum of peak visitor population plus standard resort resident population.

** Information calculated at this stage for later use in estimating islandwide employment impacts.
Table IV-12:
Projected On-Site Population
Ritz-Carlton and West Hawaii Resorts 1988 - 1998

<table>
<thead>
<tr>
<th></th>
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<td>0</td>
<td></td>
<td>0</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>Waikolo]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Ritz-Carlton]</td>
<td>1676</td>
<td>599</td>
<td>665</td>
<td>493</td>
<td>4922</td>
<td></td>
</tr>
<tr>
<td>[500-unit</td>
<td>2394</td>
<td>855</td>
<td>950</td>
<td>723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Hotel X,&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>1676</td>
<td>599</td>
<td>665</td>
<td>493</td>
<td>4922</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>2394</td>
<td>855</td>
<td>950</td>
<td>723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents:</td>
<td></td>
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<tr>
<td>avg.:</td>
<td>1676</td>
<td>599</td>
<td>665</td>
<td>493</td>
<td>4922</td>
<td></td>
</tr>
<tr>
<td>peak:</td>
<td>2394</td>
<td>855</td>
<td>950</td>
<td>723</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
<th>1997</th>
<th>Total</th>
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<tbody>
<tr>
<td>[Ritz Add-on]</td>
<td>286</td>
<td>286</td>
<td>286</td>
<td>286</td>
<td>1430</td>
</tr>
<tr>
<td>[Ritz]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>779</td>
<td>779</td>
<td>779</td>
<td>779</td>
<td>266</td>
</tr>
<tr>
<td>Visitors:</td>
<td>1233</td>
<td>1233</td>
<td>1233</td>
<td>1233</td>
<td>390</td>
</tr>
<tr>
<td>avg.:</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
<td>286</td>
</tr>
<tr>
<td>peak:</td>
<td>1519</td>
<td>1519</td>
<td>1519</td>
<td>1519</td>
<td>380</td>
</tr>
<tr>
<td>Total</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
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<tr>
<td>Total</td>
<td>1519</td>
<td>1519</td>
<td>1519</td>
<td>1519</td>
<td>380</td>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>0</td>
</tr>
<tr>
<td>Daily</td>
<td>0</td>
</tr>
<tr>
<td>Residents:</td>
<td>0</td>
</tr>
<tr>
<td>avg.:</td>
<td>1481</td>
</tr>
<tr>
<td>peak:</td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Resort</td>
<td></td>
</tr>
<tr>
<td>Residents:</td>
<td></td>
</tr>
<tr>
<td>avg.:</td>
<td></td>
</tr>
<tr>
<td>peak:</td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td>avg.:</td>
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<tr>
<td>peak:</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
Results for Ritz-Carlton: No permanent resident population is anticipated for the Ritz-Carlton. When the initial 450 units open in 1990, the average daily visitor census is expected to be about 600 guests, with peak daily visitor count of about 850 should occupancy ever reach 100 percent. With the additional 200 units tentatively assumed to open in 1998, the average daily visitor count would rise to 865, with peak daily count of 1,235 guests.

Cumulative Results: For all new West Hawaii resort units assumed to open by 1993, the average population on any one day would total about 3,500 people (roughly 1.5 percent of whom would be permanent resort residents), and the peak capacity would total some 5,000 people if visitor units should ever reach 100 percent occupancy levels. Extending the timeframe to 1998 -- including the very heavy resort development scenario implied by the official State forecasts -- the average daily on-site population would total about 8,800 people (17 percent of them permanent residents) and peak on-site population would be approximately 12,500 people.

2.2.3 Employment Impacts

Resort development generates both short-term jobs (during the construction phase) and permanent jobs (during the operational phase). In addition to on-site direct jobs, employment is also generated when resorts purchase goods or services from other businesses ("indirect" employment) and when employees spend their wages in the local economy ("induced" employment). Visitors also generate some "off-site direct" jobs when they spend money off the resort grounds (e.g., ground or air transportation, tours, purchases from roadside vendors, etc.); for construction, "off-site direct" jobs might include contractors' administrative personnel in company headquarters.

The DAHI approach ignores some of these distinctions, focusing only on islandwide total employment. However, in order to estimate how much of the islandwide employment will be located in the West Hawaii "Study Area," CRIF retains some of the distinctions in employment categories for construction jobs.

2.2.3.1 Construction Period

Using the example of the initial 450-unit Ritz-Carlton hotel, Table IV-13 shows the assumptions and methodology -- generally based on the County's requested DAHI approach -- which are utilized to calculate construction jobs. Table IV-14 shows complete results, for both the Ritz-Carlton and the cumulative West Hawaii resort development scenario.

Results for Ritz-Carlton: For the estimated 24-month construction period from 1988 to 1990, the average daily construction employment is forecast as: about 240 on-site workers, another 150 jobs elsewhere in the West Hawaii Study Area, and another 60 elsewhere on the Big Island, for a Big Island total of about 450.

The later 200-unit add-on will require fewer construction workers, since there will be no need to build additional lobbies, kitchens, etc. From 1996 to 1998, the estimated number of jobs generated by Ritz-Carlton construction would be: 80 on-site workers, 50 elsewhere in the Study Area, and 20 elsewhere on the island, for a Big Island total of about 150.
### Table IV-13

Example of Procedures for Calculating Total Construction Employment

**Ritz-Carlton 450 Units in 1990**

<table>
<thead>
<tr>
<th>A. Total Direct Statewide Employment</th>
<th>Multiplier(1)</th>
<th>Total Direct Jobs(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel Units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---Luxury</td>
<td>1.35</td>
<td></td>
</tr>
<tr>
<td>---Non-Luxury</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Condominium Units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---Luxury</td>
<td>1.62</td>
<td></td>
</tr>
<tr>
<td>---Non-Luxury</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>Single-Family Units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---Luxury</td>
<td>2.70</td>
<td></td>
</tr>
<tr>
<td>---Non-Luxury</td>
<td>2.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Allocation by Area</th>
<th>Study Area</th>
<th>Rest of Island</th>
<th>Big Island</th>
<th>State TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Site</td>
<td>243 (3)</td>
<td>0</td>
<td>243</td>
<td>243</td>
</tr>
<tr>
<td>Off-Site</td>
<td>15 (5)</td>
<td>15</td>
<td>30</td>
<td>61</td>
</tr>
<tr>
<td>(SUBTOTAL)</td>
<td>258</td>
<td>15</td>
<td>273 (4)</td>
<td>304</td>
</tr>
<tr>
<td>Indirect/Induced</td>
<td>133 (7)</td>
<td>45</td>
<td>178 (6)</td>
<td>N/A (8)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>391</td>
<td>60</td>
<td>451</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(1) Employment multipliers for non-luxury units are from DAHI (1986). CRI produced the adjusted luxury multipliers in a parallel manner to DAHI's 0.35 "luxury adjustment factor" for operational jobs. See Table IV-17.

(2) Statewide direct employment calculated by multiplying the number of units by the employment multiplier, then dividing by the number of years for construction to be completed (two years for the Ritz-Carlton).

(3) Assumes 80 percent of statewide direct jobs to be on-site.

(4) Assumes 90 percent of statewide direct jobs to be on-island.

(5) Assumes 50 percent of off-site direct jobs to be located in Study Area, with the remainder located in rest of island.

(6) Islandwide indirect/induced jobs assumed to be total islandwide direct jobs multiplied by 0.65. The 0.65 multiplier for on-island indirect/induced employment is from the DAHI methodology.

(7) Assumes 75 percent of indirect/induced jobs to be located in Study Area, with the remainder located in rest of island.

(8) The DAHI methodology did not provide a multiplier for calculating indirect/induced jobs on a statewide level.
### Table IV-14:

Average Daily Resort Construction Employment — 1988 to 1996  
(All Numbers Represent Annual Equivalent Positions)

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<td><strong>RITZ-CARLTON</strong></td>
<td></td>
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<td>391</td>
<td>391</td>
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<td></td>
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</tr>
<tr>
<td>On-Site</td>
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<td>654</td>
<td>27</td>
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<td>263</td>
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<td>1013</td>
<td>908</td>
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<td></td>
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<td>1057</td>
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<td>Rest of Island</td>
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<td><strong>COMBINED TOTALS</strong></td>
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<tr>
<td>On-Site</td>
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<td>897</td>
<td>270</td>
<td>540</td>
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<td>572</td>
<td>1860</td>
<td>1703</td>
<td>1858</td>
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<td>1382</td>
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</tr>
</tbody>
</table>

**Note:** Each year or time period begins on the first of July, and ends at the end of the following June. The only exception is the 1988-1989 period, which is separated into two six-month periods. This was done in order to distinguish the last six months of construction at the Hyatt Regency Whiltema (estimated completion date at the end of 1988) from other ongoing projects during the 1988-1989 timeframe.

**##** For reasons given in text, this number is likely to be greatly overstated.
Cumulative Results: Cumulative construction employment numbers depend on assumptions about how many units will be built and in which timeframes. Thus, results of Table IV-14 are directly dependent on the assumptions about total resort development as shown in Table IV-9.

Given these assumptions, Table IV-14 indicates considerable variation in construction employment through 1993 (which reflects historic "busts" and "booms" in the construction industry), but sustained high numbers of construction jobs from 1994 to 1998.

Because Table IV-14 reports average job figures, it suggests there may be a particularly high number of construction workers in the Kohala area during the latter part of 1988, when construction on the Hyatt Regency Waikoloa is concluding and construction on the Ritz-Carlton is beginning, and another very high number in 1989-90, when construction on the Ritz-Carlton is commencing.

In reality, however, on-site employment reaches a peak in the middle part of the construction timeframe, and there are fewer workers required in the early and later stages. Based on actual data from construction of the Mauna Lani Bay Hotel (Mauna Lani Resort, Inc., 1980), CRI modeled separate "construction job curves" for the Hyatt Waikoloa, Ritz-Carlton, and "Hotel X." Figure IV-9 shows the results obtained by superimposing the Hyatt Waikoloa and Ritz-Carlton curves alone from January 1988 (when the Hyatt will actually have passed its peak) to the end of the Ritz construction period. Figure IV-9 adds in the hypothetical "Hotel X."

Under both scenarios, during the Ritz construction period there is a modest peak in construction employment in the second half of 1989 (450 to 600 on-site), but this remains far below the Hyatt peak of 1987 and early 1988 (in excess of 1,000).

2.2.3.2 Operational Period

Number of On-Site Resort Jobs: Table IV-15 reproduces information provided by Ritz-Carlton headquarters in Atlanta, Georgia on initial staffing plans for the first 450 units, categorized by department. The majority of jobs would be in food and beverage capacities, followed by rooms (primarily housekeeping jobs). Approximately 11 percent of all jobs would be in the housekeeping category, according to the Ritz-Carlton Hotel Company. Initial staffing plans call for 628 full-time jobs plus 66 part-time or casual workers. Ritz-Carlton estimates that the 66 part-time/casual positions are equivalent to 50 full-time positions, and so the total number of FTE (full-time equivalent) jobs would be 678.

Based on the 1.2 multiplier set forth in Table IV-10, the number of additional FTE jobs created by the eventual 200-unit add-on would be 240, for a total of 918 for all 650 units.

Wages/Salaries for On-Site Employees: Exact wages for hotel staff depend to a large extent on results of union elections and collective bargaining agreements. However, to provide some indication, the Mauna Lani Bay Hotel has shared payroll data on employee wages as of 1986. As shown in Table IV-16, the median income for union workers was about $15,000 per year, while
Figure IV-9
CUMULATIVE NUMBERS OF ON-SITE CONSTRUCTION WORKERS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
IV-66
Table IV-15
Initial Ritz-Carlton Staffing Plan, by Department

<table>
<thead>
<tr>
<th>Department</th>
<th>Full-Time</th>
<th>Part-Time/ Casual</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Beverage</td>
<td>322</td>
<td>25</td>
<td>357</td>
</tr>
<tr>
<td>Rooms</td>
<td>142</td>
<td>10</td>
<td>152</td>
</tr>
<tr>
<td>Administrative &amp; General</td>
<td>44</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>Repairs &amp; Maintenance</td>
<td>26</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>House Laundry</td>
<td>24</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Garage</td>
<td>8</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Recreation</td>
<td>11</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Employee Cafeteria</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Marketing &amp; Sales</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Telephone</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Retail</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Catering &amp; Conventions</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Personnel</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTALS:</strong></td>
<td><strong>628</strong></td>
<td><strong>66</strong></td>
<td><strong>694</strong>*</td>
</tr>
</tbody>
</table>

* The 694 positions, including part-time/casual, translate into 678 FTE (full-time equivalent) jobs.

NOTE: A more detailed breakdown of positions supplied by Ritz-Carlton suggests approximately 11 percent of all jobs would be in the management/supervisory category. This is consistent with staffing patterns at the Mauna Lani Bay Hotel (Community Resources, Inc. and Datametric Research, 1987).

Source: Ritz-Carlton Hotels, December 1986.
Table IV-16
Wage/Income Distribution for Mauna Lani Bay Hotel Employees, 1986

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<tr>
<th></th>
<th>Union Workers</th>
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<th>Salaried Workers</th>
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<td>Full-Time</td>
<td>Part-Time</td>
<td>Casual</td>
<td>Full-Time</td>
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<tr>
<td>$ 7,680 or less</td>
<td>13</td>
<td>3</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>$ 7,681 - $ 9,600</td>
<td>28</td>
<td>3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>$ 9,601 - $11,520</td>
<td>17</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$11,521 - $13,340</td>
<td>61</td>
<td>7</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>$13,241 - $15,360</td>
<td>76</td>
<td>6</td>
<td>7</td>
<td>11</td>
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<tr>
<td>$15,361 - $17,280</td>
<td>50</td>
<td>3</td>
<td>1</td>
<td>15</td>
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<tr>
<td>$17,281 - $19,200</td>
<td>39</td>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>$19,201 - $21,120</td>
<td>16</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>$21,121 or more</td>
<td>47</td>
<td>2</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>347</td>
<td>33</td>
<td>57</td>
<td>88</td>
</tr>
</tbody>
</table>

APPROXIMATE MEDIAN INCOME: $14,870 $12,300 (under $7,680) $18,650 $12,430 N/A

Notes:

(1) Income before taxes and exclusive of fringes or tips.

(2) Includes only those employees remaining on payroll from 12/16/86 through 12/15/87 -- i.e., excludes people who worked for only part of a year. Thus, total numbers do not completely reflect Mauna Lani's staffing pattern, since turnover is less frequent among salaried workers.

(3) "Median" refers to the figure in the middle, with 50 percent of employees earning more and 50 percent earning less.

(4) Income figures reflect earnings of individual workers, not entire households.

Source: Ms. Geordine Nahoopii, Director of Personnel, Mauna Lani Bay Hotel, March 1987.
the median for salaried workers (both management and office support) was about $18,600. These figures exclude fringes and tips, the amount and value of which are often a source of debate.

More subjective issues surrounding resort wages and working conditions -- such as adequacy of pay and worker satisfaction -- will be discussed in later sections of the EIS.

**Number of Jobs Islandwide and in Study Area:** Again using the example of the initial Ritz-Carlton 450 units, Table IV-17 shows the assumptions and methodology -- based on the County's requested DAHI approach -- used to calculate new islandwide jobs generated by West Hawaii resort development. Overall results are contained in Table IV-18.

A few things should be noted about the DAHI methodology. First, it provides only islandwide, not statewide, employment totals. The islandwide totals are not always compatible with statewide totals based on standard multipliers developed by the Hawaii State Department of Planning and Economic Development, and so no statewide figures are reported here. Second, an unpublished feature of the DAHI approach involves a "luxury adjustment factor" for hotels such as the Ritz-Carlton; this has been calculated based on discussions with DAHI principal Dr. Bruce Flasch (personal communications, January 1987). These issues are discussed at more length in the Community Resource (1987) technical document.

As indicated in Tables IV-17 and IV-18, the initial Ritz-Carlton 450 units are estimated to generate 984 FTE jobs throughout the Big Island. These include the 678 on-site jobs plus 306 additional jobs elsewhere on the island, of which 80 percent are estimated to be located in the Study Area. The 80 percent assumption may be somewhat high since much of the island's retail and light industrial support facilities are still located in East Hawaii, but it is assumed that more such facilities will gradually develop in West Hawaii as resorts continue to open there.

For the eventual 200 unit add-on in 1998, Table IV-18 shows an islandwide figure of about 440 FTE jobs. Thus, for the total 650-unit Ritz-Carlton facility, the number of islandwide jobs would be about 1,420 -- which breaks down into some 920 on-site, 400 elsewhere in West Hawaii, and 100 in East Hawaii.

**Islandwide and Study Area Employment from Cumulative West Hawaii Resort Development:** During the 1988-93 period, the assumed new West Hawaii resorts would generate a total of about 5,650 new FTE jobs islandwide. Some 1,100 of these would come from the hypothetical "Hotel X," with the remainder from the three identified projects -- Ritz-Carlton, Hyatt Regency Waikoloa, and the South Kohala Resort. The major source of new jobs during this period will be the Hyatt Regency Waikoloa, producing nearly half the total estimated number. For all new resorts, about three out of every eight jobs would be off-site, with most of these in West Hawaii.

For the 1994-98 period, during which actual development is much more speculative at this point, the assumed scenario produces an additional 1,200 to 1,300 jobs islandwide each year. Should this scenario actually materialize, the total number of new FTE jobs islandwide from new resorts opening
Table IV-17
Example of Procedures for Calculating Total Operational Employment

Ritz 450 Units in 1990

<table>
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<tr>
<th>Units/People</th>
<th>Units/People</th>
<th>Multiplier (1)</th>
<th>Jobs</th>
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<tr>
<td>Basic Units</td>
<td>450</td>
<td>1.84</td>
<td>826</td>
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<tr>
<td>Luxury Hotel Unit Adjustment</td>
<td>450</td>
<td>0.35</td>
<td>157</td>
</tr>
<tr>
<td>No. of Resort Residents</td>
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<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
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<td>984</td>
</tr>
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<th>Study Area</th>
<th>Rest of Island</th>
<th>Island Total</th>
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<tr>
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<tr>
<td>TOTAL</td>
<td>923</td>
<td>61</td>
<td>984</td>
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</table>

(1) First multiplier calculated by procedure shown in Table IV-11. Second multiplier from Table IV-10. Third multiplier from DAHI (1986).
(2) On-site employment from hotel source or calculated from procedures in Table IV-11.
(3) Assumes 80% of off-site employment in Study Area.
<table>
<thead>
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<th></th>
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<tr>
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<td>61 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>0 39 39</td>
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<tr>
<td>ISLAND TOTAL</td>
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<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>0 437 437</td>
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<td>6214 5992</td>
<td>6067</td>
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<tr>
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<td>1378 1208 1378 1208 801</td>
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<tr>
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<td>6318 6318</td>
<td>9525</td>
</tr>
<tr>
<td>Rest of Study Area SUBTOTAL</td>
<td>844 0 315 0 246</td>
<td>1208 1046 1208 1046 801</td>
<td>6318 6318</td>
<td>9525</td>
</tr>
<tr>
<td>Rest of Island</td>
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<td>1208 1046 1208 1046 801</td>
<td>6318 6318</td>
<td>9525</td>
</tr>
<tr>
<td>ISLAND TOTAL</td>
<td>2755 0 1093 0 820</td>
<td>1335 1181 1335 1181 900</td>
<td>6668 6582</td>
<td>10600</td>
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**COMBINED TOTALS**

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<td>On-Site 2</td>
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<td>766 568 766 568 726</td>
<td>3591 3394</td>
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<tr>
<td>Year</td>
<td>245 477 477 477 158</td>
<td>1378 1208 1378 1208 801</td>
<td>6307 6307</td>
<td>3559</td>
</tr>
<tr>
<td>Rest of Study Area</td>
<td>844 245 315 0 246</td>
<td>1208 1046 1208 1046 801</td>
<td>6318 6318</td>
<td>9525</td>
</tr>
<tr>
<td>Rest of Study Area SUBTOTAL</td>
<td>844 245 315 0 246</td>
<td>1208 1046 1208 1046 801</td>
<td>6318 6318</td>
<td>9525</td>
</tr>
<tr>
<td>Rest of Island</td>
<td>2544 61 1016 0 759</td>
<td>1208 1046 1208 1046 801</td>
<td>6318 6318</td>
<td>9525</td>
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<tr>
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<td>2755 984 1093 0 820</td>
<td>1335 1181 1335 1181 900</td>
<td>6668 6582</td>
<td>12021</td>
</tr>
</tbody>
</table>

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**Note:** Opening date schedules are relatively more fixed for 1988-1993, whereas the schedule for 1994-1998 is more theoretical, based on CRF interpretation of official State forecasts.

(1) Includes the Hyatt Waikoloa

(2) On-site figures for initial Ritz-Carlton 450 units and Hyatt Waikoloa obtained from hotel sources; remainder calculated from assumptions in Table IV-10.
between 1988 and 1998 would be about 12,000, nearly 11,000 of which are assumed to be located (eventually if not immediately) in the West Hawaii Study Area.

2.2.4 Labor Demand Vs. Supply and Worker In-Migration

If the demand for workers living in the Study Area exceeds supply, it will be necessary to import workers. This section contains CRI forecasts of labor demand vs. supply and consequent needed worker in-migration (above and beyond in-migration which is expected to be taking place anyway).

The focus in this section will be on in-migration related to permanent (operational) jobs. In-migration related to construction is usually temporary, and assumptions relating to this phenomenon will be discussed in the following Section 2.2.6.1 on Construction Housing Impacts. The focus is also restricted to the West Hawaii Study Area, since the lack of competing job prospects in East Hawaii reduces concern over labor supply there.

CRI has developed several complex micro-computer models to predict levels of available West Hawaii labor supply and required in-migration. These are described in detail in that company's technical document submitted to the County (Community Resources, Inc., 1987). Several key assumptions and methods include the following:

- It is assumed that construction workers do not represent "available labor" for resort operational employment. Based on 1970 Census figures, 15 percent of the total Study Area labor force is assumed to be involved in construction trades and excluded from following analyses.

- It is also assumed that "full employment" will always exclude a certain portion of remaining workers who are between jobs even in the best of times — three percent of on-island unemployed labor force participants, and ten percent of unemployed recent in-migrants.

- The County's requirement for a cumulative impact assessment requires consideration of new non-resort, as well as new resort, labor demand in the West Hawaii Study Area. Table IV-19 provides CRI estimates of non-resort worker demand through 1998.

- "Available labor" will consist primarily of (1) new labor force entrants from natural population increase (estimated from an age-sex cohort projection technique, described in CRI's technical submission to the County) and also of (2) in-migrants who will be coming to West Hawaii regardless of economic conditions, although they will ultimately require jobs to remain (e.g., Asian Immigrants joining families already in the area, young Mainland transients, "urban refugees" from Honolulu, etc.). The latter group is estimated at 80 percent of the new labor force entrants from natural increase — considered a fairly conservative estimate in light of Hawaii State Department of Planning and Economic Development (1985, p. 11) estimates that Hawaii County population growth in the 1970's and early 1980's due to in-migration was 200 percent of the amount due to the balance of births over deaths.
### Table IV-10:
Estimated New Jobs from Study Area Economic Activities Other than New Resorts

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<tr>
<td>Increased Occupancy of Existing Units (1)</td>
<td>1135</td>
<td>462</td>
<td>51</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>145</td>
<td>145</td>
<td>145</td>
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<tr>
<td>HOST Park (2)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Other (4)</td>
<td>110</td>
<td>110</td>
<td>110</td>
<td>110</td>
<td>110</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1245</td>
<td>572</td>
<td>186</td>
<td>135</td>
<td>280</td>
<td>305</td>
<td>305</td>
<td>305</td>
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<td>340</td>
<td>340</td>
<td>340</td>
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<td>340</td>
</tr>
</tbody>
</table>

(1) Figures derived by applying DAHI multipliers and treating increased occupancy as equivalent to new units. Assumes occupancies at existing units will plateau at 67.5 percent in 1987 and thereafter, with average party size plateauing at 1.90 in 1988 and thereafter.


(3) Assumptions by CHI reflecting recent improved market prospects for coffee.

(4) Application of DAHI multiplier of 0.29 for induced jobs from new population not supported by regional economic activity. This is conservatively estimated as 25 percent of future new Study Area population, extrapolated from estimated 1980-1985 annualized growth rate of 4.89 percent.
DEFINATIONAL NOTE: In-migrants expected to come to West Hawaii anyway, even before new jobs are available, will be referred to as "Non-Induced In-Migrants." This contrasts with "Induced In-Migrants," the people who must be imported to fill any labor shortages created after new jobs are made available.

Smaller sources of labor supply — assumed to fill demand before it would be necessary to import any "Induced In-Migrants" -- would include (1) commuters from East Hawaii (constituting two percent of luxury Kohala hotel workers in the 1987 Employee Survey, a figure assumed to rise to a stable four percent by 1993 due to limited job growth prospects in East Hawaii), and (2) additional "moonlighting" by currently employed Study Area residents (assumed to account for possibly three percent of new jobs, based on the Employee Survey finding that nearly 50% of current workers desire additional employment). However, the CRI method allocates jobs to commuters and "moonlighters" only if labor demand exceeds other sources of on-island supply.

Table IV-20 contains results of the CRI analysis for the future situation in which both projected new Study Area resort jobs and non-resort jobs are developed. Table IV-21 shows the assumed distribution of new jobs and of new workers (since observed patterns of multiple jobholding indicate that required numbers of new workers will be slightly less than numbers of new jobs).

While the exact numbers in these tables are highly dependent on foregoing assumptions, the basic principle is that more induced in-migration will be required in years when more new jobs (whether due to resort or other causes) open up. If there is a period when few new jobs are being created, a surplus of available labor will build up, and little or no induced in-migration will be required.

According to the best information available as of this time, the initial Ritz-Carlton 450 units will open roughly 18 months after the Hyatt Regency Waikoloa. During these 18 months, few other currently foreseeable jobs will become available. Thus, a surplus of available Study Area labor will be developing, so that relatively little induced in-migration may be required to fill labor demand generated by the Ritz-Carlton. (Additionally, it should be noted that off-site jobs generated by the Ritz-Carlton will probably actually develop gradually, not all in the same year.)

However, under the scenario for resort development shown in Table IV-9, the 1998 Ritz add-on of 200 units will generate labor demand during a period when many other resort and non-resort activities will also be creating a demand for labor. Whereas Table IV-21 suggests that only five percent of new 1990 West Hawaii jobs would be filled by in-migrants (or 19 percent, if "Non-Induced In-Migrants" are counted), in 1998 the proportion would be 62 percent (or 73 percent, including non-induced in-migrants).

Looking at the overall timeframe in the context of cumulative West Hawaii resort development, the need for substantial in-migration is also suggested at times when the Hyatt Regency Waikoloa opens in late 1988; to a lesser extent, when the South Kohala Resort hotel opens in 1993; and in other years from 1994 to 1998, due to previously-explained assumptions about ongoing heavy resort development during this period.

IV-74
### Table IV-20:


[Excludes Construction Sector]

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<tr>
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<tr>
<td><strong>Total New Study Area Jobs</strong></td>
<td>2544</td>
<td>68</td>
<td>252</td>
<td>932</td>
<td>1150</td>
<td>1015</td>
<td>0</td>
<td>759</td>
<td>1298</td>
<td>1045</td>
<td>1208</td>
<td>1045</td>
<td>1199</td>
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<tr>
<td><strong>Resort Projects</strong></td>
<td>2544</td>
<td>68</td>
<td>252</td>
<td>932</td>
<td>1150</td>
<td>1015</td>
<td>0</td>
<td>759</td>
<td>1298</td>
<td>1045</td>
<td>1208</td>
<td>1045</td>
<td>1199</td>
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<tr>
<td><strong>Non-Resort Projects</strong></td>
<td>68</td>
<td>280</td>
<td>305</td>
<td>305</td>
<td>305</td>
<td>305</td>
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<td><strong>STUDY AREA TOTAL</strong></td>
<td>2612</td>
<td>1203</td>
<td>1320</td>
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#### Demand for Workers

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<tr>
<td><strong>New Workers Living in Study Area</strong></td>
<td>2252</td>
<td>62</td>
<td>1035</td>
<td>1132</td>
<td>280</td>
<td>908</td>
<td>1291</td>
<td>1162</td>
<td>1321</td>
<td>1182</td>
<td>1313</td>
<td>5669</td>
<td>6259</td>
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<tr>
<td><strong>Commuters from E. Hawaii</strong></td>
<td>78</td>
<td>39</td>
<td>46</td>
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<td>54</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>206</td>
<td>294</td>
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<tr>
<td><strong>Current Workers/Nonlighting</strong></td>
<td>78</td>
<td>36</td>
<td>48</td>
<td>32</td>
<td>45</td>
<td>41</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>166</td>
<td>229</td>
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<tr>
<td><strong>TOTAL (1)</strong></td>
<td>2409</td>
<td>1110</td>
<td>1218</td>
<td>982</td>
<td>1397</td>
<td>1248</td>
<td>1429</td>
<td>1279</td>
<td>1421</td>
<td>11238</td>
<td>1234</td>
<td>601</td>
<td>6773</td>
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#### New Available Study Area Labor Supply

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<td><strong>Surplus from Past Years (2)</strong></td>
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<td>152</td>
<td>621</td>
<td>16</td>
<td>71</td>
<td>169</td>
<td>41</td>
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<td>67</td>
<td>81</td>
<td>69</td>
<td>1228</td>
<td>1339</td>
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<tr>
<td><strong>Natural Population Increase</strong></td>
<td>97</td>
<td>295</td>
<td>205</td>
<td>307</td>
<td>210</td>
<td>210</td>
<td>214</td>
<td>215</td>
<td>208</td>
<td>209</td>
<td>213</td>
<td>1224</td>
<td>1059</td>
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<tr>
<td><strong>Non-Induced In-Migration</strong></td>
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<td>219</td>
<td>152</td>
<td>154</td>
<td>156</td>
<td>156</td>
<td>159</td>
<td>160</td>
<td>154</td>
<td>155</td>
<td>158</td>
<td>1309</td>
<td>986</td>
</tr>
<tr>
<td><strong>TOTAL AVAILABLE LABOR (3)</strong></td>
<td>369</td>
<td>666</td>
<td>979</td>
<td>377</td>
<td>437</td>
<td>536</td>
<td>413</td>
<td>456</td>
<td>429</td>
<td>446</td>
<td>440</td>
<td>3361</td>
<td>2814</td>
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#### Study Area Worker Demand

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<tbody>
<tr>
<td><strong>Nonex Supply (3)</strong></td>
<td>1884</td>
<td>-604</td>
<td>56</td>
<td>756</td>
<td>-157</td>
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<td>696</td>
<td>892</td>
<td>735</td>
<td>873</td>
<td>2307</td>
<td>4074</td>
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</tbody>
</table>

(1) Total demand for workers somewhat less than total new jobs due to multiple jobholding factor of 1.05 workers per job (Community Resources, Inc., and Datametrics Research, 1987). Demand for commuters and moonlighters is assumed only if total available Study Area is not adequate to fill all new Study Area Jobs.

(2) Total available labor excludes ten percent of unemployed in-migrants and three percent of other unemployed on-island workers, reflecting "full employment" assumptions. These become part of the "surplus" category for the subsequent year.

(3) Positive numbers indicate required Induced In-Migrant Workers; negative numbers indicate labor surplus and rising unemployment.
### Table IV-21:

**Distribution of New Study Area Jobs and Workers**

*Includes Both Resort and Non-Resort*

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</thead>
<tbody>
<tr>
<td>Distribution of New Jobs Located in Study Area</td>
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<tr>
<td>Available Labor: On-Island 1 Year or More</td>
<td>323</td>
<td>46</td>
<td>901</td>
<td>244</td>
<td>196</td>
<td>417</td>
<td>277</td>
<td>323</td>
<td>299</td>
<td>317</td>
<td>307</td>
<td>312</td>
<td>2130</td>
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<tr>
<td>Induced In-Migrants</td>
<td>79</td>
<td>22</td>
<td>166</td>
<td>167</td>
<td>109</td>
<td>170</td>
<td>173</td>
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<td>168</td>
<td>169</td>
<td>172</td>
<td>172</td>
<td>7786</td>
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<tr>
<td>Available Labor: Non-Induced In-Migrants</td>
<td>2053</td>
<td>0</td>
<td>61</td>
<td>824</td>
<td>0</td>
<td>406</td>
<td>957</td>
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<td>972</td>
<td>802</td>
<td>952</td>
<td>3342</td>
<td>4442</td>
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<tr>
<td>Commuters</td>
<td>78</td>
<td>0</td>
<td>39</td>
<td>46</td>
<td>0</td>
<td>43</td>
<td>61</td>
<td>54</td>
<td>62</td>
<td>55</td>
<td>62</td>
<td>206</td>
<td>294</td>
</tr>
<tr>
<td>Current Workers/ Nooliting</td>
<td>78</td>
<td>0</td>
<td>36</td>
<td>40</td>
<td>0</td>
<td>32</td>
<td>45</td>
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<td>46</td>
<td>42</td>
<td>46</td>
<td>186</td>
<td>220</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>2612</td>
<td>68</td>
<td>1203</td>
<td>1320</td>
<td>308</td>
<td>1064</td>
<td>1513</td>
<td>1350</td>
<td>1648</td>
<td>1385</td>
<td>1539</td>
<td>6573</td>
<td>7336</td>
</tr>
</tbody>
</table>

| Distribution of New Study Area Workers Living in Study Area |        |      |      |      |      |      |      |      |      |      |      |        |-------|
| Available Labor: On-Island 1 Year or More | 297  | 42   | 827  | 223  | 180  | 380  | 254  | 296  | 275  | 291  | 282  | 1949   | 1358   |
| Induced In-Migrants      | 72   | 20   | 152  | 154  | 100  | 166  | 159  | 160  | 154  | 155  | 158  | 654    | 786    |
| Available Labor: Non-Induced In-Migrants | 1804 | 0    | 56   | 756  | 0    | 372  | 878  | 696  | 892  | 735  | 873  | 3068   | 4074   |
| TOTAL                    | 2262 | 62   | 1036 | 1132 | 280  | 908  | 1291 | 1162 | 1321 | 1362 | 1313 | 5671   | 6258   |

**Source:** Community Resources, Inc. (1987) labor supply demand, utilizing key assumptions discussed in text.
It should be noted that the labor supply/demand analysis assumes that most available unemployed Study Area workers will be qualified and motivated to fill new job openings — whether on-site at resorts, in off-site jobs, or non-resort-related opportunities. As discussed at more length in the following section on "Socio-Economic Mitigations," job training and related programs could strengthen the basis for this assumption and perhaps further reduce the need for in-migrant workers by increasing the number of West Hawaii people entering the labor force.

While cumulative West Hawaii resort development (if actually carried out to the extent which has been assumed here) would unquestionably require increased levels of in-migration, there are several potential sources of labor supply among current residents which will provide "natural increase" in the West Hawaii workforce (and/or which can be further tapped to reduce in-migration):

Future High School Graduates — According to estimates provided by the Hawaii State Department of Education (personal communication, Ed Matsuehige, Information System Services Branch, Office of Information Specialist, April 27, 1987), senior class members from 1987 to 1990 Business Services, will total about 2,100 for the three Study Area public high schools (Kohala, Honokaa, and Konawaena). From 1991 to 1993, there would be another 1,650 seniors. These numbers do not take into account the recent Parker School closing in Waimea or the prospect of further in-migration in the next several years.

The issues for manpower development involve how many of these graduates will remain (or return) and whether they will have initial qualifications and motivation for on- or off-site resort-generated jobs. A Department of Education survey of 1985 Big Island high school seniors (unpublished figures, April 28, 1987) individual school results not available) provides only limited evidence. Only 21 percent had definite plans to work full-time, but only about 32 percent had definite plans to attend a four-year college. Until better data sources are available, it may be more appropriate to focus less on action strategies to increase high school seniors' qualifications and interest in future West Hawaii job opportunities.

Females — U.S. Census data for 1980 indicate West Hawaii females had a labor force participation rate some 20 percentage points lower than the rate for males (57 percent vs. 79 percent — Community Resources, Inc., 1986, p. 19). Additionally, women with children aged six and under had a particularly low rate. While this may in some cases reflect values and preferences, the particularly high participation rates of women with older children (70 percent) suggest that lack of child care may be a barrier to needed or desired employment on the part of mothers of younger children.

Resort personnel offices also report that lack of child care facilities can be a barrier to promotions, since after-work classes and other upgrade training may require periods of evening or weekend work. Thus, more child care services could increase the availability of those females who want to work.
Elderly and/or Handicapped — With the aging of the overall American population and an actual reduction in numbers of teenagers, a national concern has emerged over filling service jobs (such as fast-food counter help) normally taken by young people just entering the labor market. Several frequently cited possible replacement sources are the elderly and/or handicapped (Bacca, 1986), and more of these persons are starting to become visible in Hawaii establishments.

For West Hawaii and the state in general, the elderly represent the more numerous potential source. Statewide projections show a 74 percent expected increase from 1980 to 2000 in the population aged 60 or more (Hawaii State Commission on Manpower and Full Employment, 1984). There is a need for better local research on the actual employment needs, interests, and aptitudes among Hawaii's elderly, since the few preliminary surveys conducted to date provide conflicting results about desire for continued work after "retirement" age; however, the one survey which asked about reasons for wanting to work found that the principal motives more often had to do with desires such as "Independence" and "To Be Needed" rather than "Financial" need (ibid., pp. 14-15). Thus, part-time service employment in such occupations as retail sales, hostessing, and other low-pressure people-contact occupations would appear to be in harmony with the level of interest and abilities among some of the active elderly.

The Educationally Disadvantaged (e.g., school drop-outs or non-English speakers) are those for whom chronic unemployment or lack of job preparation has resulted in withdrawal from the labor force. Estimates of exact numbers of such individuals in West Hawaii are not available, but social agency informants suggest these are largely young adults (including some teenaged mothers).

Because many entry-level resort jobs do not require much educational background, resort work provides a good opportunity for integrating such individuals into the labor force. However, for many of the "hard-core" unemployed, deficits are as much or more related to work habits, attitudes, and self-image as to academic abilities. Other persons with educational limitations may be well motivated and actually in the workforce, but have difficulties obtaining promotions due to inadequate English.

The Attitudinally or Culturally Disinclined — People with simple attitudinal disinterest in resort jobs can still benefit from tourism growth due to the indirect employment generated. However, to the extent that negative attitudes may be based on misperceptions, educational programs would clearly increase the effective available labor supply.

There has been considerable debate — but little systematic research — as to whether native Hawaiians and other Polynesians in Hawaii have any particular cultural inclination or disinclination for resort work. It may be noted that Hawaiians and part-Hawaiians currently comprise about one-third of the workforce at both the Westin Mauna Kea and the Mauna Lani Bay Hotel, the largest single ethnic group at each hotel (Community Resources, Inc. and Datametric Research, 1987).
However, there is also a body of evidence suggesting that at least some native Hawaiians still have cultural difficulties with Western work settings in general. Of all major ethnic groups in the state, Hawaiians have the highest unemployment rate (Hawaii State Department of Labor and Industrial Relations, 1985). A variety of studies on Hawaiian "underachievement" in both employment and educational settings has identified several crucial factors -- an affiliation-- rather than achievement-oriented motivational structure; emphasis on accumulation of social rather than financial capital; fear of failure; avoidance of personal confrontations; and continued effects of culture loss during the 19th Century (c.f., Howard, 1974; Gallimore, Whitehorn, and Jordan, 1974; Jordan and Tharp, 1979; Kamehameha Schools/Bishop Estate, 1980, 1983; Linnekin, 1985).

Given that part-Hawaiians represent one of the fastest-growing ethnic groups on the Big Island, it is appropriate to consider including cultural factors in any programs aimed at maximizing resident employment at future resorts (see Section 2.2.8 on Socio-Economic Mitigations).

2.2.5 Off-Site and Total Population Impacts

This section will also focus on impacts of the resort operational, as opposed to construction, phase. Unless the hypothetical scenario for the 1990's (involving heavy ongoing resort construction) actually materializes, population growth due to construction is usually temporary and is thus better discussed in conjunction with construction housing impacts (Section 2.2.6.1).

2.2.5.1 Methods for Population and Housing Impact Estimates

Definitions of "Impact": Socio-economic "impacts" are conventionally defined as the difference between the future with the project and the future without the project (rather than the difference between the future vs. present conditions). For most of the topics discussed thus far, this definition has not been particularly important.

However, for population and housing impacts, this definition is important. That is because the County has requested data on two types of "impacts" -- project impacts and cumulative resort development impacts. For jobs, the "cumulative" impact just involved adding up individual project impacts. But the CRI approach to population and housing (see below) assumes different levels of immediate impacts depending on what proportion of the workers are on-island vs. in-migrants (since in-migrants tend to have smaller families and a greater propensity to share housing units). This leads to a need for projecting three different scenarios for the future:

(A) Scenario of "NO RESORT DEVELOPMENT SINCE BASE YEAR": This assumes no new resort construction since a designated base year -- in this case, 1985, the last year for which data are available regarding both estimated resident population and also visitor inventory in West Hawaii. Under this scenario, there would be no additional resort jobs (not even the Hyatt Waikoloa jobs), although there would some new non-resort jobs as set forth in Table IV-19, with population and housing growth due to this type of economic growth.
(B) Scenario of "NO RESORT DEVELOPMENT SINCE PREVIOUS YEAR": This assumes that resort development came to a stop in the preceding year. For example, for 1990, it would assume that the Hyatt Waikoloa did open but that the Ritz-Carlton did not.

(C) Scenario of "ALL SCHEDULED RESORT CONSTRUCTION": This assumes that all new resort units indicated in Table IV-9 open according to the schedule in that table.

Thus, for any given year, cumulative resort development impact is defined as the result of subtracting Scenario A from Scenario C. Individual project impact is defined as the result of subtracting Scenario B from Scenario C.

Assumptions and Method for Estimating Off-Site Population: The aspect of off-site population growth which can best be identified is "population supported by jobs" -- the number of workers plus other family/household members. Data from the Employee Survey of Mauna Lani and Mauna Kea workers (Community Resources and Datametric Research, 1987) indicate that hotel workers who have in-migrated during the past five years have a relatively low household population per worker (1.46), which is taken as the appropriate multiplier for future in-migrants. For future resort workers coming from the pool of available labor already living in the Study Area, the multiplier used is that recommended by DAHI -- i.e., the 1980 Census figure for West Hawaii of 2.07. (The DAHI approach would use the 2.07 figure for all workers; the difference between CRI and DAHI approaches on population and housing will be further discussed in Section 2.2.6.2.)

Table IV-22 shows: (1) the overall estimated off-site population supported by all new resort and non-resort jobs (i.e., population under the foregoing "Scenario C"); (2) population calculated by the same general procedures, but subtracting out effects due to Scenario B (i.e., project impacts on population); and (3) population calculated after subtracting out effects under Scenario A (i.e., cumulative resort development impacts on population). As previously explained, in-migration assumptions differ for Scenario A and Scenario B; therefore, the cumulative impacts as of any particular year will not necessarily equal the sum of all project impacts through that year.

2.2.5.2 Off-Site Population Impacts

Ritz-Carlton Project Impacts: For the initial 450 units in 1990, Table IV-22 indicates that islandwide jobs generated by the project would support a population of about 1,700 persons, nearly 90 percent of whom would (eventually) live in the West Hawaii Study Area. About 15 percent of this population would be associated with workers who had in-migrated the preceding year or in response to the mild labor shortage expected when the Ritz-Carlton opens in 1990. The remainder would be on-island population which, arguably, might otherwise out-migrate in the absence of new jobs.

Under the EIS assumptions, the population impact of new resort development in 1998 (the estimated year for the 200-unit Ritz add-on) would support about 1,900 residents islandwide, about 70 percent of whom would be associated with either induced or non-induced in-migrants (see "Definitional Note" in Section 2.2.4). This includes impacts of all new resort development for that
<table>
<thead>
<tr>
<th>Table IV-22:</th>
<th>Total Off-Site Population Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>-----</td>
<td>----</td>
</tr>
</tbody>
</table>

**Population Supported by All New Study Area Jobs (Both Resort and Non-Resort): (1)**

<table>
<thead>
<tr>
<th>Available Study Area Labor:</th>
<th>On-Island 1 Year or More</th>
<th>Non-Induced In-Migrants</th>
<th>Induced In-Migrants</th>
<th>STUDY AREA SUBTOTAL</th>
<th>Rest of Island</th>
<th>ISLAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>614</td>
<td>812</td>
<td>1712</td>
<td>462</td>
<td>372</td>
<td>786</td>
<td>528</td>
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<td>105</td>
<td>30</td>
<td>222</td>
<td>224</td>
<td>146</td>
<td>226</td>
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<td>1103</td>
<td>0</td>
<td>543</td>
<td>1252</td>
<td>1017</td>
</tr>
<tr>
<td>3469</td>
<td>116</td>
<td>2015</td>
<td>1789</td>
<td>518</td>
<td>1697</td>
<td>2060</td>
</tr>
<tr>
<td>549</td>
<td>0</td>
<td>150</td>
<td>236</td>
<td>0</td>
<td>197</td>
<td>356</td>
</tr>
<tr>
<td>4018</td>
<td>116</td>
<td>2205</td>
<td>2026</td>
<td>518</td>
<td>1794</td>
<td>2396</td>
</tr>
</tbody>
</table>

**Population Impacts From Development of Resorts in Individual Years (2)**

<table>
<thead>
<tr>
<th>Available Study Area Labor:</th>
<th>On-Island 1 Year or More</th>
<th>Non-Induced In-Migrants</th>
<th>Induced In-Migrants</th>
<th>STUDY AREA SUBTOTAL</th>
<th>Rest of Island</th>
<th>ISLAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>0</td>
<td>1263</td>
<td>119</td>
<td>0</td>
<td>375</td>
<td>170</td>
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<td>88</td>
<td>0</td>
<td>164</td>
<td>58</td>
<td>0</td>
<td>109</td>
<td>75</td>
</tr>
<tr>
<td>2750</td>
<td>0</td>
<td>1103</td>
<td>0</td>
<td>543</td>
<td>1252</td>
<td>1017</td>
</tr>
<tr>
<td>3348</td>
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<td>1608</td>
<td>1208</td>
<td>0</td>
<td>1027</td>
<td>1526</td>
</tr>
<tr>
<td>549</td>
<td>0</td>
<td>150</td>
<td>236</td>
<td>0</td>
<td>197</td>
<td>356</td>
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<tr>
<td>3898</td>
<td>0</td>
<td>1698</td>
<td>1615</td>
<td>0</td>
<td>1224</td>
<td>1802</td>
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</table>

**RITZ-CARLTON SHARE Percentage of Jobs (3)**

<table>
<thead>
<tr>
<th>Number</th>
<th>100%</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
</table>

**Population Impacts From Cumulative Development of New Resorts (4)**

<table>
<thead>
<tr>
<th>Available Study Area Labor:</th>
<th>On-Island 1 Year or More</th>
<th>Non-Induced In-Migrants</th>
<th>Induced In-Migrants</th>
<th>STUDY AREA SUBTOTAL</th>
<th>Rest of Island</th>
<th>ISLAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>603</td>
<td>1753</td>
<td>1707</td>
<td>1566</td>
<td>1835</td>
<td>1842</td>
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<td>93</td>
<td>266</td>
<td>440</td>
<td>539</td>
<td>723</td>
<td>913</td>
</tr>
<tr>
<td>2750</td>
<td>2750</td>
<td>2831</td>
<td>3934</td>
<td>3934</td>
<td>4477</td>
<td>5759</td>
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<td>3348</td>
<td>3346</td>
<td>4850</td>
<td>6061</td>
<td>6040</td>
<td>7026</td>
<td>8514</td>
</tr>
<tr>
<td>549</td>
<td>549</td>
<td>740</td>
<td>975</td>
<td>975</td>
<td>1172</td>
<td>1526</td>
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<tr>
<td>3898</td>
<td>3895</td>
<td>5589</td>
<td>7058</td>
<td>7015</td>
<td>8208</td>
<td>110042</td>
</tr>
</tbody>
</table>

---

(1) For Available Study Area Labor and "Rest of Island," population computed by multiplying number of workers (see Table 2.14) by 1980 Study Area population/workers ratio of 2.07, as recommended by DAHI. For various in-migrant categories, multiplier is 1.46, as determined from Employee Survey figure for "Newcomers" (Community Resources, Inc. and Demographic Research, 1987).

(2) Previous results, minus results of a similar analysis which assumed for each year that new resort construction had stopped in previous year.

(3) Based on Table 2.14.

(4) Initial results, minus results of a similar analysis which assumed no new resort construction since 1985. As explained in text, cumulative impacts are not necessarily equal to sum of incremental impacts.
year alone. Since the Ritz add-on would be responsible for about a third of all these jobs, it is assumed that about a third of the supported population (or roughly 620) can be attributed to the 200-unit add-on.

For the total 650 units, then, the combined off-site population impact would be a little over 2,300 people, roughly 30 percent of whom would be induced or recent non-induced in-migrants.

Cumulative Resort Development Impacts: The total resort development assumed for the period 1988 to 1998 would provide jobs supporting about 17,000 people, more than 80 percent of whom would eventually live in the West Hawaii Study Area. Because of the assumed heavy induced in-migration in the 1990's, more than 60 percent of this population would be associated with workers moving to West Hawaii to fill labor shortages. Including non-induced in-migrants (people expected to move to West Hawaii anyway, even before jobs become available), the proportion of in-migrants would exceed 70 percent. However, the proportion of in-migrants would be much less in particular years (such as 1990) when on-island labor supply has built up due to a relative lack of new jobs in the preceding year or two.

2.2.5.3 Total Population Impacts

Total Hawaii Island population impacts would include both off-site population and the average daily on-site population discussed in Section 2.2.2 ("average" figures from Table IV-12):

<table>
<thead>
<tr>
<th>Ritz-Carlton Project</th>
<th>Cumulative Resort</th>
</tr>
</thead>
<tbody>
<tr>
<td>(numbers rounded:)</td>
<td></td>
</tr>
<tr>
<td>Total Resident</td>
<td></td>
</tr>
<tr>
<td>(including on-site)</td>
<td>1,700</td>
</tr>
<tr>
<td>Average Daily Visitors</td>
<td>600</td>
</tr>
<tr>
<td>Total Population</td>
<td></td>
</tr>
<tr>
<td>(including Visitors)</td>
<td>2,300</td>
</tr>
</tbody>
</table>

2.2.6 Housing Impacts and Requirements

2.2.6.1 Construction Period

Ritz-Carlton: During the current Hyatt Waikoloa construction period, rental housing in the Study Area has become scarce and rents have increased. According to the real estate agent hired to assist construction workers with housing needs (personal communication, India Hoogs, West Hawaii Property Services, March 6, 1987), the current shortage is associated somewhat with out-of-area workers taking housing, but even more with increased visitor levels and a consequent shift in apartment/condominium units from residential to visitor use.
Given the smaller construction workforce required for the Ritz-Carlton (and the possibility that some already-housed Hyatt workers will simply remain in the area a while longer to work on the Ritz), it is expected that construction housing impacts will be significantly less than has been the case for the Hyatt.

Assuming an average three construction workers to a unit, and 20 percent of on-site construction workers in need of Study Area temporary housing, and given average on-site construction employment of 391 (see Table IV-14) there will be demand for 16 Study Area units, on average, during the 1988 - 1990 timeframe for construction of the initial 450 units. As suggested by the construction employment curves contained in Figure IV-9, this figure would actually fluctuate from a low of four units at the beginning of construction to a high of 28 units during construction peak.

The eventual 200-unit add-on would require only one-third as many construction workers as the initial phase. Consequently, the average number of short-term units demanded by out-of-area workers would be five or six during the 1996 - 1998 timeframe, ranging from one to nine depending on exact stage of construction.

Cumulative: During the construction overlap covering Hyatt's conclusion and Ritz's beginning (Figure IV-9), the combined demand by out-of-area workers for both projects is estimated at 20 to 35 units (depending on month). If the hypothetical "Hotel X" begins in the particular timeframe which has been assumed (Figure IV-9, combined demand during the 1988-1990 timeframe would range from 30 to 40 rental units.

The timing of the eventual 200-unit add-on and the extent of other construction at this time is extremely speculative. However, given the assumptions which have been made for illustrative "worst-case" purposes (Table IV-9), there would be an average need for 47 units, reaching 70 to 80 if all projects would peak simultaneously. However, such a sustained construction boom could well encourage permanent relocation and resolution of housing needs through purchase rather than rental.

2.2.6.2 Operational Period

2.2.6.2.1 Timing and Attribution of Impacts

Population and housing impacts of economic development shift over time, in ways that are not always easy to predict. For example, four recently-hired new resort workers might be young singles sharing one housing unit. A generation later, these four young people might each be supporting a family of five or six, living now in four different housing units. Alternatively, the original four young people might have left, only to be replaced by four other people sharing the same one unit. Little data currently exist to allow reasonable forecasts regarding long-term shifts in impact, even on some average basis.

Past EIS's have generally not addressed the timing question, but have usually calculated resort-related housing impacts in a way which implicitly assumes a short-term timeframe. There has been a traditional distinction between the assumed household sizes and household formation rates of
in-migrants versus on-island available labor. It has been assumed that some new resort workers would come from other hotels or workplaces in the Study Area ("regional turnover"); this would suggest that some needed in-migrant workers and consequent housing needs are displaced, but these displaced impacts have not always been addressed.

The DAHI approach recommended by the County is implicitly long-term in nature. It assumes that all workers will have characteristics similar to the current Study Area population (i.e., no recognition of differences between in-migrants and current available labor in West Hawaii). More significantly, it assumes that new housing units will be required for all employees of new resorts, whether or not these employees are already on-island and are thus already housed.

The housing impact analysis by CRI addresses the timing issue in the following way:

- The DAHI approach is utilized to present a picture of theoretical eventual impacts, perhaps a generation or two from now ("theoretical" because it is questionable whether 100 percent of currently available on-island labor will ever form totally new households).

- For more immediate housing impacts, CRI utilizes a procedure similar to that in past EIS's — i.e., attributing different types of impacts to in-migrants vs. those already in the Study Area — except that "regional turnover" is not discounted as in the past (i.e., if someone leaves another jobs in West Hawaii to work at the Ritz-Carlton, that person's replacement and his/her housing need is counted as a Ritz-Carlton impact).

Because the CRI approach distinguishes between types of impacts ("non-induced in-migrants" who are assumed to be already in the Study Area, vs. "induced in-migrants" who do not come until new jobs open up), the following analysis of immediate housing impacts gives a range of results. At the low end, it is assumed that, since non-induced in-migrants are already living in the Study Area, they will form new households at the same rate as other current residents. At the high end of the range, it is assumed that housing demand generated by recent in-migrants should be considered a retroactive impact of the project which allows these in-migrants to remain — i.e., non-induced in-migrants, like induced in-migrants, all require totally new housing which does not now exist.

2.2.6.2.2 Islandwide and Study Area Housing Impacts

Table IV-23 provides assumptions and results of the various approaches for assessing housing impacts related to people supported by new jobs (whether on-site or off-site). As with the population impact table (Table IV-22), there are various categories of "impact" — the combined effects of new resort and non-resort development, the effects of resort development one year at a time, and the effects of cumulative resort development (excluding non-resort effects expected to occur anyway).
### Table IV-23: Total Off-Site Housing Impacts

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>For Population Supported By</strong></td>
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<tr>
<td><strong>Available Study Area Labor</strong></td>
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<td></td>
<td></td>
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<td>On-Island 1 Year or More (1)</td>
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<tr>
<td>Non-Induced In-Migrants (2)</td>
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<td>11-54</td>
<td>11-55</td>
<td>7-36</td>
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<td>12-57</td>
<td>11-55</td>
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<td>228</td>
<td>396</td>
<td>336</td>
<td>402</td>
<td>349</td>
<td>397</td>
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<td>Rest of Island (1)</td>
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<td>369</td>
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<td>372</td>
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<td>359</td>
<td>55</td>
<td>238</td>
<td>414</td>
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<td>366</td>
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<td><strong>ISLANDWIDE TOTAL</strong></td>
<td>1767</td>
<td>43</td>
<td>800</td>
<td>874</td>
<td>196</td>
<td>1084</td>
<td>1027</td>
<td>931</td>
<td>1048</td>
<td>952</td>
<td>1059</td>
</tr>
</tbody>
</table>

#### Housing Impacts From Development of Resorts in Individual Years

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Immediate</strong></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Available Study Area Labor:</td>
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<td></td>
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<td>On-Island 1 Year or More (1)</td>
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<td>64</td>
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<td>0</td>
<td>19</td>
<td>9</td>
<td>12</td>
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<td>8-40</td>
<td>3-14</td>
<td>0</td>
<td>6-26</td>
<td>4-18</td>
<td>5-22</td>
<td>3-16</td>
<td>3-17</td>
<td>3-16</td>
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<tr>
<td>Induced In-Migrants (2)</td>
<td>671</td>
<td>0</td>
<td>50</td>
<td>269</td>
<td>0</td>
<td>133</td>
<td>313</td>
<td>248</td>
<td>318</td>
<td>262</td>
<td>311</td>
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<td>0</td>
<td>124</td>
<td>289</td>
<td>0</td>
<td>137</td>
<td>317</td>
<td>265</td>
<td>320</td>
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<td>0</td>
<td>102</td>
<td>290</td>
<td>0</td>
<td>167</td>
<td>343</td>
<td>283</td>
<td>347</td>
<td>293</td>
<td>342</td>
</tr>
<tr>
<td><strong>ISLANDWIDE TOTAL</strong></td>
<td>746</td>
<td>0</td>
<td>134</td>
<td>301</td>
<td>0</td>
<td>188</td>
<td>358</td>
<td>300</td>
<td>359</td>
<td>306</td>
<td>355</td>
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<td></td>
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<td>0</td>
<td>112-116</td>
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<td></td>
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<tr>
<td>Study Area</td>
<td>1537</td>
<td>0</td>
<td>546</td>
<td>598</td>
<td>0</td>
<td>441</td>
<td>709</td>
<td>612</td>
<td>708</td>
<td>610</td>
<td>703</td>
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<tr>
<td>Rest of Island</td>
<td>186</td>
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<td>64</td>
<td>100</td>
<td>0</td>
<td>67</td>
<td>121</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>128</td>
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<td><strong>ISLANDWIDE TOTAL</strong></td>
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<td>678</td>
<td>0</td>
<td>507</td>
<td>830</td>
<td>734</td>
<td>830</td>
<td>734</td>
<td>831</td>
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<td><strong>RITZ-CARLTON SHARE (4)</strong></td>
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<td></td>
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<td>0</td>
<td>610</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>272</td>
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CONTINUED
<table>
<thead>
<tr>
<th>Housing Impacts From Cumulative Development of New Resorts</th>
<th>Opening Date</th>
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</thead>
<tbody>
<tr>
<td>Immediate</td>
<td></td>
</tr>
<tr>
<td>Available Study Area Labor:</td>
<td></td>
</tr>
<tr>
<td>On-Island 1 Year or More (1)</td>
<td>26</td>
</tr>
<tr>
<td>Non-Induced In-Migrants (2)</td>
<td>4-21</td>
</tr>
<tr>
<td>Induced In-Migrants (2)</td>
<td>671</td>
</tr>
<tr>
<td>STUDY AREA SUBTOTAL</td>
<td>710-</td>
</tr>
<tr>
<td></td>
<td>718</td>
</tr>
<tr>
<td>Rest of Island (1)</td>
<td>28</td>
</tr>
<tr>
<td>ISLANDWIDE TOTAL</td>
<td>729-</td>
</tr>
<tr>
<td></td>
<td>746</td>
</tr>
<tr>
<td>Theoretical Eventual (4)</td>
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<td>4084</td>
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<tr>
<td>Rest of Island</td>
<td>489</td>
</tr>
<tr>
<td>ISLANDWIDE TOTAL</td>
<td>4573</td>
</tr>
</tbody>
</table>

(1) Population divided by 1980 Study Area average household size of 2.95, as recommended by DAHI (1986), times assumed 15 percent household formation rate.

(2) Population divided by average in-migrant household size of 4.10, as determined from Employee Survey figure for "Newcomers" (Community Resources, Inc. and Datametric Research, 1987). For Induced In-Migrants, a 100 percent household formation rate is assumed. For Non-Induced In-Migrants, alternative assumptions are a 15 percent rate (producing lower number in range) or 100 percent (producing higher number).

(3) Total workers times resident population per worker (2.07), divided by average 1980 resident household size (2.95). This is the procedure utilized by DAHI (1986).

(4) Based on percentages indicated in Table IV-22.
Ritz-Carlton Project Impacts: In 1990, the year when the initial 450 Ritz units open, all expected new jobs that year would generate an anticipated immediate demand for about 130 to 170 units (depending on treatment of in-migrants) islandwide, with about 93 percent of these in the West Hawaii Study Area. Subtracting the effects of non-resort jobs expected to come on-line anyway, the impact attributable to the Ritz would be around 100 to 135 units islandwide. The theoretical eventual housing impact — if and when all on-island workers move out of their current households and start new ones — would be 610 units attributed to the Ritz, 90 percent of these in the Study Area.

For 1998 (the estimated year of the 200-unit add-on), given the assumptions of many competing projects and subsequent heavy worker in-migration, the immediate housing impacts would be 370 to 420 units islandwide for all new economic development; 340 to 355 units islandwide due to West Hawaii resort development alone; and 110 to 115 units of resort impacts attributable to the Ritz add-on. The theoretical ultimate housing impact for the 200-unit Ritz add-on would be 270 housing units islandwide.

Cumulative Resort Development Impacts: Cumulative impacts are defined as the difference between developing all assumed new resorts vs. no new resorts since 1986. For the various resorts proposed to open by 1993, islandwide housing impacts would range from 1,300 to 1,400 units, with a theoretical ultimate impact of 5,400. Extending the timeframe to 1998, the figures are 2,900 to 3,200, with a theoretical ultimate impact of 10,300 units.

2.2.6.2.3 Immediate Demand by On-Site Workers and Affordability

For EIS purposes, housing demand by on-site Ritz-Carlton workers alone is estimated at two levels: (1) total number of new units demanded, and (2) number of required "assisted" units for workers whose household incomes indicate difficulty in ability to afford market housing. (NOTE: The analysis is limited to more immediate demand, since the DAHI methodology does not extend to on-site workers.)

Table IV-24 provides both methods and results. It should be noted that a somewhat different — and more conservative — set of assumptions were used for calculating housing demand by on-site workers alone, resulting in figures which suggest that most of the housing demand created by the Ritz-Carlton would be due to on-site workers alone.

Ritz-Carlton workers are expected to require between 100 and 135 new housing units for the initial 450-unit phase in 1990. For the 1998 200-unit add-on, because proportionately more of the workers are expected to be in-migrants under the scenario of heavy overall resort development in this timeframe, the demand for new housing units is expected to be almost as great as the initial demand: 85 to 95 units. The combined figures total 185 to 230 units.

A common standard for gauging ability to afford for-purchase market housing is whether household incomes reach 80 percent of the median in that area. As indicated in Table IV-24, the estimated number of such households would range from 25 to 33 for the 1990 Ritz-Carlton initial phase, and another 21 to 23 for the 1998 add-on (totaling 46 to 56).
Table IV-24:
Estimated Housing Demand By On-Site Ritz-Carlton Workers

<table>
<thead>
<tr>
<th>YEAR 1998</th>
<th>Management</th>
<th>Staff --Commuters</th>
<th>--Current Worker/ Moonlighting</th>
<th>--Available Labor (5)</th>
<th>--In-Migrants (5)</th>
<th>SUBTOTAL (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobs</td>
<td>68</td>
<td>1.05</td>
<td>65</td>
<td>100%</td>
<td>65</td>
<td>1.5</td>
</tr>
<tr>
<td># I</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># II</td>
<td>1.05</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td># III</td>
<td>65</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># IV</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># V</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># VI</td>
<td>1.5</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># VII</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># VIII</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># IX</td>
<td>11.5</td>
<td></td>
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</tr>
</tbody>
</table>

YEAR 1998

<table>
<thead>
<tr>
<th>Management</th>
<th>Staff --Commuters</th>
<th>--Current Worker/ Moonlighting</th>
<th>--Available Labor (5)</th>
<th>--In-Migrants (5)</th>
<th>SUBTOTAL (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobs</td>
<td>24</td>
<td>1.05</td>
<td>23</td>
<td>100%</td>
<td>23</td>
</tr>
<tr>
<td># I</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># II</td>
<td>1.05</td>
<td></td>
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<td># III</td>
<td>23</td>
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<tr>
<td># IV</td>
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<tr>
<td># V</td>
<td>23</td>
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<tr>
<td># VI</td>
<td>1.5</td>
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<td># VII</td>
<td>15</td>
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<tr>
<td># VIII</td>
<td>8%</td>
<td></td>
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<tr>
<td># IX</td>
<td>11.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTALS 918

(1) Jobs from Table 2.14, with ten percent assumed for management and staff distributed to other categories according to proportions calculated from top of Table IV-21.
(2) Figures derived from Employee Survey (Community Resources, Inc. and Datametric Research, 1987).
(3) CRI assumptions based primarily on figures from past EIS housing studies.
(4) Based on 80 percent of West Hawai'i Median Income, which was identical to resort worker household income in Employee Survey.
(5) Ranges indicate alternative treatment of non-induced in-migrants.
(6) Figures sometimes do not add to subtotals due to rounding error.
Based on predicted employee household incomes, 75 percent of the resort workers may be expected to afford units priced above $70,000 (assuming an interest rate of 8.5 percent and 30 percent of income available for housing), with 65 percent being able to afford housing priced above $93,000. Seventy-five percent would be able to afford rents in excess of $525 per month.

Worker households making less than 80 percent of the median will find it extremely difficult to purchase housing due to the lack of housing in this price range, over-extension of household credit, and lack of savings for down payments. Based on predicted household incomes, this may be approximately 25 percent of worker households. For this group, renting may be a more realistic option. Rents would need to be in the range of $300 to $500 per month to accommodate this portion of the work force.

The current Federal Home Administration, insured, 30-year fixed rate is between 8.5 percent and 8.85 percent, with adjustable rate loans at seven percent. The current Hula Mae rate is 8.25 percent. While very real issues such as origination points and down payments remain, interest rates in the current range indicate that housing in West Hawaii is within the grasp of the median-income household.

Due to the temporal nature of interest rates and the fact that many people rent, for the purpose of this analysis it is assumed that households making less than 80 percent of the West Hawaii median income of $25,000 per year are in need of housing assistance. This may take the form of deeply subsidized for-purchase housing or, perhaps more appropriately, rentals with rates based on a percentage of monthly income. Eighty percent of the median ($1,666 per month) falls within the surveyed range of $1,501 to $1,750 per month. Affordability as a function of interest rates is depicted in Table IV-25.

**Characteristics and Location of Demanded Units:** Employee Survey results indicate that 71 percent of current workers live in single-family housing and 21 percent in multi-family units, although a higher proportion (31 percent) of recent in-migrants live in multi-family units. The average number of rooms per unit reported in the survey was six, indicating a typical unit size of two to three bedrooms. It is therefore concluded that the housing in demand by resort workers will be two- to three-bedroom units — primarily single-family homes, but with increasing willingness to reside in apartment units as more in-migrants enter the West Hawaii workforce.

In terms of location, State and County planning and zoning policies will ultimately determine where the supply of new housing units will be permitted. The local governments are now exploring a new "support community" at Kealakehe north of Kailua-Kona, and there has also been preliminary discussion of other potential support community sites in the Kohala districts. Zoned land in also available at Waikoloa Village, Waimea, and to lesser extents in various North Kohala sites (expansion of existing communities such as Hawi and Kapaau, as well as some subdivision land between Hawi and Kawaihae).

However, some indication of future residential patterns may also be inferred from an understanding of where workers currently live, as determined by the Employee Survey (Community Resources and Demographic Research, 1987). Table IV-26 indicates the residence of various employee groups, including
### Table IV-25
Maximum Housing Purchase Price
(Interest Rate Vs. Income)

<table>
<thead>
<tr>
<th>Income</th>
<th>7.0%</th>
<th>7.5%</th>
<th>8.0%</th>
<th>8.5%</th>
<th>9.0%</th>
<th>9.5%</th>
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<tbody>
<tr>
<td>$1,000</td>
<td>$ 37,577</td>
<td>$ 35,754</td>
<td>$ 34,071</td>
<td>$ 32,513</td>
<td>$ 31,070</td>
<td>$ 29,732</td>
</tr>
<tr>
<td>1,125</td>
<td>44,623</td>
<td>42,458</td>
<td>40,459</td>
<td>38,610</td>
<td>36,896</td>
<td>35,306</td>
</tr>
<tr>
<td>1,375</td>
<td>58,714</td>
<td>55,866</td>
<td>53,236</td>
<td>50,802</td>
<td>48,548</td>
<td>46,456</td>
</tr>
<tr>
<td>1,625</td>
<td>72,805</td>
<td>69,274</td>
<td>66,012</td>
<td>62,995</td>
<td>60,199</td>
<td>57,605</td>
</tr>
<tr>
<td>1,875</td>
<td>86,897</td>
<td>82,682</td>
<td>78,789</td>
<td>75,187</td>
<td>71,850</td>
<td>68,754</td>
</tr>
<tr>
<td>2,250</td>
<td>108,034</td>
<td>102,794</td>
<td>97,954</td>
<td>93,476</td>
<td>89,328</td>
<td>85,479</td>
</tr>
<tr>
<td>2,750</td>
<td>136,216</td>
<td>129,610</td>
<td>123,507</td>
<td>117,861</td>
<td>112,630</td>
<td>107,777</td>
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<tr>
<td>3,250</td>
<td>164,399</td>
<td>156,426</td>
<td>149,060</td>
<td>142,246</td>
<td>135,933</td>
<td>130,076</td>
</tr>
<tr>
<td>3,750</td>
<td>192,582</td>
<td>183,241</td>
<td>174,613</td>
<td>166,631</td>
<td>159,236</td>
<td>152,375</td>
</tr>
</tbody>
</table>

**NOTE:** Table calculations based on 30 percent of income available for housing, $100 per month in additional housing expenses, and 30-year loan term. Standard amortization formula used for present value calculation.
Table IV-26
Current Housing Location of Luxury Kohala Resort Employees

<table>
<thead>
<tr>
<th></th>
<th>Overall Sample</th>
<th>Recent (Past Five Years) In-Migrants*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mauna Lani</td>
<td>Mauna Kea</td>
</tr>
<tr>
<td>Fuako/Waikoloa/Kawaihae</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Kaua'ula/Waimea</td>
<td>23%</td>
<td>25%</td>
</tr>
<tr>
<td>North Kohala</td>
<td>29%</td>
<td>39%</td>
</tr>
<tr>
<td>Hamakua</td>
<td>15%</td>
<td>23%</td>
</tr>
<tr>
<td>North Kona</td>
<td>18%</td>
<td>3%</td>
</tr>
<tr>
<td>South Kona</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>East Hawaii</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>(base:)</td>
<td>(371)</td>
<td>(358)</td>
</tr>
</tbody>
</table>

* non-management only

non-management recent in-migrants, whose preferences are the best indicators of the preferences of future in-migrants. As of now, newcomers are tending to live either in North Kona or the Waimea area.

There are some significant ethnic differences in current hotel workers' residential patterns. Caucasians are more likely than other groups to live in Kona and in makai South Kohala (Puako, Waikoloa, etc.) and much less likely than other ethnic groups to live in North Kohala. The other ethnic group with a distinctive pattern consists of Filipinos, who are more likely than most other groups to be living in North Kohala or Hamakua.

The Employee Survey also indicated that the great majority of current workers are satisfied with their current areas of residence. However, those most likely to be happy were workers living close to their workplaces (i.e., in the makai parts of South Kohala). Newcomers were particularly likely to want to live in the makai areas, whereas long-time residents were also interested in mauka residential areas.

In terms of actual housing moves following initial employment with a Kohala luxury resort, most workers originally living on-island have not moved from their original areas; those who did move tended to shift to mauka South Kohala. People moving from East Hawaii tended to move to the cooler parts of North Hawaii (mauka South Kohala, North Kohala, or Hamakua). In-migrants from other Hawaiian islands were more likely to settle in South Kohala, while in-migrants originally from the Mainland were relatively more likely to end up in Kona or makai South Kohala.

2.2.6.2.4 Future Available Housing

The future availability of housing is dependent upon a number of complex variables, most of which are beyond the control of individual developers or the government. This section will discuss the current status of planning for residential developments, forces likely to influence the market, and possible responses.

The primary economic activity in West Hawaii is tourism. It is not surprising to find a relationship between the growth of tourism and the production of residential housing. Although yearly housing production has been erratic as previously discussed, there has been a consistent increase in residential housing accompanying the increase in visitor units. This relationship is illustrated in Figure IV-10.

Project List and Descriptions: Table IV-27 lists the major proposed projects in the West Hawaii area (Hawaii County Department of Housing and Community Development and Department of Planning). They are described in terms of location, General Plan status, and the number of single-family, multi-family, and total units. There is no indication as to the planned price range of these units. The numbers involved, however, suggest that a majority will need to be priced to the bulk of the residential market in order to assure their marketability.

Other Potential Market Responses: In addition to traditional single-family and multi-family product, non-traditional housing may be expected to absorb a small percentage of the market. One form often discussed but as of...
Figure IV-10
RESORT UNITS AND HOUSING UNITS
RITZ–CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Gen. Plan Status</th>
<th>S. F. Units</th>
<th>M. F. Units</th>
<th>Total Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker 2020</td>
<td>S. Kohala</td>
<td>Approved</td>
<td>500</td>
<td>150</td>
<td>650</td>
</tr>
<tr>
<td>Ainakea</td>
<td>N. Kohala</td>
<td>Approved</td>
<td>100</td>
<td>5.4 ac.</td>
<td>120</td>
</tr>
<tr>
<td>Waikoloa Village</td>
<td>S. Kohala</td>
<td>Approved</td>
<td>5,800</td>
<td>1,700</td>
<td>7,500</td>
</tr>
<tr>
<td>YO, Inc.</td>
<td>N. Kona</td>
<td>Approved</td>
<td>1,093</td>
<td>340</td>
<td>1,433</td>
</tr>
<tr>
<td>Gamion</td>
<td>N. Kona</td>
<td>Approved</td>
<td>215</td>
<td>475</td>
<td>690</td>
</tr>
<tr>
<td>Keauhau View Estate</td>
<td>N. Kona</td>
<td>Approved</td>
<td>135</td>
<td>140</td>
<td>275</td>
</tr>
<tr>
<td>Kona Coast</td>
<td>N. Kona</td>
<td>Approved</td>
<td>73</td>
<td>439</td>
<td>512</td>
</tr>
<tr>
<td>Kohala Ranch</td>
<td>N. Kohala</td>
<td>Pending</td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>California-Kohala</td>
<td>S. Kohala</td>
<td>Pending</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Puako Heights</td>
<td>S. Kohala</td>
<td>Pending</td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>Lanihau</td>
<td>N. Kona</td>
<td>Pending</td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>Kealakehe</td>
<td>N. Kona</td>
<td>Pending</td>
<td></td>
<td></td>
<td>3,500</td>
</tr>
</tbody>
</table>
yet untried in the local market is the dormitory concept. These rooms would be made available at modest rents to mostly transient workers. This would be a large-scale version of the boarding house which is already gaining some popularity in North Kona. Self-help or sweat-equity housing may also find a small market among resort workers due to the relative abundance of reasonably priced lots in the area. A third form, already popular and likely to grow in numbers, is the ohana unit in existing residences, both legal and illegal.

2.2.7 Qualitative Social Impacts

The proposed Ritz-Carlton Mauna Lani is not expected to have any unique social impacts which would differ from those of other resort hotels. Also, the cumulative social effects of resort development often represent more significant impacts than would be expected from any particular project. Therefore, the following discussion will focus on West Hawaii (and/or statewide) resort development in general.

The discussion is organized in two broad parts: (1) forces for social change, and (2) statistical indicators of community cohesion.

2.2.7.1 Forces for Social Change

Four aspects of resort development have strong implications for social change:

- resident employment in resort settings;
- increased visitor population;
- in-migration of full- or part-time resort residents;
- in-migration of new workers, leading to changes in population levels or composition.

2.2.7.1.1 Employment in Resort Settings

Some frequent concerns expressed regarding resort employment are (1) whether wages and working conditions are adequate; (2) whether long-time residents have a fair share of better jobs; (3) family and psychological factors; and (4) worker satisfaction.

Economic Quality: Table IV-28 provides 1985 data on average employment and wages for various types of jobs associated with destination resorts (hotels, other services, eating and drinking places, other retail trade, and transportation), as well as plantation agriculture, another primary industry in Hawaii with which tourism is often compared.

Some implications of this table include:

- While the sorts of service jobs commonly associated with resorts comprise more than 40 percent of Hawaii's jobs statewide and nearly 46 percent of Big Island jobs (although many such jobs would actually serve residents rather than visitors), average wages for most categories fall below the average wage for all private-sector jobs.
<table>
<thead>
<tr>
<th></th>
<th>STATEWIDE</th>
<th></th>
<th>HAWAII COUNTY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Average Wage</td>
<td>Average</td>
<td>Average Wage</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>% of Total dollars</td>
<td>% of Average</td>
<td>% of Total dollars</td>
</tr>
<tr>
<td>no.</td>
<td>% of total</td>
<td>dollars</td>
<td>% of average</td>
<td>dollars</td>
</tr>
<tr>
<td>TOTAL PRIVATE SECTOR</td>
<td>343,400</td>
<td>100.0% $16,070</td>
<td>100.0%</td>
<td>27,963 $13,896</td>
</tr>
<tr>
<td>Selected Resort-Related Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Hotels, rooming houses, etc.&quot;</td>
<td>28,547</td>
<td>8.4% $13,601*</td>
<td>84.5%</td>
<td>3,931 $12,056*</td>
</tr>
<tr>
<td>&quot;Eating and drinking places&quot;</td>
<td>40,171</td>
<td>11.7% $ 7,486*</td>
<td>46.6%</td>
<td>2,657 $ 6,561*</td>
</tr>
<tr>
<td>&quot;Other retail trade&quot;</td>
<td>56,036</td>
<td>16.3% $13,029</td>
<td>81.1%</td>
<td>4,889 $11,672</td>
</tr>
<tr>
<td>&quot;Transportation&quot;</td>
<td>23,439</td>
<td>6.8% $19,508</td>
<td>121.4%</td>
<td>1,286 $17,092</td>
</tr>
<tr>
<td>Selected Plantation-Related Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Agriculture, forestry, fisheries&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-- Sugar</td>
<td>3,079</td>
<td>0.9% $18,258</td>
<td>113.6%</td>
<td>181 $22,200</td>
</tr>
<tr>
<td>-- Pineapple</td>
<td>2,056</td>
<td>0.6% $16,157</td>
<td>100.5%</td>
<td>N/A N/A</td>
</tr>
<tr>
<td>-- Other Crops</td>
<td>3,061</td>
<td>0.9% $13,095</td>
<td>81.5%</td>
<td>2,221 $13,985</td>
</tr>
<tr>
<td>&quot;Manufacturing:&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-- Sugar Mills</td>
<td>2,706</td>
<td>0.6% $20,759</td>
<td>129.2%</td>
<td>662 $23,284</td>
</tr>
<tr>
<td>-- Pineapple canning</td>
<td>2,016</td>
<td>0.6% $14,577</td>
<td>90.7%</td>
<td>N/A N/A</td>
</tr>
<tr>
<td>-- Other Food Processing</td>
<td>4,914</td>
<td>1.4% $16,857</td>
<td>105.0%</td>
<td>1,306 $15,486</td>
</tr>
</tbody>
</table>

* Wage figures do not include tips/gratuities.

Source: Hawaii State Department of Labor and Industrial Relations, 1986, pp. 2, 3, 10.
Average hotel wages are relatively close to the respective statewide or islandwide averages, but wages for food-and-beverage jobs (which are often just part-time) are below 50 percent of the average private-sector wages. However, note that these figures exclude income from tips/gratuities, which can comprise a substantial portion of income for waitstaff and some hotel workers.

Wages for sugar are higher than the statewide or islandwide average, but relatively few people still work in the sugar industry.

In addition to somewhat low average wages, hotel and other resort-related jobs are subject to seasonal fluctuations and inconvenient and/or split working hours. These problems are particularly acute for entry-level staff workers (who often start on a part-time or casual basis), since workers with seniority are less likely to be laid off in off-season and have more privileges in terms of choosing preferred working hours.

However, it should be noted that the foregoing applies to "average" hotels, and conditions are sometimes different at Kohala luxury hotels such as the Ritz-Carlton is intended to be. Related points regarding economic "quality" include:

According to the initial Ritz-Carlton staffing plan (Table IV-15, page IV-67), 90 percent of all on-site jobs will be full-time, rather than part-time or temporary.

Tip income -- which represents the unknown factor in determining how well resort employees are actually compensated -- tends to be higher at luxury hotels.

According to the Employee Survey of luxury Kohala hotel workers (Community Resources, Inc., and Datametric Research, 1987), the median overall household income of hotel workers is $25,668 per year -- which is almost identical to the County Housing Office's estimated median income for all West Hawaii residents (personal communication, Bill Moore, deputy director, March 16, 1987). About half the surveyed workers were the primary wage-earners in their households.

For particular groups surveyed, median incomes were: management/supervisory personnel -- $35,256/year; full-time workers -- $23,496; part-time/casual workers -- $27,672. The higher household income for part-time/casual workers was due to the fact that there were more wage-earners and more jobs per persons among these households.

Tourism also generates off-site employment, including support professions such as lawyers and doctors. The ratio of such off-site jobs to on-site jobs tends to be lower than for sugar plantations; however, the current issue does not involve a choice between tourism and sugar (or any other economic activity) for the Ritz-Carlton site, but rather a choice between new tourism jobs and no economic development there.
Resident Opportunities for Better Jobs at Resorts: Most Hawaii hotels are (as will be the Ritz-Carlton) managed by national or international chains which rotate top managers throughout the country or the world. While this can mean an exciting life career for Hawaii-born hotel managers transferred elsewhere, it can also mean that many top managers at Hawaii hotels are not Hawaii-born, sometimes leading to cultural misunderstandings and feelings of resentment by local workers.

At another level, there may be perceptions that some groups -- either Hawaii-born or certain ethnic groups -- tend to end up with the "worst" jobs (such as part-time or casual employment).

Two recent studies which may shed some light on these concerns are the recent Employee Survey of luxury Kohala hotel workers (Community Resources, Inc., and Datametric Research, 1987) and a Cornell University doctoral dissertation by A.M. Bouslog (1985), which utilized ten years worth of Hawaii State Health Surveillance Survey data:

- Among Mauna Lani and Mauna Kea workers, 63 percent of all employees -- including 55 percent of management/supervisory personnel -- were raised on the Big Island. About one-half the managers had been working at a non-hotel job before taking jobs at the Kohala hotels. While these figures are likely to change if labor demand from cumulative resort development exceeds local supply, the numbers do indicate that Big Island residents historically have not been closed out of Kohala hotel management positions.

- The 1987 Employee Survey also found that lifelong Big Island residents were slightly less likely than in-migrants to hold the so-called "best" (management) jobs, but they were also much less likely to hold the so-called "worst" (part-time/casual) jobs. Similarly, Caucasians were more likely than other ethnic groups to hold both managerial and part-time/casual jobs.

- Part-time/casual jobs at these two Kohala hotels were very likely to be held by young people (53 percent were under age 30) and/or people who had in-migrated in the past five years. As previously noted, household incomes were higher for part-time/casual workers than for full-time workers, due to more second jobs and more wage-earners in the household. This could be interpreted either as meaning that these households must struggle harder to survive, or that part-time/casual work provides opportunities for households of people interested in maximizing incomes.

- The Bouslog (1985) study also looked at ethnic differences in "primary-sector" vs. "secondary-sector" hotel jobs (roughly equivalent to full-time vs. part-time or casual). She found that Caucasians, Japanese, and part-Hawaiians are more likely than others to hold the better jobs.

Filipinos fared the worst, with 79 percent in secondary-sector jobs. However, this is likely a function less of ethnicity than of immigrant status, since 80 percent of foreign-born employees were working in the secondary sector. The implications of these figures
are subject to varying interpretations. The most negative would be that immigrants and/or Filipinos are being "exploited." The most positive would be that hotel employment represents an opportunity for less educated immigrants to develop work skills and experiences which will permit them over time to advance to higher rungs of the socio-economic ladder.

Bouslog also found that, compared to other civilian industries, Caucasians and Japanese are under-represented in hotel jobs, while Hawaiians and Filipinos are over-represented. Further more, age distributions suggest young residents of Japanese ancestry are unlikely to hold hotel jobs, while most of the Caucasians working in hotels are young (and, possibly, transient). The implication, subject to further study, is that Hawaiians and Filipinos are the groups most likely to make hotel work a permanent career and thus to acquire seniority and the better long-range working conditions.

Family and Psychological Factors in Resort Work: Sociological and psychological aspects of resort employment can be categorized as either transitional (aspects related to adjustment to new forms of employment) or permanent (inherent characteristics).

In Hawaii, more attention has been paid to transitional impacts, particularly in communities undergoing a switch from plantation agriculture to tourism as the economic base—e.g., North Kohala on the Big Island, Kilauea on Kauai, and Kahuku on Oahu. North Kohala's situation resulted in several published studies in the late 1960's and early 1970's (Cottingham, 1969; Hawaii State Department of Planning and Economic Development, 1972; Smith, 1972) focusing on family and psychological impacts. It is important to note that the observed impacts occurred before the sugar plantation shut down (although during a period when there was growing concern that a shutdown was inevitable) and when the new resort jobs were being filled almost entirely by women. The Cottingham study—although based largely on anecdotes and never formally published—received the most widespread publicity. Some of the major conclusions from her study and the others focused on serious marital strains attributed to husbands' jealousy over working wives' contacts with male guests; a new and improved self-image for women; problems with child care and, to some extent, juvenile delinquency associated with having two working parents; family financial problems associated with increased income; and problems with supervisors of different ethnic backgrounds.

However, the Smith (1972) follow-up study suggested that the family adjustment problems were serious only in a few already-shaky marriages and that most other working wives said their families had adjusted. More recently, interviews with community leaders in Oahu's Kahuku area (Community Resources Inc., 1985) and Kauai's Kilauea area (Belt, Collins and Associates, 1983) produced reports of only limited and temporary family disruptions when wives of ex-plantation workers there entered the resort workforce. A year-long psychiatric study in Kahuku (Young and Kinzie, 1973) found no apparent family or mental health problems during the period when women were starting initial hotel work.
To the extent that any significant family or self-image impacts did occur in Kohala's transitional period (and it is less certain now that there were such impacts), they would have been primarily associated with wives' initial entry into the labor force in general, and only secondarily with resort employment in particular. As of 1987, most Big Island families have already faced this transition and made their adjustments. However, residents of Hamakua may still be face some adjustments if sugar phases out there and substantial numbers of residents begin commuting to work in West Hawaii hotels for the first time.

Less research, although considerable speculation, has been devoted to apparently inherent problematic aspects of resort work, including shift work, the "glamour-and-gossip" work setting at some hotels that may constitute a challenge to the established values of some rural employees, and the "servant mentality" of resort work alleged by some social critics (e.g., Kent, 1975) to damage employees' self-esteem. However, there has been no published evidence to support this latter concern, and frequent interviews by Community Resources with resort personnel officers and union officials do not indicate that this has been a serious mental health problem.

Worker Satisfaction: In late 1986, the Council of Hawaii Hotels contracted with Strategic Information Research Corp. (1987) to survey hotel workers statewide. CRI requested results for selected items dealing with worker satisfaction, attitudes toward pay, and feelings about Mainland vs. Hawaii management and opportunities for promotion. The Council of Hawaii Hotels, which is involved in contract negotiations with Neighbor Island hotel unions as of this writing, agreed to provide these results on condition that no conclusions be drawn in the EIS text. Therefore, results are presented in Table IV-29 without further comment.

2.2.7.1.2 Increased Visitor Population

The Hawaii State Department of Planning and Economic Development (1981), in its Tourism Plan Technical Reference Document, concludes that increased visitor population has implications for:

- social interaction between residents and visitors,
- perpetuation of local arts and handicrafts,
- changes in lifestyle and standard of living,
- erosion of "Aloha Spirit",
- impaired resident access to coastal areas,
- competition for public facilities and resources,
- pressures on open space and agricultural lands,
- cost of living and property values,
- crime, and
- population increases and need for employee housing.

IV-100
<table>
<thead>
<tr>
<th>Table IV-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii Hotel Worker Attitudes Toward Their Jobs</td>
</tr>
<tr>
<td><strong>Job Satisfaction, Pride</strong></td>
</tr>
<tr>
<td>I like my job.</td>
</tr>
<tr>
<td>Most employees at my hotel don't like their jobs.</td>
</tr>
<tr>
<td>I am proud to work in the hotel business.</td>
</tr>
<tr>
<td>Most employees of this hotel have a sense of pride about their work.</td>
</tr>
<tr>
<td><strong>Attitudes Toward Pay</strong></td>
</tr>
<tr>
<td>I am paid fairly for the work that I do.</td>
</tr>
<tr>
<td>If I get tired of working in the hotel industry, I could easily find a job elsewhere in Hawaii that pays as well.</td>
</tr>
<tr>
<td><strong>Local vs. In-Migrant Management</strong></td>
</tr>
<tr>
<td>Not enough people are promoted up through the ranks in my hotel.</td>
</tr>
<tr>
<td>Supervisors who are not from Hawaii don't understand the needs of employees who are.</td>
</tr>
<tr>
<td>More people from Hawaii should be advanced into higher managerial positions in my hotel.</td>
</tr>
</tbody>
</table>

(base: 5,267 statewide hotel employees)

This menu of potential positive and negative outcomes does not indicate which effects are more frequent or more important. Nor does it indicate what aspects of the visitor population (such as level of expenditure or demographic composition) could affect the nature of social impacts.

However, social scientists have devoted considerable time to identifying factors which affect resident-visitor relations, both in Hawaii and elsewhere. These studies and various Hawaii surveys found no relationship between real or perceived direct economic dependence on tourism and attitudes toward either tourists or the visitor industry (although entrepreneurs associated with tourism were more likely to have positive attitudes). Rather, the studies indicate that resident attitudes have more to do with factors such as perceived competition for resources (e.g., beaches and transportation facilities), displaced political resentment, age of respondents, and perceptions of how much visitors respect local residents.

The quality of resident-visitor interaction in West Hawaii will likely also be affected by the extent of visibility for tourists and the situations in which they are encountered by local residents. The Ritz-Carlton will be located in the Mauna Lani Resort, which — like most existing or planned South Kohala resorts — is a self-contained destination area. Research for past tourism social impact assessments (Community Resources, 1984, 1985) suggests that no more than about 15 percent of the visitor population at such resorts tours off-site in any given day. To the extent that such off-site visitor presence does not interfere with important resident resources (such as recreational areas or transportation systems), it is unlikely to cause serious problems. Even here, a mitigating effect could be produced if off-site visitor activities are channelized into resident-operated tour or commercial activities, thereby increasing the proportion of residents who are likely to possess the positive attitudes of tourism entrepreneurs.

2.2.7.1.3 Worker In-Migration and Related Population Change

In addition to job-related competition, other social impacts of population growth through immigration are usually felt to consist of (1) strains on infrastructure and services (e.g., housing), with attendant social stress, and/or (2) social adjustment problems between newcomers and longtime residents (Hawaii State Department of Planning and Economic Development, 1981). However, there is frequent debate as to which of these two is more significant.

CRI has interviewed social service agency representatives throughout the state in conjunction with social impact assessments for proposed resort projects on Kauai (Belt Collins and Associates, 1983), rural Oahu (Community Resources, 1985), and West Hawaii (Community Resources, 1980, 1984, 1986). In these interviews, there was only occasional reference to serious social problems relating to conflicts between different types of people, but frequent mention of family and individual stressors resulting from population booms and associated social strains — particularly shortage of affordable housing. This finding is consistent with the major body of literature from outside Hawaii on sudden population growth in rural areas.
In-migrating new population could also have impacts on existing life-
styles and cultural values, possibly in the direction of more "Mainland/
urban" and less "local/rural". However, the extent to which this actually
happens will depend on, among other things (1) the location of future new
residential development (i.e., whether in-migrants are widely dispersed among
existing communities or are concentrated in new communities); and (2) the
actual demographics of the newcomers. While Maui and West Hawaii resort
expansion in the 1960's and 1970's attracted mostly young Mainlanders,
several major Neighbor Island resorts in the 1980's have made an effort to
recruit Hawaii-born residents. Such targeted recruitment, as well as job
training for disadvantaged West Hawaii residents to minimize need for
in-migration, represent one of the major recommended forms of socio-economic
mitigations (see Section 2.2.8).

Based on available indirect evidence from Hawaii and elsewhere, CRI
concludes that social adjustment problems between longtime residents and
newcomers represent a milder although lasting social impact, while the social
costs of housing shortages and other strains on infrastructure usually form
the more acute but short-term impact. The latter types of impact occur only
in cases of very rapid growth. The heavy development scenario for the 1980's
set forth in Table IV-9 would certainly fall in this category, as might the
impacts of the unusually large Hyatt Waikoloa project.

2.2.7.2 Statistical Indicators of Community Cohesion

To the extent that tourism causes the types of negative qualitative
social impacts of which it is often accused, at least some indication should
be found in statistical measures of:

- crime data, and/or
- juvenile arrests, and/or
- family problems, and/or
- individual mental health.

2.2.7.2.1 Crime Data

It has frequently been alleged that resort development is linked with
crime, and some studies using Hawaii data (e.g., Fujii and Mak, 1979; Fujii,
Mak, and Nishimura, 1978, 1980) have established statistical associations
between some measures of tourism and reported crime. Chesney-Lind and Lind
(1984) used Kauai crime data from 1978 to 1980 in order to compare victimiza-
tion for visitors vs. residents. In that period of time, results varied
greatly depending on the type of crime. Overall, visitors were less likely to
be crime victims than residents, although they were more likely to report a
few particular types of crime (robbery, rape, and larceny -- the latter
usually being thefts in public settings such as beach parks).

Police in rural Hawaii areas affected by tourism -- including the Kohala
area -- say that the major crime impacts generated by resorts involve property
crimes, primarily larceny at beach parks and other visitor attractions off-
site from resort destination areas themselves.

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In an effort to determine whether reported crime has increased following construction of new hotels in the South Kohala area, CRI examined crime data from both the North and South Kohala districts (Hawaii County Police Department Annual Reports, various years). (Note: The ideal comparison would have involved crime rates vs. the ratio of visitors to residents in the area. However, for many years, there are no reliable estimates of resident population in Kohala, and so rates cannot be calculated.)

Figure IV-11(a) plots number of Kohala visitor units against total reported "Type I" crimes, which include the major types of criminal violations. "Type II" crimes are less serious and/or involve offenses such as drug abuse, for which reporting and arrests may vary greatly depending on different local policies. While the number of visitor units increased sharply in the early 1980's (due to construction of the Sheraton Royal Waikoloa and the Mauna Lani Bay Hotel), there was no comparable increase in overall crime. Rather, the period during which reported crime rose most sharply was the early 1970's. While it is impossible to determine whether there was any cause-effect relationship, this was the period when the Kohala sugar plantation was phasing out and the economic future was particularly uncertain, at least for the North Kohala area.

In Figure IV-11(b), CRI also examined the relationship between visitor units and individual crimes often thought to be associated with tourism (rape, robbery, and larceny). The numbers of rapes and robberies in the Kohala area have been so few and so erratic as to be almost unplottable, and so total "violent" crime (all reported murder, manslaughter, rape, robbery, and assault) is plotted instead. Because the number of individual crimes are so few in number compared to the numbers of visitor units, Figure IV-11(b) uses standardized "Z-scores," a statistical transformation which makes the units comparable by expressing each number as a deviation from the mean for that variable. Also, for the crime data, Figure IV-11(b) employs three-year moving averages to eliminate some of the "noise" from annual fluctuations and bring out any overall trends.

These graphs fail to show any clear relationship between new Kohala visitor units and reported crime of any type, whether total, violent, or simple larceny (theft). This does not conclusively disprove any link between crime and tourism in Kohala, since statistical relationships are complex and can be masked by other variables. However, it does illustrate that any such relationship (if it exists) is not a simple one, and that building new visitor units will not automatically lead to increased crime, except for expected increase as a function of increased population.

2.2.7.2.2 Juvenile Delinquency

Figure IV-12 plots Kohala visitor units against juvenile arrests in the South and North Kohala districts combined (Total Type I offenses, again using Z-scores to transform both variables to the same scale). According to the South Kohala police operations clerk (personal communication, Mrs. Patricia Levi, April 24, 1987), the sharp spike in 1978 was due to several repeat offenders rather than to any increase in the overall number of offenders. She also noted that the upturn since 1983 has been associated with overall increased population and that juvenile offenders are increasingly members of newcomer, rather than longtime resident, families.
NOTE: To allow comparison on the same scale, raw numbers were transformed to Z-scores, and three-year moving averages were used for crime data.

Figure IV-11
KOHALA AREA VISITOR UNITS VS. REPORTED CRIME, 1970-1985
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii

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Figure IV-12
KOHALA AREA VISITOR UNITS VS JUVENILE ARRESTS FOR TYPE I OFFENSES, 1976-1985
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
It is possible to interpret Figure IV-12 as suggesting a delayed association between resort development and juvenile crime, since the upturn in North/South Kohala juvenile arrests followed opening of the Sheraton Royal Waikoloa and Mauna Lani Bay Hotel by several years. (Actually, the recent increased juvenile arrests coincide with a period of increased occupancies for all West Hawaii resorts, which could mean more visitors spilling over into South Kohala recreation areas, where juveniles are often responsible for minor thefts.) However, it is also apparent that known juvenile crime actually dropped in the years when the last two new Kohala hotels opened.

In past resort social impact assessments (Community Resources, Inc., 1984, 1985), police officers from Kohala and other rural resort areas throughout Hawaii have been quoted as saying that the major implications of tourism for juvenile delinquency involve (1) increased juvenile opportunities for thefts at beach parks or other public places, and (2) creation of a "street scene" in tourist commercial areas such as Lahaina or Kailua-Kona. Compared to independent hotels in semi-urban complexes, self-contained destination areas such as Mauna Lani contribute relatively little to the first of these factors and even less to the second.

2.2.7.2.3 Family Problems

As noted in Section 2.2.7.1.1, resort employment can theoretically contribute to marital discord or child care problems. The only district-level statistics on such problems relate to child abuse and/or neglect. Table IV-30 shows state wide and Big Island data for child abuse/neglect since 1980.

Child abuse/neglect figures must be treated with great caution because (1) there has been a recent statewide (and national) increase in willingness to report cases, which does not necessarily mean actual increased abuse or neglect, (2) available figures may include repeated reports over time about the same families; and (3) reported cases are also partly a function of the number of caseworkers who are present to record the reports, and an organization of Kona parents recently prepared a report suggesting that -- due to staffing problems -- West Hawaii caseworkers have much higher caseloads than official State statistics would indicate (Families as Allies, 1987).

Given these caveats, it may be seen from Table IV-30 that there has been a sharp islandwide increase in both reported and confirmed child abuse/neglect cases from 1980 to 1985. However:

- the Big Island rates are essentially identical to state wide rates;
- the total West Hawaii Study Area's share of confirmed cases islandwide has fluctuated greatly, ranging from 22 percent in 1982 to 55 percent two years later, and a downturn to 41 percent in 1985 (when visitor counts and tourism employment was on the rise);
- Cases in South and North Kohala have begun to pick up in the mid-1980's, following construction of the most recent two hotels there. While no cause-effect relationship can be established at this time (and while it is uncertain whether any possible cause-effect connection would have more to do with tourism per se or with population increase and in-migration), the figures suggest that this is a topic worth further exploration and monitoring.

IV-107
**Table IV-30**

Statewide and West Hawaii Child Abuse/Neglect Data, 1980 - 1985

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported:</td>
<td>2,104</td>
<td>2,358</td>
<td>2,681</td>
<td>3,631</td>
<td>4,378</td>
<td>4,234</td>
</tr>
<tr>
<td>Rate/10,000 Residents:</td>
<td>21.7</td>
<td>24.0</td>
<td>26.9</td>
<td>35.7</td>
<td>42.1</td>
<td>40.2</td>
</tr>
<tr>
<td>Confirmed:</td>
<td>1,061</td>
<td>1,134</td>
<td>1,379</td>
<td>1,620</td>
<td>2,181</td>
<td>2,336</td>
</tr>
<tr>
<td>Rate/10,000 Res.:</td>
<td>11.0</td>
<td>11.6</td>
<td>13.8</td>
<td>15.9</td>
<td>21.0</td>
<td>22.2</td>
</tr>
</tbody>
</table>

**HAWAII**

| Reported: | 214 | 209 | 288 | 371 | 477 | 521 |
| Rate/10,000 Res.: | 23.0 | 21.5 | 28.8 | 36.0 | 45.0 | 47.7 |

**HAWAII CENSUS TRACT REPORTS (CONFIRMED ONLY)**

| 217 - S. Kohala (as % of County:)| 3 | 0 | 1 | 5 | 13 | 7 |
| (as % of County:)| (1.6%) | (0.0%) |(.90%) | (3.2%) | (5.6%) | (2.5%) |

| 218 - N. Kohala (as % of County:)| 1 | 0 | 0 | 6 | 7 | 13 |
| (as % of County:)| (1.2%) | (0.0%) | (0.0%) | (3.0%) | (3.0%) | (4.7%) |

| 215, 216 - N. Kona (as % of County:)| 22 | 14 | 14 | 56 | 65 | 71 |
| (as % of County:)| (26.5%) | (15.4%) | (12.6%) | (36.1%) | (27.9%) | (25.4%) |

| 213, 214 - S. Kona (as % of County:)| 7 | 10 | 6 | 10 | 34 | 20 |
| (as % of County:)| (8.4%) | (11.0%) | (5.4%) | (6.5%) | (14.6%) | (7.2%) |

| 219 - Honokaa/ Kukuihaele (as % of County:)| 6 | 6 | 3 | 4 | 10 | 2 |
| (as % of County:)| (7.2%) | (6.6%) | (2.7%) | (2.6%) | (4.3%) | (1.7%) |

| TOTAL STUDY AREA (as % of County:)| 39 | 30 | 24 | 81 | 129 | 113 |
| (as % of County:)| (47.0%) | (33.0%) | (21.6%) | (52.3%) | (55.4%) | (40.5%) |

**Note:** Figures are for unduplicated abuse and/or neglect. However, cases reported on different days involving the same individual are listed as separate instances.

**Source:** Unpublished data, Hawaii State Department of Social Services & Housing. Rates per 10,000 residents calculated by Community Resources, Inc., based on County population estimates from Hawaii State Department of Planning and Economic Development (1986).
2.2.7.2.4 Mental Health

According to the Chief of the Hawaii County Community Mental Health Center (personal communication, David Wrigley, April 24, 1987), the apparent "decline" in mental health caseloads (as reported in Hawaii State Department of Health published data) actually reflects a reduced number of caseworkers and a more selective screening process. Therefore, it would be inappropriate to use the data for even tentative comparisons with tourism development in West Hawaii.

However, interviews with West Hawaii social service agencies (Community Resources, Inc., 1980, 1986) suggest that (1) any relationship between resort development and either individual or family stress probably has more to do with strains from population growth (e.g., having to "double up" in housing) than with tourism per se; and (2) newcomers are more likely than longtime residents to exhibit psychiatric symptomatology in response to stress — partially due to lack of support networks and partially because Mainland-raised individuals are culturally more likely to internalize stress while many local residents vent their frustrations externally (i.e., fights, minor crime, family arguments).

Thus, cumulative resort development — or any other form of economic development generating rapid in-migration — can be expected to increase demands for mental health services, possibly somewhat out of proportion to population growth rates alone. As indicated in Section 2.2.7.1.3, this would depend to some extent on whether housing and other infrastructure is provided in a timely fashion. The Chief of the Hawaii County Mental Health Community Center states that his agency is now beginning to study this issue, although no planning is yet underway.

2.2.7.2.5 Social Consequences of Unemployment

Preceding discussions of impacts from resort development and resort employment have not explicitly considered alternatives, which for some people — particularly the educationally and culturally disadvantaged — may still be unemployment.

There have been many studies nationwide which basically indicate that mental health problems are far more prevalent among the unemployed than among the employed, and poverty is strongly associated with virtually all forms of mental illness.

Crime is a more complicated issue. While crime rates are higher in extremely poor areas, there is no apparent relationship between job loss and increased crime (Horwitz, 1984), and crime rates sometimes drop during economically troubled times.

However, in terms of family stability, studies going back to the Great Depression, as well as more recent ones have demonstrated extreme negative impacts of unemployment and financial crisis on family relationships. Child abuse has also recently been linked to unemployment.

Thus, while resort employment — like employment in any type of industry — may have negative as well as positive sociological and psychological aspects, these aspects would generally be less problematic than impacts of widespread unemployment.

IV-109
2.2.8 Socio-Economic Mitigations

2.2.8.1 Purpose of EIS Socio-Economic Mitigation Discussions

The term "mitigations" refers to actions which can be taken to reduce negative impacts (or enhance positive ones), whether these actions are taken by the developer, local government, or some other party.

A purpose of the EIS is to discuss possible actions, at least in a broad and preliminary way. That is because the actual method for deciding upon mitigations usually involves negotiated conditions attached to government land use approvals (and/or government budget decisions). The function of an EIS is to discuss matters relevant to these decisions, but not to pre-determine the outcome of the political negotiating process which leads to these decisions.

2.2.8.2 Steps to Maximize Employment for Current Residents

To the extent that new resort jobs go to current residents of the Study Area (West Hawai‘i, including Hamakua), several social purposes would be served:

- In-migration and attendant social stress would be reduced;
- Housing impacts would be reduced, since many workers would already be housed;
- The West Hawai‘i tourism workforce would retain a culturally cosmopolitan make-up;
- The purpose of economic "development" would actually be served, in the sense of improving quality of life for the disadvantaged and marginally employable.

As a secondary priority, efforts to maximize employment for current residents of East Hawai‘i would alleviate unemployment in that area. And as a third priority, recruitment among residents of other Hawaiian islands and/or among ex-Big Island residents now on the Mainland would help assure that in-migrants are socially compatible with current residents.

The basic method for maximizing employment among current residents is job training (in the broad sense, including such factors as basic education and attitudinal counseling), as well as support services such as child care or transportation assistance.

Individual hotels typically provide extensive training for their workers. In response to a query from CRI on Ritz-Carlton's plans for training and hiring, Executive Vice-President Douglas McGarrity (personal communication, 12/10/86) replied:

"We are a 'promote from within' company with strong community participation at all organization levels. Key executive positions will be filled by promoting and transferring our most qualified staff members. Departmental management opportunities will be staffed in large part by hiring local talent before hotel opening and training in existing Ritz-Carlton Hotels."
"We are committed to assisting in the ongoing professional development of employees. Training and career enrichment are accomplished through comprehensive orientation and reorientation sessions with emphasis upon cross-training assignments. Lateral service -- which is staff interdepartmental on-the-job-training -- broadens an individual's guest service awareness and experience, thus optimizing promotability."

However, in order to assure that more residents are hired in the first place, more basic job preparation education and training is required -- e.g., training in basic skills and work habits, vocational education, and job-specific occupational training. At higher levels, there is a need for human resource development to assure that area residents are competitive for managerial as well as staff positions. These efforts would necessarily be regional and/or islandwide, not limited to individual resorts.

Numerous existing agencies already provide training, education, and related services -- among them the State Employment Service, Alu Like, and the State Department of Education.

On the statewide level, the 1987 Legislature authorized funding to staff the "Tourism Training Council," which will focus in large part on ways to assure that Hawaii residents have the skills to take on supervisory and management positions.

Perhaps the most involved agency on the local level has been the University of Hawaii at Hilo (UHH) West Hawaii Instructional Facility, which coordinates various course offerings from the UH/Manoa, the UH/Hilo, Hawaii Community College, and the Center for Continuing Education and Community Services (CCECS). The current focus of West Hawaii programs has been on upgrade training, although CCECS in the future will begin to place more emphasis on entry-level job training (personal communication, CCECS director Judith Kirkendall, April 25, 1987). A "Hotel Operations Program" (encompassing current culinary arts courses, plus front desk operations) will soon be offered.

On the private-sector side, the Big Island chapter of the Hawaii Hotel Association has taken the lead in organizing input to West Hawaii college course planning. This group also recently decided to expand its relationship with area high schools, increasing the visibility and effectiveness of such programs as Career Days, Career Shadowing, student hotel tours, liaison with principals and counselors, etc.

Thus, there appears to be little need to create new agencies to provide services. However, numerous private comments to CRI in the course of resort assessments throughout rural Hawaii (including but not limited to West Hawaii) suggest a possible need for better communication and coordination among existing agencies. This need may increase in the future as West Hawaii's population expands and current patterns of loose, informal communication becomes less efficient.

Therefore, socio-economic consultants CRI recommend that consideration be given to regional efforts focusing on:
- improved coordination of existing education/training resources;
- job awareness outreach and education programs (both on- and off-island);
- feasibility studies on managerial modifications to accommodate local cultural aspects;
- increased attention to entrepreneurial development programs;
- child care programs;
- employee transportation assistance.

Table IV-31 relates these potential actions to several of the major potential labor supply sources for future West Hawaii development. Some additional comments on each component:

**Improved Coordination of Existing Training/Education Programs:** A significant question is: Who will assume the responsibility for such coordination? In West Hawaii, there are numerous destination areas and numerous hotel operators. Hotels compete with one another for labor supply, and there is some history of disagreement between operators and developers as to who should bear responsibility for matters such as training or employee transportation assistance. Therefore, it is recommended that, if a coordinated program is to be designed, government take the lead (although with appropriate input from community organizations and resort interests).

**Job Awareness Outreach and Education Programs:** On-island efforts would be primarily focused on pockets of potential workers who might not readily consider resort employment without some campaign to attract them (e.g., the elderly); exposing students to resort work; and correcting misperceptions in the general public which can lead to negative attitudes toward resort work.

Off-island campaigns to attract former Big Island residents or workers from Oahu (rather than out-of-state) represent a somewhat more tentative suggestion, since they may also attract job-seekers other than the target population. Word of mouth may ultimately prove most effective.

**Changes in Management to Accommodate "Local" Culture:** As discussed in Section 2.2.7.1, there are often concerns about cultural value differences between Mainland or Japanese hotel managers and local Hawaii residents, particularly those whose value systems include strong preferences to group approaches to work problems and aversion to competitive, individualistic work practices.

A number of new approaches to education developed by the Kamehameha Schools could theoretically be transferred to the workplace, in the form of greater involvement of entire family groups at work, an emphasis on achievement through group rather than individual incentives, and some de-emphasis on typical Western hierarchical approaches to supervision.

IV-112
<table>
<thead>
<tr>
<th>Improved Coordination of Existing Training/ Education Programs</th>
<th>Job Awareness Outreach and Education Programs</th>
<th>Managerial Modifications to Accommodate Cultural Aspects</th>
<th>Entrepreneurial Development Programs</th>
<th>Child Care Programs</th>
<th>Employee Transportation Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sources Currently in Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future high school graduates</td>
<td>X</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underemployed (less than full-time workers)</td>
<td>XX</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudinally or culturally disinclined</td>
<td>X</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Educationally disadvantaged</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Elderly</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sources Not Currently in Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Hawaii residents</td>
<td>XX</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrants from other islands</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filipino or other immigrants joining local families</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Island residents</td>
<td>XX</td>
<td></td>
<td>XX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Community Resources, Inc.
Entrepreneurial Development Programs: The recent proliferation of visitor-oriented businesses (both retail and recreational activities) in places such as Kona, Hanalei, and West Maui illustrate that tourism's economic opportunities are not limited to wage positions in hotels. The challenge is to assure that such opportunities are maximally known to, and taken advantage of by, West Hawaii residents -- particularly students making career decisions and former residents who may be attracted home readily by business opportunities than by hotel jobs.

Child Care Programs: As discussed in Section 2.2.4, mothers with young children at home have substantially lower labor force participation rates than do mothers of older children. It may be assumed that child care would be a particular concern for females among the educationally disadvantaged, as well.

While recent resort approvals on Oahu have included requirements for land to be used for child care facilities, it is possible that the greater need (in light of existing private-sector day care operations) is for new services, such as coordination of independent babysitting services.

Employee Transportation Assistance: Currently, several South Kohala hotels subsidize worker ridership on County buses. However, the long-term stability of this arrangement is in some doubt. The program could be logically evaluated in the broader context of all the foregoing efforts to increase labor force participation.

Supervisory Upgrade: Once residents possess jobs, many would require a sense of opportunity for upward mobility if they are to remain in the jobs. The prospect of a series of hotel openings over the coming 15 to 20 years would provide "stepping stones" for continual job advancement. While no individual hotel may be expected to train its workers for a better job at a competing new hotel, an ongoing regional training program would be in an excellent position to assist workers in developing needed skills. The University system is already focusing on this objective.

2.2.8.3 Provision of Housing for Employees and New Residents

Mauna Lani Resort has assumed responsibility for meeting employee housing requirements for the Ritz-Carlton Mauna Lani project.

According to Resort officials, Mauna Lani has been and will continue to be involved in providing housing for resort employees. As part of the development of the Mauna Lani Bay Hotel, the Resort established 29 rental units in Waimea. Nineteen of these units -- collectively known as Noe'ili -- were built by Mauna Lani Resort and turned over to the State of Hawaii, which currently manages them through the Hawaii Housing Authority (HHA). The other ten units, known as Hale Waimea, were leased for three years by Mauna Lani for employee use, and these have now been returned to the owner.

Mauna Lani is currently involved in discussions with the County Planning Department and the Office of Housing and Community Development to establish the housing requirement for the Ritz-Carlton. At this time, Mauna Lani Resort has proposed building a 26-unit, Phase Two expansion to Noe'ili in Waimea. The developer has also proposed building 200 rental units in Kealakehe, North
Kona on land owned by the NHA. These units would be built to provide employee housing for the Ritz-Carlton Mauna Lani and additional hotels to be constructed at Mauna Lani in the future.

Following are additional possible actions recommended by socio-economic consultants CRI:

**Government Measures to Assure Land Availability for Private-Sector Housing Development:** State and County officials are planning the development of approximately 3,500 units at Kealakeke, and there has been longstanding general discussion of the possibility of government action to develop some similar "support community" in South or North Kohala.

However, of the approximately 15,000 housing units now existing in West Hawaii, most were privately developed in response to market conditions. As discussed in Section 2.2.6, private-sector housing initiatives historically have kept pace with resort unit development (although residential housing costs are increasing, as they are throughout the state). The primary measures by which local government affects private-sector housing supply are (1) development of regional infrastructure (roads, water, sewer lines, etc.), and (2) provision of zoned lands.

**Infrastructure provision** represents perhaps the major challenge to continued construction of affordable housing in West Hawaii, since much of the cost of housing development rests in factors such as water and sewer lines. Government provision of main lines would greatly increase the cost-effectiveness of residential developments which can then hook up to the main lines.

The County of Hawaii is now examining different alternatives to the difficult question of financing the infrastructure and of finding ways that new developments, and not just existing residents or businesses, can shoulder this cost. The following is a list of possible alternative solutions, not specific recommendations:

- Government bonds tied to revenues resulting from the value created by new resort development.
- Negotiated "exactions" from developers, requirements of cash or in-kind contributions which may be imposed as conditions of land use approvals.
- Impact fees, an approach which involves predictable formulas for assessing new developments based on pro-rata shares of usage of specified new infrastructure specifically created to serve the various developments which are assessed.
- User fees levied on individual consumers over time, rather than on developers on an up-front basis.
- Improvement districts established to permit a special tax levy on property owners benefitting from specific public improvements within the district, with assessments based on street frontage or acreage. A variation is the "special district," which involves government bodies separate from the local government.
Tax increment financing which involves earmarking increased tax revenues resulting from a new development to repay public expenditures (or bonds) used to provide infrastructure. The new development in effect pays its own way, using the community's normal tax program as the mechanism for deriving revenues.

Providing residentially-zoned land: The draft updated Hawaii County General Plan provides various locations for urban expansion. Therefore, provision of residentially-designated land is not seen as a major problem, assuming (1) that actual zoning of designated lands is timely, and (2) government is willing to designate future lands as market conditions warrant.

Private-Sector Employer Measures to Assist Employees: Increasing supply of housing does not always address the broader community question of "housing for whom?" To assure that resort workers are among the beneficiaries of new housing development, resorts or other major employers could take certain cost-effective steps to help their workers find market housing, both owner-occupied and rentals.

Counseling -- During the construction and start-up phases of a resort, employee housing counseling may provide an efficient way to assure adequate quarters for resort workers.

A continuation of such a program during initial staffing of the hotel would provide housing information and assistance to both newcomers and also longtime residents seeking new housing. Even after the start-up phase, the occasional services of a real estate agent for employees could be offered.

Employee notices -- The simplest way to provide housing information is through the systematic and institutionalized use of employee notices, through posting on employee bulletin boards or announcements published in an employee newsletter. A program of this nature is best suited once a resort is in full operation and start-up housing concerns have been addressed.

2.2.8.4 Ongoing Community-Resort Communication Mechanisms

Currently, all resort developers and most individual hotel operators maintain separate community relations departments or programs. Kohala-area resorts have made significant contributions to the overall community welfare, such as land for a fire department sub-station at Mauna Lani and Westin Hotels' cash contribution of $5 million to improve hospital facilities at Waimea. Resort personnel are generally active in community organizations, and community leaders not affiliated with resorts are usually consulted as new plans are formulated.

However, a possible addition to these activities could involve creation of an ongoing forum to promote regular communication between resorts and residents. The value of such a forum would rest largely in the opportunity for residents to pose questions and express concerns to the resorts, rather than only reacting to proposals for new development.
2.2.8.5 Management-Oriented Research

Depending on the exact level and rate of cumulative resort development in West Hawaii, the key socio-economic impact issues will have less to do with forecasting impacts than with managing them. In order to do this effectively, a number of applied research projects would be useful, including:

- An islandwide study of Hawaii County's unemployed and other potential labor force entrants -- their numbers, characteristics, willingness to move to other parts of the island, and factors affecting that willingness.

- An ongoing tracking system to monitor changes in the West Hawaii resort and/or general workforce profiles.

- Survey data to provide more solid quantitative evidence about the true extent and magnitude of any family impacts connected directly with tourism employment or indirectly through rapid population growth.

For the most part, such studies would be appropriately carried out by government. One possible vehicle might be the new "Tourism Impact Management System" which the 1986 State Legislature placed in the Hawaii State Department of Planning and Economic Development. The overall concept of an impact management system represents a significant opportunity for government and the private sector to obtain information useful for future planning in West Hawaii.

2.2.9 Fiscal Impacts

The fiscal impact analysis for the Ritz-Carlton Mauna Lani project focuses on the estimate of potential monetary benefits that would accrue to workers, businesses, and government as a result of the proposed development. The following presents estimates of visitor expenditures, State output and income effects, and a public revenue-cost analysis.

2.2.9.1 Visitor Expenditures

The following set of assumptions was used to estimate the expenditures that could be attributed to visitors to the Ritz-Carlton Mauna Lani:

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Party Size</td>
<td>1.9</td>
</tr>
<tr>
<td>Average Daily Expenditures</td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td>$230</td>
</tr>
<tr>
<td>Non-Japanese</td>
<td>90</td>
</tr>
<tr>
<td>Visitor Distribution</td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td>20%</td>
</tr>
<tr>
<td>Non-Japanese</td>
<td>80%</td>
</tr>
</tbody>
</table>
Based on these assumptions, the initial 450-unit hotel will yield annual visitor expenditures of $25.8-million, in 1987 dollars. When in operation, the 200 additional units are expected to increase annual expenditures by $11.5-million, given the same assumptions as above.

2.2.9.2 Output and Income Effects

Environmental Capital Managers, Inc. (ECMI) used the State of Hawaii, Department of Planning and Economic Development input-output model to project impacts on the economy as a result of Ritz-Carlton Mauna Lani hotel development. The model shows inter-relationships among all sectors of the State’s economy. An application of the model is the formulation of output, income, and employment multipliers which can be applied to estimate direct, indirect, and induced impacts of a given project. The direct effect is the immediate primary impact of a project on the economy, the indirect effect is the secondary impact (when establishments which cater to visitors purchase goods and services for their operations), and the induced effect is the subsequent round of changes in the economy (when employees or owners of businesses catering to visitors spend their earnings).

Employment effects are not included here, as they have been analyzed previously in section 2.2.3 of this EIS. The results below for output effects and income effects should be viewed as the relative magnitudes of impact should the Ritz-Carlton Mauna Lani be constructed and become fully operational. Due in part to the inherent assumptions built into the State input-output model and various estimation errors, the results should be viewed as estimations, and not as predictions.

Output Effects. The impacts here represent the changes that could occur to the Gross State Product, or the effect on the total value of goods and services produced within the State’s economy.

Upon full operation of the hotel, it was estimated that the initial 450-unit phase of the project would generate an annual average of $17.0-million, in constant 1987 dollars. The additional 200 units would contribute another $6.0-million. The indirect and induced effects were calculated using the following multipliers for the hotel industry:

<table>
<thead>
<tr>
<th></th>
<th>Indirect</th>
<th>Induced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect</td>
<td>0.453</td>
<td>0.779</td>
</tr>
</tbody>
</table>

Based on these multipliers, the various effects are estimated as follows:

<table>
<thead>
<tr>
<th></th>
<th>450 Units</th>
<th>200 Additional Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$17.0-million</td>
<td>$6.0-million</td>
</tr>
<tr>
<td>Indirect</td>
<td>7.7-million</td>
<td>2.7-million</td>
</tr>
<tr>
<td>Induced</td>
<td>13.2-million</td>
<td>4.7-million</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$37.9-million</td>
<td>$13.4-million</td>
</tr>
</tbody>
</table>

IV-118
Income Effects. This impact represents the income changes that could occur to the household sector of the economy. The various effects were calculated using the following multipliers for the hotel industry:

<table>
<thead>
<tr>
<th>Type</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>0.369</td>
</tr>
<tr>
<td>Indirect</td>
<td>0.167</td>
</tr>
<tr>
<td>Induced</td>
<td>0.314</td>
</tr>
</tbody>
</table>

The income effects were calculated using these multipliers with the direct output estimate of $17.0-million.

Based on the above, the estimates of the various income effects are as follows:

<table>
<thead>
<tr>
<th></th>
<th>450 Units</th>
<th>200 Additional Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$6.1-million</td>
<td>$2.2-million</td>
</tr>
<tr>
<td>Indirect</td>
<td>2.8-million</td>
<td>1.0-million</td>
</tr>
<tr>
<td>Induced</td>
<td>5.3-million</td>
<td>1.3-million</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$14.4-million</td>
<td>$5.1-million</td>
</tr>
</tbody>
</table>

2.2.9.3 Public Revenue Cost Analysis

Economic activities such as the Ritz-Carlton Mauna Lani project provide the State and County of Hawaii with additional sources of revenues and, simultaneously, increase the burden on available public resources. To assess the impact of the proposed hotel development, incremental revenues and costs were estimated and fully charged to the project to calculate the revenue-cost ratio.

ECMI took the approach of first identifying the kinds of revenue and cost elements to be considered, then estimating the dollar amount which should be associated with each element, and finally comparing the discounted present values of the various revenue and cost totals. The objective of the analysis was to determine whether the additional County and State government revenues generated as a result of the project would offset the necessary additional costs. For the purposes of this analysis, the base period was set at 1987, the start year 1988 and the end year 2000.

2.2.9.3.1 Study Variables. This section presents both the public revenue and public cost variables which were considered for the revenue-cost analysis.

Public Revenue Variables

General Excise/Development. This variable was included to reflect the revenue generation that would occur as a result of the development/construction activities. The development costs include only the initial 450-unit hotel. The excluded 200 units to be constructed at a later date would provide additional revenue dollars to the State of Hawaii.
General Excise/Operations. The rental income derived from the operations of the hotel would be assessed the general excise tax of 4%.

General Excise/Personal Consumption. A portion of the wages earned would be spent on various goods and services. It was assumed that the average employee would spend 60 percent of his or her gross income on consumable goods and services.

Corporate Income Tax/Development. The net taxable income derived from the development of the project would be subject to the corporate income tax. It was assumed that 10% of the estimated income generated by the project would be subject to the corporate income tax.

Corporate Income Tax/Operations. The net taxable income derived from the hotel's operations would be subject to the corporate income tax. Again, it was assumed that 10% of the estimated income generated by the project would be subject to the corporate income tax.

Personal Income Tax. For the fiscal impact analysis, it was assumed that each employee represented an individual household and that each employee would be the sole wage earner for that household.

Real Property Tax. The reclassification and rezoning of the property would increase the relative value of the land. In addition, the improvements would also have value. The budget for the improvements to the initial 450-unit project is $67-million, and the analysis is based on this amount only. There is currently no budget for the additional 200 units, therefore making the analysis very conservative.

Hotel Room Tax. Effective January 1, 1987, hotel room rentals are subject to a 3 percent hotel room tax. This source of revenue was incorporated into the analysis, assuming 70 percent occupancy and an average room rate of $195 per night.

Public Cost Variables

Lower Education. The increase in population from operational period employment may increase public education costs if additional teachers, supplies, etc., are needed beyond the level currently being planned. Given that the majority of direct labor required will come from on-island sources, actual cost increases are expected to be small. However, for analysis purposes, an average cost allocation to the project was made.

Higher Education. For analysis purposes, the average costs for the major elements for the Hilo Campus of the University of Hawaii were charged to the project.

Health Services. This variable includes emergency medical service and the Hono'oko'a, Kohala and Kona Hospital components. The average cost was estimated to be $104 per person, on the basis of de facto population since hotel guests may require emergency medical care.
Mass Transit Services. Hotel guests are unlikely to use public transportation services; however, it is expected that some employees will commute to work by bus. For the analysis, an average variable cost of $5 per (de facto) person was used.

Police Services. Employment and related population growth due to the project have the potential to add to the police service workload. An average $299 was assessed each employee household.

Fire Services. It was estimated that the average variable cost per employee household would be $166.

Excluded Variables

Certain variables, such as highway maintenance and utilities, were excluded from this analysis. Although these variables might be affected by the Ritz-Carlton Mauna Lani project, they are funded through user fees which keep the providers of these services and facilities solvent. Therefore, the inclusion of these costs, along with the assessed user fees, would result in a "wash."

2.2.9.3.2 Results of the Present Value Revenue-Cost Analysis. As shown in Table IV-32, the Ritz-Carlton Mauna Lani hotel project is expected to have a favorable revenue-cost ratio of 3.2 to 1.0. This indicates that an additional $3.20 in public revenue will be generated by the State of Hawaii and/or the County of Hawaii for every dollar of public cost caused by the project.

The cumulative discounted public revenues totalled $223.8-million in constant 1987 dollars. Of these variables, the combined "general excise tax" variable contributed over $9.7-million or over 40 percent of the total. The second largest factor was the new "hotel room tax" variable: $6.2-million or over 25 percent of the total.

The cumulative discounted public costs totalled $7.4-million in constant 1987 dollars, with the two education variables accounting for over 60 percent of the total.
Table IV-32
Revenue-Cost Analysis Summary
(in 1987 dollars)
Ritz-Carlton Mauna Lani
1988 - 2000

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Excise Tax/Development</td>
<td>$ 5,162,882</td>
</tr>
<tr>
<td>General Excise Tax/Operations</td>
<td>3,689,415</td>
</tr>
<tr>
<td>General Excise Tax/Personal Consumption</td>
<td>816,892</td>
</tr>
<tr>
<td>Corporate Income Tax/Development</td>
<td>830,337</td>
</tr>
<tr>
<td>Corporate Income Tax/Operations</td>
<td>592,786</td>
</tr>
<tr>
<td>Personal Income Tax</td>
<td>3,165,518</td>
</tr>
<tr>
<td>Real Property Tax</td>
<td>3,366,364</td>
</tr>
<tr>
<td>Hotel Room Tax</td>
<td>6,197,030</td>
</tr>
<tr>
<td><strong>PUBLIC REVENUES</strong></td>
<td>$ 23,821,224</td>
</tr>
<tr>
<td>Lower Education</td>
<td>$ 2,929,057</td>
</tr>
<tr>
<td>Higher Education</td>
<td>1,592,527</td>
</tr>
<tr>
<td>Health Services</td>
<td>1,134,969</td>
</tr>
<tr>
<td>Mass Transit Services</td>
<td>57,327</td>
</tr>
<tr>
<td>Police Service</td>
<td>1,107,684</td>
</tr>
<tr>
<td>Fire Service</td>
<td>611,698</td>
</tr>
<tr>
<td><strong>PUBLIC COSTS</strong></td>
<td>$ 7,433,262</td>
</tr>
<tr>
<td><strong>REVENUE - COST RATIO</strong></td>
<td>3.2 to 1.0</td>
</tr>
</tbody>
</table>
3.0 TRANSPORTATION FACILITIES

3.1 TRAFFIC IMPACT ANALYSIS

3.1.1 Introduction

3.1.1.1 Scope of Analysis

The proposed Ritz-Carlton Mauna Lani project is only one among several resort facilities and other development planned for the West Hawaii region and estimates of its impact on transportation facilities and traffic must be conducted with this in mind. It should be noted that long-range forecasts are only as good as the development scenarios on which they are based. To the extent that the rate of development exceeds or falls short of that which is planned, traffic volumes may also increase more rapidly or more slowly than projected. It is therefore perhaps most useful to treat the following discussion as an indication of the potential problems that may arise in the future rather than an attempt to specify exact timetables.

The Hawaii County Planning Department asked that a regional traffic analysis be performed for this EIS, to include potential impacts from the Ritz-Carlton project as well from other development in the West Hawaii region within a 10-year time frame. This traffic analysis projects impacts for the years 1993 and 1998. Assumptions concerning the extent and timing of development (also used in the socioeconomic impacts section of this report) are as follows:

- Ritz-Carlton Mauna Lani: 450 rooms in 1993 and an additional 200 rooms in 1998
- Hyatt Regency Waikoloa: 1,260 rooms in 1993
- An assumed Hotel "x" located in the vicinity of KonaHole Airport: 500 rooms in 1993
- South Kohala Resort: 350 hotel rooms, 15 single-family units and 50 multifamily units in 1993; 110 single-family units and 600 multi-family units in 1998
- Kohala Estates: 47 single-family units in 1993 and 47 units in 1998
- Kohala Ranch: 1300 single-family units and 360 multifamily units in 1993; and 2,265 single-family units and 690 multifamily units in 1998

Traffic on selected roadway segments and intersections (see Figure IV-13) was analyzed for the existing traffic condition in 1987 and according to six scenarios, or three each for the years 1993 and 1998. The purpose of structuring the analysis in this way was to enable projecting the impacts that could be attributed to the Ritz-Carlton Mauna Lani hotel development by itself and also those that could be attributed to regional growth with or without the Ritz-Carlton Mauna Lani. The six scenarios are as follows:
Scenario 1  Impact of traffic generated by the Ritz-Carlton added to existing traffic (1993)
Scenario 2  Impact of traffic generated by all other projects listed above added to existing traffic (1993)
Scenario 3  Cumulative impact of traffic generated by all other projects and the Ritz-Carlton (1993)
Scenario 4  Impact of traffic generated by the Ritz-Carlton added to existing traffic (1998)
Scenario 5  Impact of traffic generated by all other projects listed above added to existing traffic (1998)
Scenario 6  Cumulative impact of traffic generated by all other projects and the Ritz-Carlton (1998)

Included in the regional traffic analysis are vehicular trips made by both visitors and residents. Much of the additional traffic generated can be attributed to operations employees coming and going from their work places, construction workers also coming and going from their work places, residents of the West Hawaii region, material suppliers and others coming and going from various parts of the island.

In the analysis, it was assumed that the traffic generated by the projects noted above constitutes traffic growth in both 1993 and 1998.

3.1.1.2 Computer Model

A computer model was used to perform the analysis: the Impax traffic model developed by PRC Engineering of Orange, California, which is an integrated package of computer programs used to analyze incremental traffic loads on street networks related to specific land uses. Input to the computer program describes the street system, existing traffic, trip generation from projects, intersection information, and distribution of the project traffic on specified travel paths. Traffic generated by the projects is assigned to the road system in the study area, analyses performed for street volumes, intersection turn volumes, and level of service for signalized intersections.

Level of service for unsignalized intersections and roadways were calculated using the methods outlined in the "Highway Capacity Manual" (Transportation Research Board, 1985). "Highway Capacity Software" (U.S. Department of Transportation, Federal Highway Administration, January 1987) are computer programs developed to perform calculations for procedures outlined in the Highway Capacity Manual.

In the traffic analysis, to describe the operational conditions of roadways and intersections, the level of service (LOS) was calculated for the afternoon or PM peak hour, which is more pronounced than the AM peak hour (making for a more conservative analysis). Level of service is a qualitative measure describing the operational condition within a traffic flow. On a descending scale of A to E, level of service A indicates free-flow conditions, with low volumes and high speeds. Level of service E represents the extreme
opposite conditions where a particular roadway is near or at capacity. Below this level is level of service F which is a forced condition involving a breakdown in traffic flow.

3.1.2 Existing Conditions

3.1.2.1 Existing Roadway Conditions

The existing roadway system is shown on Figure IV-13. West Hawaii roads include State highways, County roads and private roads.

Queen Kaahumanu Highway is a State highway which extends along the North Kona and South Kohala coast from Kailua-Kona to Kawaihae. It has two lanes with a posted speed limit of 55 mph. The major intersections on Queen Kaahumanu Highway are at Palani Road, Palisades Subdivision Road, Kawaihae Airport Road, Waikoloa Beach Resort, Waikoloa Village Road, Mauna Lani Resort, Pa'ako, Hapuna Beach, Mauna Kea Resort, and Waimea-Kawaihae Road. The intersection with Palani Road is four-way, fully channelized, and signalized. The other intersections are unsignalized, channelized "T"s, except for the intersection with the Waimea-Kawaihae Road, which is not channelized.

Mamalahoa Highway, a two-way State highway which serves the upland areas of North Kona and South Kohala, has as its major intersections those at Lindsey Road, the Saddle Road, Waikoloa Village Road, Palisades Subdivision Road, and Palani Road. The intersection with Lindsey Road is fully channelized, four-way, and signalized, while the remaining intersections are "T" intersections. The intersection with Waikoloa Village Road is fully channelized while the others are not.

Akoni Pule Highway is a two-lane State highway which extends from Kawaihae to Hapi, with fully channelized intersections at Kohala Estates Road and Kohala Ranch Road.

County roads in the region are Palani Road, Palisades Subdivision Road, Waimea-Kawaihae Road, Lindsey Road and Kohala Mountain Road. All of these roads are two-lane roads.

Private roads in the region are Waikoloa Village Road, Waikoloa Beach Resort, Mauna Lani Resort, Mauna Kea Resort, Kohala Ranch and Kohala Estates. All of these roads are two-lane roads.

3.1.2.2 Historic Traffic

Traffic counts have been taken by the Highways Division, Department of Transportation, State of Hawaii, at locations listed below from 1974 to 1984. These counts have been taken at an average of once every two years. These counts do not include turning movements.

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 - H</td>
<td>Queen Kaahumanu Highway at Waikoloa Village Road</td>
</tr>
<tr>
<td>C-8-M</td>
<td>Queen Kaahumanu Highway at 2.5 north of Kaaalehe Pkwy</td>
</tr>
<tr>
<td>8-P</td>
<td>Queen Kaahumanu Highway at Kawaihae Airport Road</td>
</tr>
<tr>
<td>9-A</td>
<td>Mamalahoa Highway at Waikoloa Road</td>
</tr>
</tbody>
</table>

IV-126
<table>
<thead>
<tr>
<th>Station No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-9-C</td>
<td>Queen Kaahumanu Highway at Palani Road</td>
</tr>
<tr>
<td>10</td>
<td>Mamalahoa Highway at Kawaihae-Waimea Road</td>
</tr>
<tr>
<td>11</td>
<td>Kohala Mountain Road at Kawaihae-Waimea Road</td>
</tr>
<tr>
<td>11-E</td>
<td>Queen Kaahumanu Highway at Kawaihae-Waimea Road</td>
</tr>
</tbody>
</table>

The historic traffic data indicates that traffic has grown from 1976 to 1986 by three times in the Kailua area, by two times in the airport area, by 1.8 times in the Waimea area and by 1.6 times in the Kawaihae area.

3.1.2.3 Current Traffic

As part of the traffic study, traffic was counted on January 21, 1987, at 12 intersections shown on Figure IV-13 by Belt Collins & Associates with the aid of the Waimea Hawaiian Civic Club and the Kona Hawaiian Civic Club. Turning movements were counted at all intersections from 6:00 AM to 6:00 PM. The counts were taken at the following locations:

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Waimea-Kawaihae Road and Kohala Mountain Road</td>
</tr>
<tr>
<td>16</td>
<td>Mamalahoa Highway and Lindsey Road</td>
</tr>
<tr>
<td>23</td>
<td>Mamalahoa Highway and Waikoloa Village Road</td>
</tr>
<tr>
<td>27</td>
<td>Mamalahoa Highway and Palisades Road</td>
</tr>
<tr>
<td>37</td>
<td>Queen Kaahumanu Highway and Palani Road</td>
</tr>
<tr>
<td>41</td>
<td>Queen Kaahumanu Highway and Palisades Road</td>
</tr>
<tr>
<td>43</td>
<td>Queen Kaahumanu Highway and Keahole Airport Road</td>
</tr>
<tr>
<td>46</td>
<td>Queen Kaahumanu Highway and Waikoloa Beach Resort</td>
</tr>
<tr>
<td>49</td>
<td>Queen Kaahumanu Highway and Waikoloa Village Road</td>
</tr>
<tr>
<td>51</td>
<td>Queen Kaahumanu Highway and Mauna Lani Resort</td>
</tr>
<tr>
<td>57</td>
<td>Queen Kaahumanu Highway and Mauna Kea Resort</td>
</tr>
<tr>
<td>60</td>
<td>Queen Kaahumanu Highway and Waimea-Kawaihae Road</td>
</tr>
</tbody>
</table>

Peak traffic generally occurred from 7:00 to 8:30 AM and 3:00 to 5:00 PM. The PM peak hour was the most pronounced and with the greater number of vehicles. The traffic in the region does not have distinct peak hours but is fairly uniform from mid-morning to late afternoon. This traffic profile is characteristic of areas with visitor facilities.

3.1.3 Probable Impacts on Roadways and Traffic

3.1.3.1 Trip Generation

Trip generation rates for hotels were derived from traffic counts taken at the entrance to Mauna Lani and Mauna Kea Resorts on January 21, 1987. The peak hour traffic was correlated to the number of hotel rooms to derive peak hour generation rates. The average trip generation rates per hotel room are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Enter</th>
<th>Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Hour</td>
<td>0.36</td>
<td>0.06</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>0.31</td>
<td>0.45</td>
</tr>
</tbody>
</table>

IV-127
Trip generation rates for single-family and multifamily units are based on rates published in the manual, "Trip Generation" (Third Edition, 1982, Institute of Transportation Engineers). Trip generation rates are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Enter</th>
<th>Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td>0.21</td>
<td>0.55</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>0.63</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>Multifamily</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td>0.07</td>
<td>0.37</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>0.37</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Trips generated by the projects included in the analysis are shown below:

<table>
<thead>
<tr>
<th>Project</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enter</td>
<td>Exit</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ritz-Carlton</td>
<td>162</td>
<td>27</td>
</tr>
<tr>
<td>Hyatt Waikoloa</td>
<td>454</td>
<td>76</td>
</tr>
<tr>
<td>Hotel &quot;X&quot;</td>
<td>140</td>
<td>25</td>
</tr>
<tr>
<td>South Kohala Resort</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Kohala Ranch</td>
<td>85</td>
<td>245</td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ritz-Carlton</td>
<td>234</td>
<td>39</td>
</tr>
<tr>
<td>Hyatt Waikoloa</td>
<td>454</td>
<td>76</td>
</tr>
<tr>
<td>Hotel &quot;X&quot;</td>
<td>140</td>
<td>25</td>
</tr>
<tr>
<td>South Kohala Resort</td>
<td>145</td>
<td>106</td>
</tr>
<tr>
<td>Kohala Ranch</td>
<td>207</td>
<td>601</td>
</tr>
</tbody>
</table>

3.1.3.2 Trip Distribution

The trips generated by the projects were assumed to be distributed to the various locations in the region via the existing street network by the following percentages for the PM peak hour:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Ritz-Carlton</th>
<th>Hyatt Waikoloa</th>
<th>Hotel &quot;X&quot;</th>
<th>South Kohala</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Kohala</td>
<td>15</td>
<td>10</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Waimea West of Lindsey</td>
<td>15</td>
<td>10</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Mamalahoa Hwy North of Lindsey</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Lindsey Rd East of Mamalahoa</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Mamalahoa Hwy South of Lindsey</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Puako</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Waikoloa Village</td>
<td>5</td>
<td>10</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Keahole Airport</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Palisades Subdivision</td>
<td>5</td>
<td>10</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Destination</td>
<td>Ritz-Carlton</td>
<td>Hyatt Waikoloa</td>
<td>&quot;X&quot;</td>
<td>South Kohala</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>-----</td>
<td>--------------</td>
</tr>
<tr>
<td>Palani Road Mauka of Queen Kaahumanu Highway</td>
<td>5</td>
<td>13</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Queen Kaahumanu Highway South of Palani Road</td>
<td>10</td>
<td>15</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Kailua Makai of Queen Kaahumanu Highway</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>

Kohala Ranch, being mainly a residential community, would have distribution of traffic that is different from that of the resort projects. PM peak hour traffic from and to Kohala Ranch is assumed to be distributed by the following percentages:

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exiting from Kohala Ranch to:</td>
<td></td>
</tr>
<tr>
<td>Waimea</td>
<td>60</td>
</tr>
<tr>
<td>South Kohala and Kona</td>
<td>20</td>
</tr>
<tr>
<td>North Kohala</td>
<td>20</td>
</tr>
<tr>
<td>Entering Kohala Ranch from:</td>
<td></td>
</tr>
<tr>
<td>Waimea</td>
<td>15</td>
</tr>
<tr>
<td>South Kohala</td>
<td>83</td>
</tr>
<tr>
<td>North Kohala</td>
<td>2</td>
</tr>
</tbody>
</table>

3.1.3.3 Results of Analysis

In the appendix are figures showing regression equations based on counts, taken by the State Department of Transportation, of traffic entering the intersections of Queen Kaahumanu Highway and Palani Road, Queen Kaahumanu Highway and Keahole Airport, Queen Kaahumanu Highway and Waimea-Kawaihae Road, and Mamalahoa Highway and Lindsey Road. Also shown are points of projected traffic entering the intersections for Scenarios 3 and 6. The regression equation shows the trend of traffic growth at each intersection based on historic data. If the assumption is made that future traffic will follow the same trend as past traffic, a regression equation can be used to project future traffic. The projected traffic on the figures can be compared to the regression equation to see the relative difference between historic trends and projected traffic. The projected traffic for Scenarios 3 and 6 is above the regression line for the intersections of Queen Kaahumanu Highway and Keahole Airport and Queen Kaahumanu Highway and Waimea-Kawaihae Road; it is below or at the regression line for the intersection of Mamalahoa Highway and Lindsey Road; and is below the regression line for the intersection of Queen Kaahumanu Highway and Palani Road.

See Table IV-33 for a summary of the roadway level of service by scenario.

Traffic from the Ritz-Carlton Mauna Lani (Scenarios 1 & 4) would cause the level of service of Waimea-Kawaihae Road in Waimea to be reduced from "M" to "C" in 1993 and to "D" in 1998, and on Queen Kaahumanu Highway from Kailua to Kawaihae to remain at the current level of service or be reduced by one.
<table>
<thead>
<tr>
<th>Roadway Section</th>
<th>Study</th>
<th>Existing</th>
<th>1993</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waimea-Kawaihae Road</td>
<td>Existing</td>
<td>8-C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scenario 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scenario 2</td>
<td></td>
<td></td>
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Table IV-33
Roadway Level of Service
(continued)

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Traffic from all the projects in the area without the Ritz-Carlton (Scenarios 2 & 5) would cause the level of service of the Waimea-Kawaihe Road in Waimea to go to "D" in 1993 and "E" in 1998, and on Queen Kaahumanu Highway from Kailua to the airport to be reduced to "F" in 1993 and "G-F" in 1998, from the airport to Kawaihe to "C-D" in 1993 and "D-E" in 1998.

Cumulative traffic from all the projects in the area (Scenarios 3 & 6) would cause the level of service to be reduced on Waimea-Kawaihe Road in Waimea to "D" in 1993 and "E" in 1998, on Mamalahoa Highway to "D" in 1993 and 1998, on Queen Kaahumanu Highway from the airport to Kawaihe, the level of service would be reduced to "E" in 1998 and north of Palani Road would remain at "E" in 1993 and be reduced to "F" in 1998.

The intersections will also be affected by the increased traffic. The signalized intersections at Mamalahoa Highway and Lindsey Road in Waimea and Queen Kaahumanu Highway and Palani Road in Kailua are currently operating at level of service "A" and "B", respectively. Level of service for Scenarios 1, 2, 4 & 5 will be level of service "A" for Mamalahoa/Lindsey intersection and level of service "B" for Queen Kaahumanu/Palani intersection. For Scenarios 3 & 6 (cumulative impact), level of service for Mamalahoa/Lindsey intersection will be "A" and Queen Kaahumanu/Palani intersection will be "F".

The level of service of the unsignalized intersections can be represented by a selected group as shown in Appendix C. The left turn movement out of a minor road onto a major road is most affected by the growth of traffic within an intersection. The levels of service of the left-turn movements out of a minor street onto a major street are currently at levels of service "B-D", with Scenarios 1 & 4, levels of service will go to "C-F", and with Scenarios 2, 3, 5 and 6, level of service will go to "G-F".

3.1.3.4 Conclusions and Mitigation Measures

The Ritz-Carlton Mauna Lani hotel development will have an impact on the roadway system in the North Kona/South Kohala area. However, the Ritz-Carlton hotel project by itself will not cause the level of service of the roadway system to be lowered to such an extent as to require improvements to keep traffic flowing smoothly. On the other hand, the cumulative impact of all the projects planned for the region, if they develop on schedule, will cause the operating levels of the roadways and intersections to deteriorate to a point where improvements would be required for smooth traffic operation. Traffic impact is the result of an accumulation of traffic from all generators.

Mitigation measures include the addition of roadway lanes and the construction of intersection improvements, as well as measures not directly related to roadways. These include carpooling, the implementation of staggered work hours, and bussing of employees, all of which would most effectively be approached on a coordinated regional basis by public and private entities.

In the area of roadway and intersection improvements, the following are specific mitigation measures.
Queen Kaahumanu Highway, from Kailua-Kona to Kona Airport, is expected to operate at level of service F. To improve traffic flow, two lanes could be added to the highway. Such an addition would improve the traffic flow and reduce it to level of service C.

In future, the intersection of Queen Kaahumanu Highway and Pa'auilo Road is expected to operate at level of service F. Additional left-hand turns could be added to improve traffic flow through the intersection. Also, the intersection of Queen Kaahumanu Highway and Wai'anae-Kalaeloa Road could be improved by channelizing the intersection.
3.2 AIRPORTS

3.2.1 Existing Facilities

The Kohala Coast region is serviced by three airports: Keahole and Waimea-Keahole, which are operated by the State Department of Transportation, and the Kailua Airport, which is located near the Waikoloa Beach Resort and began operations in 1984.

Keahole Airport is located about 20 miles south of Mauna Lani Resort and the Ritz-Carlton Mauna Lani site. It is served by all three major interisland carriers, as well as by several of the commuter airlines and cargo companies. The airport handles direct flights from the mainland United States. Although Keahole's 6,500-foot long runway is adequate for the largest interisland aircraft, it is too short to permit wide-bodied jet aircraft to take off with a full load of fuel. Return flights to the mainland, therefore, require a stop at General Lyman Field in Hilo or Kahului Airport on Maui, both of which have longer runways to accommodate aircraft with larger loads.

3.2.2 Probable Impacts

The proposed 450-unit hotel, with an additional 200 units to be developed by 1998, is not expected to have a significant effect on Keahole Airport's service. The airport served about 130,000 mainland passengers in 1985 and over 1.3-million interisland passenger during the same year (DPED 1986 Data Book, p. 491). However, the cumulative effect of resort development in West Hawaii will eventually require improvements to Keahole Airport. The master plan for the West Hawaii airport is expected to be updated by the State Department of Transportation and future airport expansion as well as runway extension recommended.

3.3 HARBORS

3.3.1 Existing Facilities

Kawaihae Harbor, north of Mauna Lani Resort, is the only deep water harbor in West Hawaii and is used primarily by interisland barges. Cargo handled includes building materials, consumer goods, large equipment and machinery, as well as the provisions and supplies needed to operate hotels and resorts in South Kohala and Kona. The Honokohau Small Boat Harbor is about 13 miles south of the project site, in the North Kona district.

3.3.2 Probable Impacts

According to the State Department of Transportation, the facilities at Kawaihae are adequate to accommodate the foreseen long-term water transportation needs of West Hawaii.
4.0 AIR QUALITY IMPACTS

4.1 INTRODUCTION

J.W. Morrow prepared an air quality impact assessment for the 1985 Mauna Lani Resort environmental impact statement which was submitted to the State Land Use Commission to accompany an application for land use change. The analysis covered the effects of development at the entire 1,430-acre resort, which includes the Ritz-Carlton 52-acre parcel as one of several elements. Impacts attributable to development of Mauna Lani Resort, in general, can also be attributable to the Ritz-Carlton project, although on a lesser scale. Results of the 1985 analysis represent the cumulative impact of Mauna Lani Resort development, of which the Ritz-Carlton Mauna Lani hotel development is part. The reader is referred to the earlier EIS for a full discussion of potential air quality impacts.

4.2 EXISTING CONDITIONS

The reader is referred to the Mauna Lani Resort EIS for a discussion of air quality standards, noting that Hawaii standards are more stringent than their Federal counterparts.

While there are no continuous air monitoring stations in West Hawaii, the absence of large stationary sources of vehicular traffic and the relatively low levels of traffic make it likely that existing air quality in the region is currently good most of the time. The nearest active State Department of Health air monitoring station is located some 50 miles east at Hilo. Data from that station suggest that the State's stringent standards are being met for sulfur dioxide and total suspended particulates. Unfortunately, the two principal automotive pollutants, carbon monoxide and oxides of nitrogen, are not monitored on the Island of Hawaii.

The worst air pollution episodes experienced on the island are due to periodic volcanic eruptions. Visibility is affected by the presence of fine particulates resulting directly from volcanic activity as well as secondarily from forest fires caused by lava flows. In addition, substantial increases in the ambient concentrations of mercury and sulfur dioxide have been recorded during eruptions.

There is little seasonal or diurnal temperature variation in the vicinity of Mauna Lani Resort; monthly temperature averages vary by only 6 degrees from the warmest months to the coolest. An 18-year rainfall record indicates that the area of Mauna Lani Resort is dry, with an annual average of only 10.65 inches. A strong land-sea breeze regime apparently dominates air movement in the area.
4.3 PROBABLE IMPACTS

4.3.1 Short-Term Effects

The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along Queen Kaahumanu Highway as well as in the vicinity of the Ritz-Carlton Mauna Lani site.

The movement of construction vehicles on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity and moderate soil silt content. There is little soil at the Ritz-Carlton Mauna Lani site and soil that is brought in may have a silt content greater than the 30 percent moderate soil silt content. This, in conjunction with the relatively dry local climate, suggests a potential for even greater fugitive dust emissions such as were experienced during construction of the Mauna Lani golf course.

This potential for fugitive dust make it important for adequate dust control measures to be employed during the construction period. Dust control could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The Environmental Protection Agency estimates that twice daily watering can reduce fugitive emissions by as much as 50 percent. Early landscaping of completed areas would also mitigate impacts.

4.3.2 Long-Term Effects

For a more detailed discussion of long-term air quality impacts, the reader is referred to the Mauna Lani Resort EIS. Long-term impacts attributable to the total 650 units of the Ritz-Carlton Mauna Lani will be mostly in the form of increased automobile emissions as the principal air pollution source. These emissions would include all three major automobile pollutants in the Mauna Lani Resort area, including carbon monoxide. Increased demand for electricity by the hotel and employee families will necessitate the generation of electricity by power plants, thus contributing to added pollution. Hawaii Island electricity is currently generated primarily by the burning of high sulfur fuel oil, diesel oil, and bagasse, with a small amount coming from a geothermal plant. With the exception of the geothermal plant, all of these result in the emission of various quantities of sulfur oxides, nitrogen oxides, particulates, and hydrocarbons.

The long-term increase in pollutants attributable to the Ritz-Carlton Mauna Lani project by itself is not significant enough to warrant mitigation measures. However, the cumulative impact of development at Mauna Lani Resort, most of which will take place after construction of the Ritz-Carlton Mauna Lani, will be for State standards to eventually be exceeded at the Mauna Lani Drive—Queen Kaahumanu Highway intersection, according to the J.W. Morrow analysis. Less stringent Federal standards would not be exceeded. Increased concentrations would be due primarily to queuing on both roadways by vehicles attempting to make turning movements into or out of Mauna Lani Drive. Mitigation measures include roadway improvements such as additional lanes and signalization.
5.0 NOISE IMPACTS

5.1 INTRODUCTION

Y. Ebisu & Associates prepared a noise impact assessment for the Mauna Lani Resort EIS in 1985. The reader is referred to this document for a full discussion of potential noise impacts due to Mauna Lani Resort development, of which the Ritz-Carlton Mauna Lani is part.

Increased noise generated by the hotel project, both in the short-term and long-term, will be associated mostly with vehicular traffic. Two descriptors used to relate traffic noise levels to land use compatibility and to assess environmental noise in general, are the "Equivalent Noise Level" (Leq) and the "Day-Night Average Sound Level" (Ldn). As a general rule, noise levels of 55 Ldn or less occur in rural areas, or in urbanized areas which are shielded from streets carrying large volumes of traffic. In urbanized areas, noise levels typically range from 55 Ldn to 65 Ldn, and motor vehicle traffic noise is usually the controlling factor.

An exterior noise limit of 65 Ldn is used nationally for purposes of determining noise acceptability for funding assistance from Federal agencies. However, because of Hawaii's living conditions and the widespread use of naturally ventilated dwellings, an exterior noise level of 65 Ldn does not eliminate all risks of adverse noise impacts.

5.2 EXISTING CONDITIONS

Noise level measurements were made by Y. Ebisu for its 1985 analysis at various stations at Mauna Lani Resort and its vicinity. At that time, existing peak-hour noise levels below 55 Ldn beyond 110 feet from the centerline of Queen Kaahumanu Highway and traffic noise levels along the internal roadways of the resort were below 55 Ldn at distances of 50 feet or more.
5.3 Probable Impacts

5.3.1 Short-Term Construction Noise

Increased noise levels due to construction vehicles and equipment will be a temporary effect. Mitigation measures to reduce temporary high noise levels include the use of mufflers and the operation of machinery during normal daytime hours and during the regular work week.

5.3.2 Traffic and Other Long-Term On-Site Noise

Traffic noise increases of approximately 2 Ldn per five-year period are expected along the external and internal roadways serving Mauna Lani Resort. Over the full development span of the resort project, traffic noise adjacent to Queen Kaahumanu Highway is expected to rise by 7 to 8 Ldn, and total increases of 10 to 11 Ldn are predicted along the internal roadway to the resort. Increases of 7 to 11 Ldn are significant; however, the Ritz-Carlton Mauna Lani will be constructed during the first five-year period, during which time traffic noise will increase by about 2 Ldn.

It should be noted that the projected noise levels on Queen Kaahumanu Highway are the result of greatly increased traffic from cumulative development in the region, as well as from ongoing development of Mauna Lani Resort.

To reduce noise impacts, buffer zones could be used to shield developed areas and appropriate building setbacks maintained.
6.0 PUBLIC SERVICES AND FACILITIES

6.1 SCHOOLS

6.1.1 Existing Facilities

The majority of students from new employee families associated with
direct employment at the Ritz-Carlton Mauna Lani are expected to attend
classes at the schools noted below:

<table>
<thead>
<tr>
<th>Service Region</th>
<th>Elementary or Intermediate Schools</th>
<th>High Schools</th>
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<tbody>
<tr>
<td>North Kohala</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>South Kohala</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>North and South Kona</td>
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<td>1</td>
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<td>Hilo</td>
<td>13</td>
<td>2</td>
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South Kohala is the location of two of the county's best known private
schools, Hawaii Preparatory Academy (grades K through 12) and Parker School
(grades 7 through 12), both in Waimea. Although the Parker Ranch announced in
early 1987 that the Parker School will begin to phase out and will be accepting
no new students, it is expected that the Hawaii Preparatory Academy will
expand its services to meet the region's needs. Hawaii Preparatory Academy is
currently seeking government permits to allow it to build a new lower school
serving grades K through 3 in Keauhou.

6.1.2 Probable Impacts

There will be no direct demand for increased public school service due to
the development of hotel units at the Ritz-Carlton Mauna Lani site. However,
employment will be generated by the Ritz-Carlton Mauna Lani project, leading
to an increase in population islandwide. Community Resources estimates a
population increase of 245 in-migrants (induced and non-induced) and 1,698
islandwide in 1990 and 439 in-migrants and 618 islandwide in 1998. In-migrant
families are expected to create an incremental increase in the demand for
public school service, whereas established families presumably have children
in the existing school system.

Community Resources' cohort model suggests that the proportions of total
West Hawaii population falling in the school-age years (5 to 17) would be
21.9% in 1990 and 20.0% in 1998. Applying these proportions to the population
projected, there would be 54 new students from in-migrant families and 372
students islandwide in 1990 and 88 additional new students from in-migrant
families and 124 additional students islandwide in 1998, for a total of 142
and 496, respectively.
6.2 HEALTH CARE FACILITIES

6.2.1 Existing Facilities

The Island of Hawaii has five hospitals which provide a range of medical services. The Kohala area is serviced by two state-operated hospitals, the Kohala Hospital located in Kapa'au in North Kohala and the Honoka'a Hospital. The Kohala Hospital is primarily a long-term care institution which also offers 24-hour emergency services. Served by a staff of three physicians, the facility has 10 acute care beds and 16 long-term beds. The Honoka'a Hospital has 35 beds, 27 for acute care patients and 8 for long-term care. It is served by 13 to 14 physicians. Neither hospital is equipped to provide full patient services, and the facilities at Honoka'a are considered substandard because the building in which they are housed is thought to be too old and too small.

Kona Hospital is a "full service" health care facility; it has 53 acute care beds, 28 beds for long-term care, and an active staff of 36 physicians. Nevertheless, in 1985, an administrator in the State Department of Health described Kona Hospital's resources as inadequate for the needs of the existing regional population.

In Waimea, the private Lucy Henriques Medical Center provides outpatient health services, including emergency room treatment, x-ray, laboratory services and radiology. Westin Hotels & Resorts contributed $5 million to the center in November 1986 to encourage long-term planning for upgrading the medical center to a modern hospital with a full range of medical facilities.

6.2.2 Probable Impacts

Existing conditions seem to indicate that the health care facilities in the West Hawaii region will require upgrading with or without additional development, including the proposed Ritz-Carlton Mauna Lani hotel. Visitors to the new hotel will be able to seek emergency care at Lucy Henriques Medical Center or Kona Hospital. New population in the study area generated by the hotel project will add to the already increasing demand for medical services in the Kohalas and Kona. New induced and non-induced in-migrant population due to Ritz-Carlton Mauna Lani development would be about 265 in 1990 and an additional 460 in 1998, a total of 685. This population would generate demand for increased medical care services.
6.3 POLICE PROTECTION

6.3.1 Existing Services and Facilities

Police services for South Kohala are located in Waimea. Other police facilities in the study area are the Kapa'a station, which serves the North Kohala area, and the Kona station in North Kona. Both the Waimea and Kapa'a police stations are of relatively recent construction, and there is room in both for additional staff.

6.3.2 Probable Impacts

In a letter responding to an environmental impact statement preparation notice for the revised master plan for Mauna Lani Resort in 1985, Hawaii County Police Chief Guy Paul foresaw a greater police workload as a result of general development at the resort and at other Kohala coast resorts, with perhaps the need for the establishment of a police substation that would require capital outlays as well as the cost of additional personnel and equipment. Such costs would be covered by revenue generated by the proposed Ritz-Carlton Mauna Lani and other resort development in West Hawaii.

In a more recent response (see letter from Police Department dated November 7, 1986 in Chapter XI), the Police Department predicted an increase in criminal activity associated with growth, as well as an increase in requests for police services in the resort area. The reader is referred back to section 2.2.7.2.1 of this report for a more detailed discussion of potential crime impacts.

It is expected that demands on County police services will be partially offset by on-site services provided by hotel security personnel. As the resident population increases in the study area as a result of employee immigration, the need for more police personnel will have to be evaluated in the context of a County Police Department needs assessment.
6.4 FIRE PROTECTION

6.4.1 Existing Services and Facilities

Fire protection service for the South Kohala district is headquartered in a County-operated station in Waimea. The station provides 24-hour service and has a staff of six, supplemented by volunteers from Puako and Waikoloa Village and by a fire equipment operator from Kawaihae. The Waimea station is equipped with one engine, a 1,250-gallon water tanker and a rescue van used by an emergency medical unit. Additional engines and a ladder truck are dispatched from Kailua-Kona when needed; also, a privately owned fire truck manned by volunteers is stationed at the Westin Mauna Kea beach hotel.

The County of Hawaii had contracted with Pan Pacific Construction Company to build a fire station at the Mauna Lani Resort. Funding for the facility was provided by municipal bonds floated by the County. By agreement between the County and the Kohala Coast Resort Association, the association will pay the principal and interest on the bonds. The groundbreaking ceremony for the new fire station took place in April 1987. The new $1.1-million emergency facility will be located on a 1.1-acre parcel of land about one mile north of Mauna Lani Resort, makeni of Queen Kashumanu Highway, and 2.5 miles south of Puako. The facility will include a fire station and a police substation. An emergency medical service vehicle will also be stationed at the new facility. The fire station is planned to become operational by the end of 1987.

6.4.2 Probable Impacts

The construction of the Ritz-Carlton Hotel at Mauna Lani Resort will lead to increased demand for fire protection services and facilities. It is anticipated, however, that construction of the Ritz-Carlton Mauna Lani will not cause fire protection problems given the construction of the new fire station described above and provided that the hotel design and construction comply with current County fire and building codes and requirements. When the Kohala Coast Fire Station becomes operational, response time to emergencies will be greatly reduced from 40 minutes to about 5 minutes.

Regional population growth, indirectly attributable to the project, is also expected to place greater demand upon fire protection services.
6.5 WATER SUPPLY

6.5.1 Existing Conditions

A preliminary analysis of municipal water supply and demand in the South Kohala district was completed by the U.S. Army Corps of Engineers in 1984. Within the South Kohala district, water demand could increase from 2.5-million gallons per day (mgd) to 20 mgd by 2010. The principal cause for increased demand is resort development along the coast. The present supply could be augmented by private development of groundwater. The development of groundwater is regulated by the State of Hawai‘i, Department of Land and Natural Resources, Division of Water and Land Development. Approval from the State Department of Health must also be obtained.

The principal current sources of water for the coastal region of the South Kohala district are the Lalamilo water system operated by the County of Hawaii, which services the Mauna Lani Resort, within which the Ritz-Carlton Hotel will be located, and the private Waikoloa water system.

In January 1979, an agreement was signed by the County of Hawaii, Mauna Loa Land, Inc. (the predecessor of Mauna Lani Resort, Inc.) and Olohana Corporation (the predecessor of Mauna Kea Properties, Inc.) to develop a water system utilizing groundwater from the State-owned tract of land known as Lalamilo.

Mauna Lani Resort, Inc.’s reserved water allocation from the system is currently 1.0-million gallons a day (mgd) from Well A and 0.5 mgd from Well B/C. Well D has been drilled, but has not yet been outfitted with a pump. The pump will be installed when development at Mauna Lani Resort necessitates more potable water than can be obtained from wells A and B/C. The results of pump testing for Well D have been submitted to the County of Hawaii. When the well becomes functional, it is expected to yield 1.44 mgd, 1.3 mgd of which will be allocated to Mauna Lani Resort, Inc.

To accommodate projected increasing demand for potable water, five well sites have been designated on Parker Ranch land. Should exploration be successful, four of these wells will serve the water needs of further development at Mauna Lani Resort.

6.5.2 Probable Impacts

No public funds will be expended to provide potable water for the proposed project. Mauna Lani Resort confirms that The Ritz-Carlton Hotel Company will satisfy its demand for water through participation in the Lalamilo water system.

Mauna Lani Resort currently uses about 0.5 mgd (million gallons per day) of potable water, and thus has in reserve an additional 1.0 mgd from Wells A and B/C. An analysis of potable water requirements at Mauna Lani Resort was done in 1985 in conjunction with the preparation of the Mauna Lani Resort revised master plan EIS. Projections were made for domestic and irrigation water demand based on rates of 500 gpd (gallons per day) for each hotel unit and 6,425 gpd per acre. Using these same rates, the 650 hotel units (450 units initially and 200 additional units by 1998) and the grounds at the
32-acre Ritz-Carlton site will require 0.53 mgd of potable water. This amount is well within Mauna Lani Resort's remaining allotment of 1.0 mgd, although it should be noted that actual potable water usage at Ritz-Carlton Mauna Lani may vary from that which is projected.

Water withdrawal from the Lalamilo water system for Ritz-Carlton hotel development is not expected to affect agricultural uses in the surrounding area. There is no evidence that groundwater withdrawal from the Lalamilo wells has had an adverse impact on other water sources.

As a secondary impact, increased population in the study area associated with employment at the proposed Ritz-Carlton will lead to increased water demand in Kohala and Kona communities. This demand, indirectly generated by Ritz-Carlton Mauna Lani development, will be part of a much larger demand generated by other residential, commercial, and industrial projects planned for West Hawaii. Water sources, storage and delivery systems are expected to be developed by both public and private entities. There is currently no surplus capacity to supply Waimea town demand, for example. An exploratory well drilling program is being pursued by the Division of Water and Land Development at three well sites. If the exploration is successful, potable water may be made available to current and future residents of the Waimea area.
6.6 WASTEWATER TREATMENT AND DISPOSAL

6.6.1 Existing Conditions

There are no public sewage treatment facilities in the South Kohala coastal region. The Mauna Lani Resort, as are other Kohala coast resorts, is served by a privately operated wastewater treatment plant and underground connection system. The system was constructed by Mauna Lani Resort, Inc., which continues to operate the facility. Fees are assessed users connected to the system to help pay operating and maintenance costs. Treated effluent from the plant is used for tree nursery irrigation, the only location at the resort where it is used. The Ritz-Carlton Hotel will be connected to the wastewater treatment facility presently serving Mauna Lani Resort.

6.6.2 Probable Impacts

The existing wastewater treatment facility at Mauna Lani Resort has a design capacity of 0.76 mgd and can be expanded to handle 2.1 mgd. Cumulative flow is currently less than 0.2 mgd, a fraction of what the existing wastewater treatment facility is designed to accommodate.

Based on 100 percent unit occupancy and a sewage generation rate of 450 gpd/unit (90 percent of average domestic water use, excluding irrigation), the 450 units at the Ritz-Carlton Mauna Lani will generate 202,500 gpd. The additional 200 units to be built by 1998 will generate another 90,000 gpd, for a project total of 0.29 mgd, well within the remaining existing design capacity of the Mauna Lani Resort wastewater treatment plant.

6.7 SOLID WASTE DISPOSAL

6.7.1 Existing Conditions

The Kailua landfill is located at Kealakehe, near Kailua-Kona, and will serve the North Kona and South Kohala coastal area until it reaches capacity (projected to be in 1990). The County Sewers and Sanitation Bureau has plans to develop a new 300-acre public sanitary landfill at Puuanahulu, east of Mamalahoa Highway in North Kona. The new site is expected to be operational in about three years, and would accommodate solid waste generated by planned resort development in South Kohala (Kuba; March 24, 1987).

6.7.2 Probable Impacts

Solid waste generated at the Ritz-Carlton is expected to be collected by a private contractor and accommodated at the landfill site mentioned above or at other County operated landfills as new sites are designated.
6.8 ELECTRICAL POWER AND COMMUNICATIONS

6.8.1 Existing Conditions

Electrical power for the island of Hawaii is provided by Hawaii Electric Light Company, Inc. (HELCO); its system has a total firm capacity of 26 megawatts (letter of December 24, 1986 from HELCO in Chapter XII). To decrease dependence on imported oil, HELCO continues to support the development of alternate energy sources. A private enterprise plans to develop a new geothermal plant by 1989. Also, private companies are studying the feasibility of developing hydroelectric power at stream sites along the Hamakua coast.

Following are HELCO's projections of power generated by type of resource, renewable and non-renewable:

<table>
<thead>
<tr>
<th>Energy Projection</th>
<th>% 1986</th>
<th>% 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>Fossil</td>
<td>53</td>
<td>40</td>
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<tr>
<td>Geothermal</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Hydroelectric power</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Wind</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Telephone service to the entire Mauna Lani Resort area is provided by the Hawaiian Telephone Company. A telephone substation is located in the service support area. Telephone signals are received via microwave dish. Cable television (CATV) lines are located underground and extend to all development sites. The CATV signal is picked up by microwave dish at the service support area.

6.8.2 Probable Impacts

Electrical power to Mauna Lani Resort is supplied by HELCO and the resort distribution system is through underground conduits, which extend to the resort under the major roadways. It is expected that the Ritz-Carlton Mauna Lani will be connected to the resort electrical power system when the hotel becomes operational.

HELCO recommends that the proposed hotel take advantage of waste heat recovery equipment to recycle and reuse waste heat rejected by the hotel's air conditioning and refrigeration equipment. A conversation with the project architects (January 14, 1987) confirms that the operator will consider the use of waste heat recovery equipment to reduce the cost of operation and the amount of propane or oil that must be burned onsite to support its operation.

Telephone service at the Ritz-Carlton Mauna Lani will be part of the Mauna Lani Resort system. The Ritz-Carlton Hotel Company will take into consideration a suggestion from Hawaiian Telephone (letter of November 10, 1987 in Chapter XII) that the developer contact Hawaiian Telephone's planning consultants during the facility planning stage to review requirements of the installation of a telephone system.
7.0 RECREATIONAL FACILITIES

7.1 EXISTING FACILITIES

Kohala and North Kona recreational facilities include golf courses, tennis courts, beaches, riding stables, historic sites, small boat harbors, and other amenities and attractions. The County's Samuel Spencer Beach Park and the Hapuna Beach State Recreation Area are the principal developed recreational facilities in the immediate vicinity of the Ritz-Carlton Mauna Lani. They offer white sand beaches, picnic and camp grounds, and restroom and parking facilities. Recreational facilities are also available at Mauna Lani Resort, Mauna Kea Resort, and Waikoloa Resort.

At Mauna Lani Resort, a public right-of-way provided by Mauna Lani Resort leads to the shoreline fronting the Mauna Lani Bay Hotel. Rocky shoreline areas and beaches, as well as waters offshore, are used by the public and resort guests. Recreational activities include fishing, squidding, limu gathering, swimming, snorkeling, scuba diving, sunbathing, beachcombing, surfing, windsurfing and sailing.

Public access exists to the Resort's historic areas and fishponds. The Puako petroglyph field, a well known Hawaiian archaeological site maintained by community volunteers and Mauna Lani Resort, Inc., is a significant attraction for both island residents and visitors, and is the focus of an archaeological park being developed by Mauna Lani Resort, Inc.

The shoreline area of the proposed Ritz-Carlton Mauna Lani site is accessible through an unimproved shoreline pedestrian trail. It is currently not easily accessible by vehicle and is used mostly by Mauna Lani Resort employees for picnicking and fishing. According to the State Department of Land and Natural Resources, there are no known shoreline recreation resources of significant value at Pauoa Bay (Letter of January 8, 1987 in Chapter XI).
7.2 PROBABLE IMPACTS

Use of offsite recreational facilities on the island of Hawaii will increase as a result of the Ritz-Carlton Mauna Lani development. Although visitors to the hotel are expected to remain mostly at Mauna Lani Resort to take advantage of golf, tennis and water recreation amenities, they are also expected to make some trips to recreational facilities offsite. However, because of the ample existing and planned facilities at Mauna Lani Resort, the burden on public recreational facilities offsite as a result of increased visitor population is not expected to be significant. Immigrant workers (about 30 to 105 in 1990 and 125 to 145 in 1998) and their families will contribute to the demand for recreational facilities on the island and will increase use of existing facilities.

Development of the Ritz-Carlton Mauna Lani hotel site according to the proposed plan will improve onsite shoreline recreational amenities. The construction of the swimming lagoon and improvements to the beach area will provide safe sandy beach areas for visitors and residents. At the same time, the project will probably lead to the decreased use of the shoreline by fishermen who seek a more solitary environment.

Pedestrian access to the Ritz-Carlton Mauna Lani shoreline area at Pauoa Bay and its recreational amenities will improve. The pedestrian trail which skirts the shoreline along Mauna Lani Resort's seaward boundary will be raked and cleaned at the project site, retaining its natural character; it will be rerouted around the proposed swimming lagoon. Mauna Lani Resort plans to develop a public shoreline park adjacent to the Ritz-Carlton hotel site which will include public parking. The new public park north of Pauoa Bay is projected for completion at about the same time as the Ritz-Carlton Mauna Lani. Pedestrians will have access to the Ritz-Carlton site through the pedestrian shoreline path which will extend from the public park area to the Pauoa Bay shoreline. Resort guests and others at Pauoa Bay will have improved access to the Puako petroglyphs north of the public shoreline park.

There are no surf sites within Pauoa Bay, where shoreline improvements construction will occur. However, there are seasonal surf sites out off both the north and south points of the project site. Mauna Lani Resort staff reports that these surf sites are suitable for surfing only during a few days in the winter when northwest swells are large enough. It is expected that there will be no impact on these surf sites, which are outside the embayment, due to construction activities within the bay. There will be a beneficial impact after completion of the hotel and public beach park projects, due to increased accessibility to the surf sites.

The Hawaii County Department of Parks and Recreation has a target ratio of five acres of developed park land for every 1,000 resident population. This ratio is noted in the County Park Dedication Ordinance. No onsite permanent population will be generated by the proposed hotel development. Immigrant operational period workers and their families are expected to account for up to about 700 new island population. There is enough park and recreation land and developable within Mauna Lani Resort and offsite to accommodate these new residents.
8.0 VISUAL IMPACTS

8.1 VISUAL CHARACTER OF THE PROJECT SITE

The Ritz-Carlton Hotel site encompasses 32 acres of land fronting Pauoa Bay within the Mauna Lani Resort. The proposed facility will be located approximately 8,400 feet (1.6 miles) from Queen Ka'ahumanu Highway, the nearest public highway which will provide a view of the property, and approximately 4,200 feet (.8 mile) from the intersection of Mauna Lani Drive and Kaniku Drive, the resort's two major roadways. This geographical separation is a major factor in minimizing the potential visual impact of the proposed facility.

The general character of the project site is a wide, spacious area gently sloping up from the pristine shoreline of Pauoa Bay. The topography of the entire parcel is relatively uniform with no prominent variations in elevation.

8.2 EXPECTED VIEWS OF THE HOTEL FROM THE HIGHWAY AND SHORELINE

The Ritz-Carlton Hotel will be located on the seaward portion of a 32-acre parcel. Approaching the hotel from the landward side, the six-story guest wings of the structures will be visible, but somewhat concealed from view by the single story porte-cochere which will be built on a gentle rise at an elevation equal to the third or fourth floors of the hotel. The cumulative effect will be a low-rise entrance with large, Hawaiian-style roofs that gives way to a spacious central courtyard looking out to the ocean, with a guest wing on either side. The surrounding landscaping and water features will contribute to the overall spaciousness and low-density ambiance of the facility.

From the ocean, the hotel will be framed against the gently sloping land extending nearly two miles back to the highway and beyond. The continuous slope of Mauna Kea creates the distant horizon, providing a relatively continuous background devoid of individual features such as prominent hills or cinder cones.

Beginning at the public shoreline park at the northern end of Mauna Lani Resort, a public access pathway will extend south along the shoreline. Passing makai of the golf course which borders the proposed hotel on the north, the path will reach Pauoa Bay, revealing the first view of the Ritz-Carlton property. The pathway will extend along the bayfront between a large water feature fronting the northern guest wing and the shoreline. At the center point of the bay's shoreline, the view of the hotel will include the central courtyard and pool area, with a guest wing on either side. Passing the hotel, the pathway will continue south around the rear of the proposed swimming lagoon and to the front of Keanaopu fishpond. Beyond the fishpond, at the southern point of Pauoa Bay, the Mauna Lani Bay Hotel will come into view to the south about a half mile away.

The overall visual effect will be of an elegant, open-ended structure situated among stately palm trees and surrounded by extensive landscaping and water features. The choice of colors and texture for the hotel will contribute significantly to the appearance and impact of the structure from Queen Ka'ahumanu Highway. Earth or vegetation tones would help to blend the structure more completely with the surrounding landscaping.
8.3 VISUAL IMPACTS OF THE DEVELOPMENT

The Mauna Lani Resort contains over 3,000 acres of land situated makai of the Queen Ka'ahumanu Highway. The resort presently contains the Mauna Lani Bay Hotel: a six-story, 351-room luxury-class facility; an 18-hole golf course; the 80-unit Mauna Lani Terrace condominiums; a tennis and beach club; and the 116-unit Mauna Lani Point condominium project; as well as various support service facilities including a sewage treatment plant; all located within a 778-acre central core area. From the Queen Ka'ahumanu Highway, the most striking feature of the resort is the lush green landscaping creating the appearance of an oasis in the midst of the surrounding barren lava fields. The Mauna Lani Bay Hotel rises just above the palm trees surrounding it, but because of the great distance of the facility from the highway (nearly two miles), it has a minimal visual impact.

The proposed Ritz-Carlton Hotel constitutes an single new component of this vast resort complex. Located approximately 2,400 feet north of the Mauna Lani Bay Hotel, it will appear from the highway as a distant low-rise structure on the northern fringe of the resort's central core area.

Approaching the intersection of Mauna Lani Drive and Queen Ka'ahumanu Highway, the resort entrance, and looking west toward the Ritz-Carlton property, the view will include the existing light industrial service area, located along Kaniku Drive just under one mile from the highway and buffered by extensive landscaping. Beyond the service area, a new 18-hole golf course will extend seaward nearly 3/4 of a mile, virtually surrounding the Ritz-Carlton property. Consequently, the hotel will appear to be an extension of the existing resort area, thereby further reducing its overall visual impact.

However, it is acknowledged that views of the project site will be changed considerably, particularly from the shoreline where hotel structures will be noticeably visible. The shoreline area is planned to remain as natural looking as possible, but most of the project site will be landscaped, replacing existing vegetation and bulldozed barren or sparsely vegetated lava.
CHAPTER V
CHAPTER V

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

1.0 STATE LAND USE LAW

All lands in the State have been placed in one of four land use districts (Urban, Agriculture, Conservation, or Rural) by the State Land Use Commission (SLUC). State Land Use District Boundary Reviews are undertaken by the State Land Use Commission to update its Land Use District Maps. Besides this SLUC-initiated review, provisions for applicant-initiated amendments to the district boundaries have been established in Section 205-6 of the Hawai'i Revised Statutes (HRS), and further promulgated in the State Land Use Commission: Rules of Practice and Procedure and District Regulations (12-21-75 as amended).

The site of the proposed Ritz-Carlton Mauna Lani project is in Urban designated land.

2.0 CONSERVATION DISTRICT RULES

The administrative rules of the Hawai'i State Department of Land and Natural Resources (June 1981) Title 13, Chapter 2 (formerly Regulation No. 4) govern land use within the conservation district and provide for four categories, or subzones. The Ritz-Carlton Hotel Company proposes use of the State-owned conservation district land fronting the property site and including the Keanae Fishpond adjacent to the proposed shoreline improvements. The actions for which it seeks approval from the Board of Land and Natural Resources are summarized below and following that is a discussion of the relationship of the proposed project to the conservation district rules.
2.1 PROPOSAL FOR THE CONSERVATION DISTRICT

As established by State Law, all property located makai of the certified shoreline is designated Conservation. In conjunction with the proposed hotel development, three projects are proposed which are located below the shoreline or in the nearshore area:

(1) excavation of a seawater swimming lagoon;
(2) restoration of an existing anchialine pond; and
(3) improvement of a portion of the existing shoreline beach.

Although described separately below, these projects are contiguous and have been designed as an integrated improvement for the southwest corner of the resort project site. The design is intended to maximize open space, improve natural circulation and flushing of the swimming lagoon, and preserve environmentally sensitive shoreline areas. A baseline study of the marine offshore area and an engineering evaluation study of the proposed improvements appear in this document as appendices. It should be further noted that the existing anchialine pond, while situated within the Urban designated district, is classified as Conservation by the State Land Use Commission. The pond has been traditionally identified as Keanaou Fishpond on various land use and tax maps. Although it lies across the Ritz-Carlton Mauna Lani hotel site boundary, it is being treated as an integral part of the overall beach development project, and is, therefore, pertinent to this document.

2.2 EXISTING SUBZONE

The proposed swimming lagoon and beach improvement projects are located within a Resource Subzone. The anchialine pond, shown as a fishpond in Figure II-3, is not given a subzone classification by the Department of Land and Natural Resources.

The objective of the Resource subzone, within which the swimming lagoon and beach restoration projects are situated, is to develop with proper management, areas to ensure sustained use of the natural resources of those areas.

Pauoa Bay is presently an underutilized recreational resource. The proposed projects will both enhance its recreational potential and contribute to the preservation and enhancement of its natural beauty. Although the lands mauka of the shoreline along Pauoa Bay are classified Urban and zoned for Resort use, the intent of the proposed shoreline projects is to help mitigate the potential impacts which adjacent urban uses may have upon Pauoa Bay and its shoreline.
2.3 PROCEDURES FOR PERMITS AND AMENDMENTS

An application for a Conservation District Use Permit for the uses discussed above was filed in February 1987 with the Board of Land and Natural Resources. This EIS is identified as part of the application materials.

2.3.1 Conditions of Conservation District Use

All allowed uses in the conservation district are subject to the conditions outlined in Section 13-2-21 of the regulations. The conditions relevant to the Ritz-Carlton Hotel's conservation district use application are shown below in quotation marks, and following each is a discussion of the proposed actions' compliance with them.

"(1) The use shall be compatible with the locality and surrounding areas, and appropriate to the physical conditions and capabilities of the specific parcel or parcels of land."

The proposed swimming lagoon and beach improvement projects are compatible with the character of the surrounding shoreline and beach area. Pauoa Bay is a well-formed bay that contains a wide natural beach and normally gentle offshore waves. The beach is comprised of medium grain to coarse sand and rock boulders. The applicant proposes to preserve the shoreline area, as much as possible, improve the sand beach area, and develop an inland lagoon that would focus the beach activities of the hotel away from the bay and near the hotel. The lagoon will be deep enough for swimming and have sand beach along its border for sitting and sunbathing.

"(2) The existing physical and environmental aspects of the subject areas, such as natural beauty and open space characteristics, shall be preserved, or improved upon, whichever is applicable."

While enhancing the recreational potential of the area, the swimming lagoon and beach improvement will significantly improve the quality of the coastal area. Although it is proposed that a swimming area be created in the bay, the primary focus of beach activities for hotel guests will be the proposed swimming lagoon. The intention is to provide a safe, easily accessible recreational area for guests relatively unfamiliar with ocean surges and currents. It is expected that more experienced swimmers will use the swimming area in Pauoa Bay. Thus, the creation of the swimming lagoon will help to redirect most recreational activities away from Pauoa Bay, thereby helping to preserve the bay area as a scenic and open space resource.

As established by the State Land Use Commission, all fishponds are classified in the Conservation District. Sources at the Mauna Lani Resort have informed the applicant that the natural fishpond is thought to have been altered in the 1930's by the then land-owner, Francis I'i Brown, to improve it for raising of mullet. Restoration of the pond will entail the removal of the dense vegetation presently surrounding it and pumping out the accumulated silt in the pond. The applicant's intent is to preserve the anchialine pond, which is a designated historic site, and restore its vitality which has been severely undermined by the accumulation of vegetation and silt over the years. The applicant has no intention of operating the pond as an active fishpond.
"(13) Clearing areas for construction purposes shall require prior approval by the chairperson, ground cover of slopes over 40% shall not be removed unless specifically authorized by the chairperson."

Approval of the clearing plan will be obtained before commencing construction. The area that would be cleared for the recreational facilities has slopes much less than 40%.

"(14) Cleared areas shall be revegetated within thirty days unless otherwise provided for in a plan on file with and approved by the department." The provisions of this condition will be complied with.

"(15) Upon approval of a particular use by the board, any work or construction to be done on the land shall be initiated within one year of the approval of the use and all work and construction shall be completed within three years of the approval of the use." The provisions of this condition regarding time limits will be met.

2.3.2 Guidelines for Reviewing Applications

The Board of Land and Natural Resources has set out four guidelines that it applies in reviewing applications. These are given below and the proposed actions' consistency with them are discussed following each one.

"(1) All applications shall be reviewed in such a manner that the objectives of the subzone or subzones are given primary consideration."

The subzone objectives are discussed in Section 2.2 of this Chapter, and the actions proposed are consistent with them.

"(2) All applications shall be reviewed so that any physical hazard, as determined by the department shall be alleviated by the applicant when required by the board."

The shoreline area is subject to tsunami inundation. No structures will be located within the Conservation District.

"(3) All applications for subdivision shall address their relationship with the county general plan."

No application for subdivision is being sought at this time.

"(4) All applications shall meet the purpose and intent of the State's conservation district."

The definition of "conservation" in section 1 of the DLNR Title 13, Chapter 2 rules outlines the purpose and intent of the State's conservation district.
"Conservation means a practice, by both government and private landowners, of protecting and preserving, by judicious development and utilization, the natural and scenic resources attendant to land, including territorial waters within the State, to ensure optimum long-term benefits for the inhabitants of the State."

The proposed actions are in accord with this definition. The proposed swimming lagoon and beach improvement would be a means of judiciously developing natural resources for recreational use by both State residents and visitors. These are considered the optimum long-term beneficial uses of this conservation land.
3.0 HAWAII STATE PLAN

The Hawai‘i State Plan (Hawai‘i, State of, Department of Planning and Economic Development, 1978) consists of a series of broad goals, objectives and policies which are to act as the guidelines for the growth and development of the State. In general, the proposed action is consistent with the overall intent of the State Plan. Discussed below are the specific goals, objectives, policies, and priority actions contained in Part I and Part III of the State Plan which are thought to be most directly related to the proposed project.

3.1 PART I: OVERALL THEMES, GOALS, OBJECTIVES, AND POLICIES

"Section 226-4  State Goals

(1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai‘i’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."

The proposed project is consistent with the goals of the State Plan. Resort development in the South Kohala district will provide new employment opportunities and enhance economic development. The construction and operation of a new hotel will bring job opportunities to nearby residential communities and will contribute to the growth of much needed commercial development. Urban development on unusable land characterized by barren lava flows does not encroach upon other types of land uses and affords the opportunity to create a physical environment which will greatly enhance the area’s ecosystem. While unique flora will be preserved and allowed to flourish, innovative landscaping and design will provide new habitats for native flora and fauna which would otherwise be unable to survive in the arid climate. The end result will be the development of a well-designed, aesthetically pleasing environment providing previously unavailable recreational opportunities to visitors and area residents alike.

"Section 226-5  Population

(a) 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.

(b) To achieve the population objective, it shall be the policy of this State to:

(2) Encourage an increase in economic activities and employment opportunities on the Neighbor Islands consistent with community needs and desires.

(3) Promote increased opportunities for Hawai‘i’s people to pursue their socio-economic aspirations throughout the islands.
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.

At a time when employment opportunities are decreasing in the agricultural sector of Hawaii's economy, opportunities are increasing in the visitor industry. The development of the Ritz-Carlton Hotel will contribute to the growth of the Mauna Lani Resort, a major visitor destination area for South Kohala that is consistent with the communities' desire and need as demonstrated in the County General Plan. Resultant primary and secondary employment at the resort will provide new opportunities for socio-economic growth and development. The coordinated planning and development of the proposed hotel and its accompanying infrastructure will result in the optimal use of land and water resources.

Section 226-6 Economy - General

(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:

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

(b) To achieve the general economic objectives, it shall be the policy of the State to:

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

(8) Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.

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

(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.

Development of the Ritz-Carlton Hotel will provide new employment opportunities in the West Hawaii area. Construction of facilities is expected to occur over a period of two years initially and another two years when the additional units are built, thereby contributing to sustaining a healthy level of construction activity on the island of Hawaii. Both hotel/resort and construction employment have favorable financial multiplier effects. Due to the decline of the sugar industry in North Kohala, local unemployment rates have been higher than statewide rates. Direct and indirect employment related to the Ritz-Carlton Hotel will contribute to alleviating this problem.
"Section 226-7 Economy — Agriculture

(a) OBJECTIVE: Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:

(1) Continued viability in Hawaii's sugar and pineapple industries.

(2) Continued growth and development of diversified agriculture throughout the State.

(b) To achieve the agricultural objectives, it shall be the policy of this State to:

(8) Expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.

(11) Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment."

Local agricultural products are featured at the Mauna Lani Resort food service establishments where, very often, visitors are first introduced to some of these products. The development of the Ritz-Carlton Mauna Lani will provide a new, expanded market for local fruits, vegetables, fish, meat and beverages. At the same time, development of the Ritz-Carlton Hotel will not decrease the inventory of agriculturally suitable lands. The entire project site is covered with aged pahoehe lava and unsuited to agricultural use, particularly if left unirrigated.

"Section 226-8 Economy — Visitor Industry

(a) OBJECTIVE: Planning for the State's economy with respect to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.

(b) To achieve the visitor industry objective, it shall be the policy of this State to:

(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.

(2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people.

(3) Improve the quality of existing visitor destination areas.

(4) Encourage cooperation between the public and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities."
(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.

(6) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.

(7) Foster a recognition of the contribution of the visitor industry to Hawaii's economy and the need to perpetuate the aloha spirit.

(8) Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawaii's cultures and values."

The Ritz-Carlton Mauna Lani intends to maintain the high standards of operation established by the Mauna Lani Resort and which are characteristic of other Ritz-Carlton hotels. These include low-density development and the careful blending of hotel structures and amenities into the natural surroundings.

Due to the luxury character of the hotel and its extensive landscaping, the ratio of employees to hotel guests will exceed the average for visitor facilities in Hawaii. The Ritz-Carlton Hotel Company will provide training for employees and further local opportunities for employment.

The goods and services required by the hotel will generate a positive economic benefit for businesses in the region, island and statewide. Businesses stimulated by the new hotel will, in turn, contribute to further economic growth and new opportunities for employment.

Finally, the success of the Ritz-Carlton Mauna Lani will depend in part upon the ability to preserve the scenic beauty of the area. To that end, preservation and enhancement of the natural resources on and around the project site will be a matter of great importance and concern during the construction and operation of the facility.

"Section 226-11 Physical Environment - Land-Based, Shoreline, and Marine Resources

(a) OBJECTIVE: Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:

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

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

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

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

(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."

The site of the proposed hotel is located at Pauoa Bay, a pristine body of water fronted by a natural coarse-grained sand and rock beach. The facility, its surrounding landscaping and recreational amenities will all be designed to enhance and protect the existing environment. The creation of a swimming lagoon is intended to focus beach activities away from Pauoa Bay in an effort to reduce impacts upon the shoreline and marine resources. Preservation and restoration of the existing fishpond represents an attempt to integrate compatible natural resources into the overall design of the hotel facility. The public access path along the entire shoreline of Mauna Lani Resort will cross the seaward portion of the project site, thereby providing increased public access to the area.

"Section 226-12 Physical Environment – Scenic, Natural Beauty, and Historic Resources

(a) 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 multicultural/historical resources.

(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

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

(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."

Data recovery will be made from the four historic sites identified on the Ritz-Carlton property and the fishpond will be restored. Furthermore, the applicant is committed to the preservation and enhancement of the natural features associated with the project site including, but not limited to, the shoreline and mountain vistas and the natural character of Paaua Bay.

"Section 226-13  Physical Environment - Land, Air, and Water Quality

(a) OBJECTIVE: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:

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

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

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

(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.

(6) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.

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

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

The design, construction and management of the Ritz-Carlton Mauna Lani will be in keeping with the standards established for the Mauna Lani Resort and characteristic of all Ritz-Carlton hotels. Landscaping will be designed to intercept and minimize on-site drainage into Paaua Bay. Construction plans for the proposed swimming lagoon and beach improvement projects will focus on reducing long term impacts on coastal water quality and mitigating short term impacts wherever practicable. The Ritz-Carlton Hotel will utilize existing services and support facilities at the Mauna Lani Resort and will enhance the existing urban development in the area.
"Section 226-15  Facility Systems - Solid and Liquid Wastes

(a) OBJECTIVE: Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:

(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.

(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.

(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:

(1) Encourage the adequate development of sewerage facilities that complement planned growth."

The design capacity of the existing wastewater treatment plant planned to serve the entire Mauna Lani Resort is 0.76 million gallons per day (mgd) and is expandable to 2.1 mgd. Cumulative flow at the resort is currently under 0.2 mgd. Based on 100 percent occupancy and a sewage generation rate of 450 gpd/unit, the ultimate 650 units at the Ritz-Carlton Mauna Lani will generate 0.29 mgd. The needs of the Ritz-Carlton will be fully accommodated by the existing facility's planned capacity.

"Section 226-16  Facility Systems - Water

(a) OBJECTIVE: Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

(b) To achieve the facility systems water objective, it shall be the policy of this State to:

(1) Coordinate development of land use activities with existing and potential water supply.

(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs."

The Ritz-Carlton Hotel will utilize the Lāhālilo water resources developed by the Mauna Lani Resort. The resort currently has access to adequate potable water supplies to meet resort demand in the short term. Four new well sites have been designated and it is expected that new wells will be developed as new resort facilities such as the Ritz-Carlton are built, and demand for water increases.
"Section 226-18 Facility Systems - Energy/Telecommunications

(c) To further the energy objectives, it shall be the policy of this State to:

(3) Promote prudent use of power and fuel supplies through conservation measures including education and energy-efficient practices and technologies."

The design, construction and operation of the Ritz-Carlton Hotel will utilize the most appropriate energy technologies and conservation methods.

"Section 226-19 Socio-Cultural Advancement - Housing

(a) OBJECTIVE: Planning for the State's socio-cultural advancement with regard to housing shall be directed towards achievement of the following objectives:

(1) Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, livable homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals.

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

(b) To achieve the housing objectives, it shall be the policy of this State to:

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

(2) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.

(3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

(4) 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.

(5) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.

(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."

Recognizing that the development of the Ritz-Carlton Hotel will further stimulate economic and population growth in the region, Mauna Lani Resort is presently engaged in discussions with County authorities focused on identifying appropriate alternatives for the provision of employee housing to serve the needs of the employees of the Ritz-Carlton Mauna Lani. Development of employee
housing within existing urban areas that is consistent with the culture and values expressed in the surrounding community will contribute to the lessening of demand for housing in the community. The specific method of providing employee housing to meet future demand will be determined by the current negotiations.

"Section 226-23  Socio-Cultural Advancement - Leisure

(a) OBJECTIVE: Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

(b) To achieve the leisure objective, it shall be the policy of this State to:

(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historic, geological, or biological values while ensuring that their inherent values are preserved.

(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.

(10) Assure adequate access to significant natural and cultural resources in public ownership."

The identification and preservation of appropriate historic and natural resources onsite will further the public's understanding of their historic, cultural and scientific significance. Development of the proposed swimming lagoon and the beach improvement project will increase recreational opportunities in the area without compromising the integrity of the natural coastal resources at Pauoa Bay. A shoreline access path along the seaward portion of the project site will improve public access to Pauoa Bay from the nearby shoreline park.

"Section 226-25  Socio-Cultural Advancement - Culture

(a) OBJECTIVE: Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.

(b) To achieve the cultural objective, it shall be the policy of this State to:

(1) Foster increased knowledge and understanding of Hawaii's ethnic and cultural heritages and the history of Hawaii."

Data will be recovered from four archaeological sites deemed to be significant for their informational content. The historic fishpond will be restored and preserved.
3.2 RELATIONSHIP OF PROPOSED ACTION TO THE STATE PLAN PRIORITY GUIDELINES

The Priority Guidelines of the Hawai‘i State Plan are established to provide overall guidelines to address areas of statewide concern. The proposed action is generally consistent with the general intent of the guidelines. Discussed below are the specific Priority Guidelines what are thought to be most directly related to the proposed project.

"Section 226-103 Economic

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

(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:

(A) An industry that can take advantage of Hawai‘i's unique location and available physical and human resources.

(B) A clean industry that would have minimal adverse effects on Hawai‘i's environment.

(C) An industry that is willing to hire and train Hawai‘i’s people to meet the industry's labor needs.

(D) An industry that would provide reasonable income and steady employment."

Development of the Ritz-Carlton Hotel will contribute to construction employment over a period of at least four years, permanent full-time and part-time operational jobs, and will stimulate the growth of employment in sectors of Hawai‘i's economy other than the visitor industry. As part of a major visitor destination area, the Ritz-Carlton Hotel will make a significant contribution to the economy of Hawai‘i County while having a relatively negligible physical impact on the environment.

"(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 Hawai‘i'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 provides for adequate shoreline setbacks and beach access.

(4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawai‘i's significant natural, scenic, historic, and cultural resources.
(5) Develop and maintain career opportunities in the visitor industry for Hawaii's people, with emphasis on managerial positions."

Following the high standards established by the Mauna Lani Resort and the Ritz-Carlton Hotel Company, the Ritz-Carlton Mauna Lani will promote visitor satisfaction by offering luxury-class facilities and services that are carefully and sensitively integrated into the natural beauty of the Mauna Lani Resort environment. The low-density character of the facility, with its lush tropical landscaping, will conform to relevant State and County zoning and other regulations. The quality of the hotel development will be further enhanced by its commitment to providing long-term employment and advancement opportunities to its employees.

"(a) Priority guidelines for water use and development:

(1) Maintain and improve water conservation programs to reduce the overall water consumption.

(f) Priority guidelines for energy use and development:

(2) Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy."

The Ritz-Carlton Hotel will implement appropriate conservation programs with regard to water and energy use in a manner consistent with the policies of the Mauna Lani Resort and governmental guidelines.

"Section 226-104 Population Growth and Land Resources

(a) Priority guidelines to effect desired statewide growth and distribution:

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

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

(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."
The development of the Ritz-Carlton Hotel at Mauna Lani Resort will focus new growth in an existing urban area with no significant potential for alternative uses. This implements the policy of maximizing the use of limited land resources. Furthermore, the use of existing infrastructure for water and waste disposal will reduce the need for public expenditures to provide similar services. Finally, the design and construction of the facility will protect and enhance the shoreline, open spaces and scenic resources of the area.

"Section 226-106 Affordable Housing"

(6) Encourage public and private sector cooperation in the development of rental housing alternatives.

(7) Encourage improved coordination between various agencies and levels of government to deal with housing policies and regulations."

The provision of affordable housing, especially for employees of the Ritz-Carlton, is a concern that can be adequately addressed through a close working relationship between the resort's owners and the appropriate agencies of the County and State. Working together, the specific needs can be readily identified and appropriate responses and development plans can be formulated which will provide new housing opportunities in the region.
4.0 STATE FUNCTIONAL PLANS

State functional plans are intended to provide more detail to the Hawai'i State Plan in twelve specific areas of concern - agriculture, conservation lands, education, higher education, energy, health, historic preservation, housing, recreation, tourism, transportation, and water resources development. As defined in the Hawai'i State Plan (section 2-10), a functional plan sets forth "the policies, programs and projects designed to implement the objectives of a specific field of activity when such activity or program is proposed, administered, or funded by an agency of the State." The twelve State functional plans were examined to determine the relationship of the proposed Ritz-Carlton Hotel project to each.

4.1 STATE AGRICULTURE FUNCTIONAL PLAN

Nearly the entire 32-acre project site is aged basalt lava that is either barren or has a sparse vegetation cover of grass and kahiku. The entire parcel is designated as Urban by the State Land Use Commission, and is not considered suitable for cultivation. It is not designated as important agricultural land on the ALISH (Agricultural Lands of Importance to the State of Hawaii) map of the area. Subsequently, the implementing actions of the State Agriculture Functional Plan do not pertain either directly or indirectly to the proposed project.

4.2 STATE CONSERVATION LANDS FUNCTIONAL PLAN

There are several implementing actions in the State Conservation Lands Functional Plan (Hawaii, State of, Department of Land and Natural Resources, June 1984) that are relevant to the proposed project, and these are discussed below. Related discussions are also found in the section of this chapter which discusses the Conservation District. This functional plan addresses more than officially designated Conservation District lands, and includes (among a lengthy list) shoreline areas under the coverage of the plan.

"A(1)(c) IMPLEMENTING ACTION: Review the various rules and regulations and permit systems applicable to Conservation District lands for possible simplification and/or consolidation for effective and efficient management controls and compliance with the Coastal Zone Management program."

This implementing action is addressed largely to DLNR, but the issue of compliance with the CZM program is relevant to any shoreline project. On February 19, 1987, a detailed Coastal Zone Management Assessment was submitted to the DPED for review. The purpose of the submittal was to present a detailed evaluation of the the proposed project's relationship to the specific policies of the Coastal Zone Management program. On June 16, 1987, DPED determined that the project is consistent with the Hawaii CZM Program.
"A(1)(d) IMPLEMENTING ACTION: Provide for effective enforcement of rules and regulations and permit system applicable to the Conservation District."

The proposed project will follow the rules and regulations applicable to the Conservation District Use permit system.

"A(1)(a) IMPLEMENTING ACTION: Review applications for use of Conservation lands to control impacts on natural and cultural resources."

This EIS document will allow extensive review by government agencies and the public. Adequate control of impacts on natural and cultural resources can be assured through the conditions placed on the various permits/approvals which the proposed Ritz-Carlton Hotel will require.

"C(2)(b) IMPLEMENTING ACTION: Encourage and support local participation in conservation planning and programming as provided for in the Soil and Water Conservation Districts programs."

Construction of the proposed hotel facility will adhere to all applicable policies and guidelines of the Mauna Kea Soil and Water Conservation District, within which the project is located. Specific construction techniques, as well as proposed landscaping and drainage systems, are intended to minimize soil erosion and prevent the deterioration of water quality on-shore and off-shore.

"C(3)(b) IMPLEMENTING ACTION: Acquire and maintain historic sites for parks and other purposes.

C(3)(c) IMPLEMENTING ACTION: Establish criteria and evaluate areas of public land with historic or natural resource value and establish management practices to ensure the protection of areas from further degradation."

Five archaeological and historic sites have been identified at the project site. The Historic Sites Section of the DLNR has determined that one site is no longer significant and that three inland sites are significant solely for their information content. The fifth site, Keaapou Fishpond, is deemed significant for its information content and as a good example of a site type, a fishpond established in an ancialine pond. The applicant will follow the mitigation plan for the sites established by the Historic Sites Section, as approved by the County Planning Department or County Planning Commission. None of the sites are recommended for acquisition and they are not in public lands.

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4.3 STATE EDUCATION FUNCTIONAL PLAN

This functional plan (Hawaii, State of, Department of Education, April 1983) presents high priority implementing actions for education. All of the actions are to be undertaken by the Department of Education. Therefore, they are not applicable to the Ritz-Carlton Mauna Lani project.

4.4 STATE HIGHER EDUCATION FUNCTIONAL PLAN

There are no policies or implementing actions in this functional plan, prepared by the University of Hawaii (June 1984) of direct relevance to the Ritz-Carlton project.

4.5 STATE ENERGY FUNCTIONAL PLAN

The State Energy Functional Plan (Hawaii, State of, Department of Planning and Economic Development, June 1984) has as an objective the promotion of energy-efficient design. This relates both to overall land use planning and to specific building design and equipment selection decisions. While specific building designs have not yet been completed, the proposed project will adhere to energy conservation standards wherever practicable.

4.6 STATE HEALTH FUNCTIONAL PLAN

The State Health Functional Plan (Hawaii, State of, Department of Health, June 1984) focuses primarily on public health programs under the jurisdiction of the State Health Department. Several of the implementing actions relate to operating Department of Health (DOH) permit/approval programs that the proposed project is subject to. These include operating the environmental impact statement process; reviewing private wastewater treatment systems; administering permit programs for discharges to the air, all surface and groundwater, and for treatment and disposal of solid wastes; reviewing plans for new sources of drinking water; and reviewing plans for air conditioning and mechanical ventilation systems for buildings that are used by the public. These topics (wastewater, air quality, water quality, potable water systems, solid waste, and approvals needed) are discussed in terms of the proposed project in various sections of the EIS. The implementing actions also express other areas of concern to the DOH, such as reuse of treated effluent, noise, and medical services, that are covered in this EIS as well. Generally, the proposed project will comply with all necessary requirements related to the Department of Health's permitting procedures.

A Section 401 Water Quality Certification application has been submitted and a public hearing is scheduled for August 4, 1987.
4.7 STATE HISTORIC PRESERVATION FUNCTIONAL PLAN

Essentially all of the policies and implementing actions in the State Historic Preservation Functional Plan (Hawaii, State of, Department of Land and Natural Resources, June 1984b) are directed at State agencies, especially DLNR. The archaeological resources at the Ritz-Carlton project site have been evaluated by the Historic Sites Section of DLNR. The applicant, with approval from the County Planning Department, will implement the mitigation plan suggested by DLNR for three inland sites and Keanaau Fishpond.

4.8 STATE HOUSING FUNCTIONAL PLAN

This State functional plan summarizes the results of the Hawaii Housing Authority (Hawaii, State of, Department of Social Services and Housing, June 1984:ii) study "to formulate a comprehensive plan for the development, operation, and management of housing within the State." Most of the policies and implementing actions apply to the government sector. There is presently no housing component contained in the proposed Ritz-Carlton project. Nevertheless, the need for employee housing and the potential impact of the proposed hotel on economic development and population growth in the general region are all matters of acute concern. The specific alternatives for the provision of employee housing are presently the subject of ongoing discussions between the Mauna Lani Resort and the appropriate County agencies.

4.9 STATE RECREATION FUNCTIONAL PLAN

The State Recreation Functional Plan (Hawaii, State of, Department of Land and Natural Resources, June 1984) has as Policy D(2) "the securing of public accesses to resources with recreational value." The public access path intended to extend along the entire shoreline of the Mauna Lani Resort will cross the seaward portion of the Ritz-Carlton property.

Policy E(3) of the State Recreation Functional Plan aims to: "coordinate visitor and resident recreation interests to achieve compatible recreation usage." The creation of a public shoreline park adjacent to the Ritz-Carlton Hotel site by Mauna Lani Resort will provide not only specific opportunities for passive recreational activities, but will also provide parking and comfort station facilities for people who utilize the public access path along the shoreline of the entire Mauna Lani Resort, including the Ritz-Carlton property. The development of these facilities will enhance existing recreational activities in the area and facilitate greater access by visitors and residents alike.
STATE TOURISM FUNCTIONAL PLAN

The Hawai’i State Department of Planning and Economic Development (June 1984b) authored this functional plan and considers it a "guide to help coordinate the various sectors of government and private industry toward achieving statewide objectives of the Hawai’i State Plan" (p. 2). The role of government in tourism is seen not only as protecting the economic health of the industry, but also as "advancing the social goals of the community" (p. 8). The policies and implementing actions which are most relevant to the private sector, and particularly to the proposed project, are those concerning physical development.

"B(2) POLICY: Improve the quality of existing visitor destination areas."

The development of the proposed Ritz-Carlton Hotel will expand recreational opportunities available to visitors at Mauna Lani Resort. The specific design proposals for both the hotel and its surrounding landscaping will greatly enhance the quality of the general area by converting an arid, relatively inhospitable and barren lava field into a lush setting of tropical vegetation and water features.

"B(3) POLICY: Encourage greater cooperation between the public and private sectors in developing and maintaining well-designed and adequately serviced visitor industry and related development."

The development of the Ritz-Carlton Hotel represents an expansion of the Mauna Lani Resort, which has been previously designated as a major visitor destination area in the County General Plan. The Environmental Impact Statement process, coupled with the detailed land use permitting process at both the State and County levels of government, provide extensive opportunities for coordination between the public and private sectors.

"B(3)(a) IMPLEMENTING ACTION: Assure that adequate infrastructure and amenities, such as roads, water, drainage and parks, are provided through a reasonable distribution of financial responsibilities between governmental and private parties."

The proposed hotel will utilize the infrastructure already in existence at the Mauna Lani Resort, thereby significantly reducing the need for new government investment in infrastructure. The necessary services and facilities presently exist to adequately serve the needs of the new hotel and its amenities.

"B(3)(c) IMPLEMENTING ACTION: Encourage private development of designated visitor destination areas where capital improvements have been made or are planned before encouraging development of other possible visitor destinations."

As an integral component of Mauna Lani Resort, the Ritz-Carlton Hotel will be a well-designed and adequately serviced development. The infrastructure within the Mauna Lani Resort has all been paid for by the developer and contributions toward the public Lalamaio water system have also been provided.
by the developer. Mauna Lani Resort is a designated visitor destination area where extensive capital improvements have been made in anticipation of continued growth to fully implement the County's General Plan.

"B(3)(d) IMPLEMENTING ACTION: Encourage the clustering of hotels and resort condominium developments to provide open space and promote energy conservation."

The proposed Ritz-Carlton Hotel will be the second hotel facility developed within Mauna Lani Resort. The clustering of hotels and condominiums at Mauna Lani Resort, rather than spreading this development over the island, allows for energy conservation by promoting alternative transportation means such as walking or bicycling between the various facilities at the resort. Furthermore, the clustering of multiple resort facilities in a single area provides greater and varied recreational opportunities for resort visitors, thereby reducing the need for travel outside the resort boundaries.

"B(3)(e) IMPLEMENTING ACTION: Encourage the use of regional sewerage systems by hotel and visitor condominium developments rather than use of individual private systems."

Instead of using individual private sewerage treatment systems for each development within Mauna Lani Resort, all the parcels will be connected to a resort-wide sewerage system. The economies of scale and the greater efficiency of a wastewater treatment plant (WWTP) for the entire resort make it preferable to individual treatment systems for each project.

"B(4) POLICY: Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities."

The Ritz-Carlton Hotel is proposed to be built in a vacant area of the Mauna Lani Resort. As proposed, the luxury facility will be fully compatible with the existing hotel and will greatly enhance the entire resort area. The low-density character of the new hotel will contribute to the existing resort's ambience. The proposed Ritz-Carlton Hotel has been designed to maximize open space on the property and will be well integrated into the overall architectural flavor of the resort.

"B(4)(e) IMPLEMENTING ACTION: Resort development should take place within designated visitor destination areas."

The Ritz-Carlton Mauna Lani will be within Mauna Lani Resort, which is an area designated by the County for resort development.

"B(4)(b) IMPLEMENTING ACTION: Ensure that new hotel and condominium projects be set back from the shoreline for access which facilitates and permits use of those areas."

The proposed hotel and its related amenities will be set back from the shoreline in accordance with all appropriate regulations. A public access path along the seaward portion of the Ritz-Carlton property will provide opportunities for increased access and use of areas which have been previously limited by the harsh topography of the area.
"B(4)(d) IMPLEMENTING ACTION: Plan development of resorts in a coordi-
nated manner to minimize loss of public recreational opportu-
nities in designated visitor destination areas."

The proposed Ritz-Carlton Hotel facilitates public access along the
shoreline. Few, if any, public recreational opportunities would be lost; and
public use of the shoreline would greatly increase with the beach improvement
project proposed for Pauoa Bay.

"D(3)(a) IMPLEMENTING ACTION: Provide relevant information to visitors
to foster their understanding of Hawaii's uniqueness in order
to minimize damage of natural, historic, and archaeological
resources, promote their personal safety and protection, and
foster an appreciation of the contribution of Hawaii's resi-
dents to the enjoyment of the visitor's experience in Hawaii."

The preservation of the existing anchialine pond (Keanapou Fishpond),
the identification of historic sites, and the tropical landscaping proposed
for the area will all provide opportunities for visitor information. The
detailed and informative descriptions of points of interest which presently
characterize the Mauna Lani Resort will be provided where applicable on the
Ritz-Carlton property.

The development of a swimming lagoon is specifically intended to enhance
visitor safety and protection by providing an alternative to ocean-related
recreation activities at Pauoa Bay. Visitors unfamiliar with the character
and force of open ocean surges will find the swimming lagoon to be an enjoy-
able alternative.

"D(3)(b) IMPLEMENTING ACTION: Provide relevant interpretation of, and
public access to, sites of archaeological significance when-
ever feasible, and establish a program to explain Hawaii's
history and values to visitors and residents."

The applicant will recover information from three inland significant
sites, as approved by the State Department of Land and Natural Resources and
Hawaii County Planning Department. Keanapou fishpond, which will be accessi-
ble to the public and hotel guests, will be restored and preserved.
4.11 STATE TRANSPORTATION FUNCTIONAL PLAN

None of the policies or implementing actions in this functional plan (Hawaii, State of, Department of Transportation, June 1984) address specific developments such as the Ritz-Carlton Hotel. The overall objective of the plan is to provide for the efficient, safe, and convenient movement of people and goods. The impacts of the proposed hotel development at Mauna Lani Resort on existing transportation facilities, are addressed in the traffic analysis section of this document.

4.12 STATE WATER RESOURCES DEVELOPMENT FUNCTIONAL PLAN

This functional plan, prepared by the Hawaii State Department of Land and Natural Resources (June 1984d:2) "primarily affects State operations, it also involves some actions of ... the private sector. It points out where ... private industry coordination will be needed and ... can help achieve water resources objectives". As the other State functional plans, it does not mandate private sector actions.

The plan presents general objectives and policies for the management of potable water supply, floodplains, agricultural water, and estuarine environments that could be considered relevant to this project. The proposed Ritz-Carlton Hotel will utilize existing infrastructure at the Mauna Lani Resort. Aside from potential short-range impacts of construction upon existing water resources on the project site, the Ritz-Carlton Hotel is not directly responsible for the general management of the water resources serving the facility.
5.0 HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The Hawaii Coastal Zone Management Act (Act 188, SLH 1977), which became Chapter 205A, Hawaii Revised Statutes, established State policies for any action affecting the coastal zone. The act established specific objectives and policies in seven broad categories. The relationship of the proposed Ritz-Carlton Hotel project to these categories of concern is discussed below.

5.1 RECREATIONAL RESOURCES

In addition to the preservation and improvement of the existing beach at Pa'aoa Bay, the Ritz-Carlton Hotel Company proposes to develop a lagoon deep enough for swimming which will have a single 110-foot-wide opening to Pa'aoa Bay. Although Pa'aoa Bay is used by local residents for diving and shorefishing, access has traditionally been limited by the rugged terrain. Approval of the Nauna Lani Revised Master Plan included provisions for continuous public and guest access along the shoreline from north of Pa'aoa Bay to Honokaoape Bay. This accessway will cross the Ritz-Carlton site just behind Pa'aoa Bay and the proposed swimming lagoon. Thus, the public accessway, together with the proposed swimming lagoon and beach improvement project, will provide recreational opportunities which are presently unavailable or underutilized.

5.2 HISTORIC RESOURCES

Keamapou Fishpond, in the coastal area, has been identified by a DLNR Historic Sites Section archaeologist as being a good example of a site type (a fishpond established in an anchialine pond), significant for its information content. The applicant will implement a mitigation plan to restore and preserve the fishpond.

5.3 SCENIC AND OPEN SPACE RESOURCES

The overall character of the project site will change; vacant open space will be replaced by low density development, including six-story wings of the hotel.

The Ritz-Carlton Hotel proposes to utilize a variety of water-oriented landscape features to achieve a transition from the barren lava flows which dominate the property to the classical Hawaiian architectural design and verdant landscaping proposed for the resort. Included among these features are a swimming lagoon, a large landscape water feature, a beach improvement project and the preservation of an existing anchialine pond (Keamapou Fishpond). This allows the project to maximize open space amenities, improve natural circulation and flushing of the swimming lagoon and preserve environmentally sensitive shoreline areas. The cumulative effect of these features will be a significant enhancement of the area's open space and scenic resources in some areas of the site, balanced against the effect of the hotel structure.

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5.4 COASTAL ECOSYSTEMS

The ecosystems of the nearshore waters and the shoreline area are not expected to be significantly adversely affected by the development proposed for the Ritz-Carlton Hotel. A detailed discussion of the probable impacts of the proposed swimming lagoon and beach improvement projects is included in this document. The development of a shoreline swimming lagoon is intended to allow Pauoa Bay and its related resources to retain their pristine character, by redirecting activity away from those areas of the bay deemed particularly sensitive.

5.5 ECONOMIC USES

Resort development of the Mauna Lani lands has been acknowledged as the most appropriate use of the land by the Hawaii County General Plan and by the actions of State and County agencies (e.g., by the granting of various permits and by cooperating in the Lalamilo Water System). The policies under this heading state that reasonable growth in areas designated for visitor industry facilities (which are recognized as coastal dependent developments) is to be permitted, assuring that adverse impacts are minimized. As demonstrated elsewhere in this document, the proposed Ritz-Carlton Hotel development is not expected to cause any significant adverse impacts. In areas of potential adverse effect, mitigation measures will be taken to avoid or minimize them. In general, the proposed project fully implements the Mauna Lani Resort Revised Master Plan.

5.6 COASTAL HAZARDS

An area along the shoreline area is subject to potential hazards from storm waves and tsunamis as identified on the Flood Insurance Rate Map included in this document. Peak flood elevation is projected to be 8 feet and reduces progressively inland. A minimum building elevation of 12 feet for structures within flood hazard areas is being recommended. Development along the coast will conform to the requirements of the Federal Flood Insurance Program and will incorporate measures to protect against these hazards. Erosion will be controlled to avoid any impacts on coastal waters.

5.7 MANAGING DEVELOPMENT

This EIS is a tool for communicating the impacts of the proposed Ritz-Carlton Hotel at an early stage of planning. It is intended to facilitate participation in the planning and review process. The proposed plan will require a variety of development permits before it can be implemented. These will afford numerous opportunities for the Hawaii Coastal Zone Management Program network authorities to place conditions on the project which will assure the proper management of coastal zone resources.
6.0 COUNTY SPECIAL MANAGEMENT AREA

The entire project area falls within the "Special Management Area" (SMA) and is therefore subject to the SMA Rules and Regulations of the County of Hawaii. Following is a discussion of the relationship of the proposed Ritz-Carlton Hotel to the SMA guidelines in the Hawaii County Planning Commission's Rule No. 9. The guidelines are summarized and brief comments following note the extent to which the proposed project is believed to be consistent with them. The objectives and policies of the State's Coastal Zone Management Act are also discussed in the County's SMA Rule.

"Guideline A.1 This guideline seeks to minimize alterations to any body of water."

Although the proposed swimming lagoon and beach improvement projects may alter the physical character of Pauoa Bay, the projects are intended to expand and enhance the recreational opportunities associated with the bay. Alterations to Pauoa Bay are designed to preserve the existing beach area, improve overall circulation, and generally enhance the bay as an open space and recreational resource. The existing anchialine pond on the project site will be preserved and restored.

"Guidelines A.2 & 3 These guidelines seek to minimize reductions in the availability and/or access to beaches and other recreational areas and shoreline areas due to development."

The Ritz-Carlton Hotel and its accompanying shoreline projects would increase the availability of shoreline recreational resources and access to them by providing a public access path to areas presently of limited access.

"Guideline A.4 This guideline concerns the visual impacts of the proposed development."

The development of the proposed hotel will occur at a distance of more than a mile and a half from Queen Kapiolani Highway, and thus will not substantially detract from the line of sight between the highway and the sea. Structures will be softened by landscaping which will contrast with the adjacent lava-dominated environment. The overall design of the structures and the surrounding landscaping will combine to present an aesthetically pleasing appearance to the observer. In effect, the landscaping of the Mauna Lani Resort in general, and the proposed hotel in particular, will present the image of a lush oasis surrounded by the barren lava fields of South Kohala.

From the ocean, views of the site will be modified. Open views will be replaced by landscaping and the six-story hotel structures. The hotel will be framed against the gently sloping land extending to the highway and beyond. The continuous slope of Mauna Kea creates the distant horizon, providing a relatively continuous background devoid of individual features such as prominent hills or cindercones.
"Guideline A.5 This guideline aims at minimizing development that adversely affects water, scenic, or wildlife resources, or that adversely affects existing or potential agricultural uses of the land."

The water and scenic resources of the project site are planned to be incorporated into the development and adverse impact on them avoided. There are no significant wildlife resources associated with the project site. A detailed discussion of the development impacts is presented within this EIS. There are no existing or potential agriculture uses associated with the project site.

"Guidelines B.1, 2 & 3 These guidelines state that no development shall be approved unless it has no significant adverse environmental effects, and is found consistent with Chapter 205A, HRS, the Hawaii County General Plan, the Hawaii County Zoning and Subdivision Codes, and other applicable ordinances."

This EIS analyses the potential of the proposed project to create adverse effects and outlines the mitigation measures that will be taken to avoid them or minimize them to insignificant levels. The plan's consistency with Chapter 205A, HRS and with the Hawaii County General Plan is discussed in this section.

"Guideline C.1 & 2 These guidelines seek to ensure access to beaches, recreation areas, and natural reserves, and to ensure that adequate recreation and wildlife preserves are maintained."

Access to Pauoa Bay will be improved by the development of a public access path along the seaward portion of the project site. An anchialine pond on the project site which is in the final stages of deterioration will be preserved and restored. There are no wildlife preserves associated with the project site.

"Guideline C.3 This guideline concerns solid and liquid waste management."

The Ritz-Carlton Hotel will utilize the existing infrastructure and related services of the Mauna Lani Resort for the disposal of liquid and solid waste.

"Guideline C.4 This guideline seeks to minimize adverse impacts resulting from alterations to existing landforms and vegetation."

No specific grading plans for the development site have been prepared, but the proposed project will be characterized by low density resort development that utilizes existing landforms. Existing vegetation within the Ritz-Carlton development area consists primarily of grasses and Kame groves covering lava flows. The anchialine pond (Keanapou Fishpond) is surrounded by a Hau tree grove which is encroaching upon the pond to the point of completely obscuring it from view. Restoration of the pond will entail removing some of the surrounding vegetation.
"Guideline C.5  This guideline seeks to minimize adverse environmental or ecological impacts due to the project."

The Ritz-Carlton Hotel Company is committed to minimizing adverse environmental or ecological impacts. Moreover, the multi-level review and permit process that the project must undergo before it is implemented will ensure that mitigation measures are made conditions to development.

"Guideline C.6  This guideline states that the proposed project must be consistent with the General Plan."

As outlined in the following section, the revised master plan is consistent with the Hawai‘i County General Plan.
7.0 HAWAI'I COUNTY GENERAL PLAN

The Hawai'i County General Plan (Hawai'i, County of, 1971 as amended) contains both a set of policies and land use maps showing the location of desired land uses for the entire island. The latter are referred to as "Land Use Pattern Allocation Guide Maps" (LUPAG maps). A mixture of resort, medium density urban, low density urban, open, and alternate urban expansion designations are shown within the Mauna Lani Resort boundaries on the General Plan LUPAG map. The general area of the proposed Ritz-Carlton Hotel is designated as Low and Medium Density Urban and Resort. The General Plan (p. 77) states that for the LUPAG maps "the boundaries indicated are long-range guides to general location." On the following page the same idea is reiterated:

The land use pattern is a broad, flexible design intended to guide the direction and quality of future developments in a coordinated and rational manner. The General Plan Land Use Pattern Allocation Map indicates the general location of various land uses in relation to each other (emphasis added).

The LUPAG map is not intended to be as detailed and locationally specific as the zoning maps. Thus, the rezonings that have been granted to the resort since the General Plan was adopted and the proposed rezoning do not involve a change to the LUPAG map. The proposed project is consistent with the LUPAG map of the County General Plan.

The project is also consistent with the policies of the General Plan. The Mauna Lani Resort is on the list (as Puako-Honokaa'ope Bay) of "major" resorts in the Land Use element (p. 79) of the General Plan. It meets the requirements for a major resort:

A major resort area is a self-contained resort destination area which provides basic and support facilities for the needs of the entire development. Such facilities shall include sewer, water, roads, employee housing, and recreational facilities, etc.

8.0 HAWAI'I COUNTY ZONING

The Ritz-Carlton project site was originally designated as Hotel Site #3 on the Mauna Lani Master Plan and was zoned V-1.0 Resort in August 1978 (see Figure V-1). In late 1986, Mauna Lani Resort, Inc. submitted a zoning request to the County of Hawaii to rezone certain parcels contained in the Mauna Lani Resort to bring them into conformance with the Revised Master Plan, approved by the County in 1985. The Ritz-Carlton project site was included in that request. However, the only change being sought for the project site was a boundary change to reflect the new configuration of the parcel. In late March 1987, the County Planning Commission approved the Mauna Lani Resort's rezoning request, including the Ritz-Carlton parcel from V-1.0 (Resort) to V-1.25 (Resort).
HAWAII COUNTY ZONING

COUNTY ZONING

CV-1.0  Village Commercial
O      Open
RM-1.5  Multiple Family (1,500 sq.ft/unit)
RM-3   Multiple Family (3,000 sq.ft/unit)
RM-4   Multiple Family (4,000 sq.ft/unit)
V-1.0  Resort Hotel (1,000 sq.ft/unit)
V-1.25 Resort Hotel (1,250 sq.ft/unit)

CV-1.0  Existing Zoning
V-1.25  Proposed Zoning

Figure V-1

HAWAII COUNTY ZONING

RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
9.0 PLAN OF NEARBY COMMUNITIES

No regional plan has been prepared for South Kohala. The following plans were examined to note the role of the South Kohala resorts in the planning for these nearby communities.

9.1 NORTH KOHALA COMMUNITY DEVELOPMENT PLAN

There are numerous references in the North Kohala Community Development Plan (Phillips Brandt Reddick, November 30, 1984) to the employment opportunities and economic base which the South Kohala resorts have provided for North Kohala residents. It is reiterated several times that South Kohala tourism development filled the gap left by the closure of the sugar plantations in North Kohala. And in turn, the South Kohala resorts have depended upon North Kohala as a source of employees.

A certain amount of growth in residential housing for visitor industry employees is expected in North Kohala, but the extent to which such development might be directed to the southern portion of the district (in the vicinity of Kohala Estates and Ranch) which is functionally closer to the South Kohala resort employment centers has not been determined.

The plan mentions the need for expanded public bus service between the North Kohala towns and the South Kohala resorts.

9.2 KONA REGIONAL PLAN

The Kona Regional Plan (Hawaii, County of, Planning Department, November 28, 1983) has references to the South Kohala Resorts only in the Economic Activities and Land Use chapters. The relationship between the visitor facilities in the Kona and Kohala districts is noted several times. The competition that the destination resorts in South Kohala will pose for Kona's visitor industry is stressed. The opportunities for industrial expansion in the area north of Kailua are mentioned, fueled by both the South Kohala resorts and Kona's visitor market/population growth. Indirect employment opportunities related to the industrial and service sectors that the South Kohala resorts will create for Kona residents are in addition to the direct jobs the resorts will provide.

The economies of the Kohala and Kona Districts will become more and more interdependent, especially as both are based largely on the tourism industry. Thus the land use planning has to be coordinated also. Thus this plan recognizes that the resort areas that have been started in both South Kohala and in Kona should be firmly established before additional areas are developed.

9.3 WAIMEA DESIGN PLAN

The Waimea Design Plan (Phillips Brandt Reddick, May 1984:17) makes one brief mention of the prospects for continued growth in the town due to the resort developments on the coast.
CHAPTER VI
CHAPTER VI

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE
ENVIRONMENT AND MAINTENANCE OF LONG-TERM PRODUCTIVITY
AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Because the project site consists largely of sparsely vegetated lava land unsuited to agricultural use and because it is within Mauna Lani Resort, future options for alternate uses of this land, other than resort use, are limited, if any. The land will be committed to a long-term use: hotel operations. The shoreline will be altered to include a swimming lagoon, also a long-term use.

Development of the hotel site is not expected to pose any long-term risks to health and safety. It is obviously in the interest of the hotel site developer and operator to provide a healthful, safe, and enjoyable experience at the hotel and on the hotel grounds.

The improved shoreline access and access from the nearby public park, which is planned to be constructed at about the same time as the hotel, will allow increased use of the site's resources and represent a long-term gain for the public. Proposed shoreline improvements will increase hotel guests' and the public's safe use of the shoreline area.

A man-made environment will replace the natural terrain of lava field. Extensive landscaping of hotel grounds will enhance the site, and the shoreline area will be improved to enhance its natural appearance. Development will occur with minimal disturbance to coastal strand vegetation. No significant long-term losses of resources are anticipated. Significant archaeological sites at the project site will undergo archaeological data recovery done to recover significant information.

Long-term benefits of the Ritz-Carlton Mauna Lani development include long-term employment and other economic benefits which the project will bring to the West Hawaii region. De facto and resident population growth will follow the development of the Ritz-Carlton Mauna Lani. The effects of this growth have been weighed and the benefits found to offset the impacts.
CHAPTER VII
CHAPTER VII
OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

No significant adverse effects are expected to result from the construction and operation of the Ritz-Carlton Mauna Lani and the associated shoreline improvements. There will be some minor impacts, which will be more than offset by the benefits derived from the project. The State and County have invested considerable funds in providing public infrastructure for West Hawaii and have encouraged quality resort development along the West Hawaii coast. Governmental policies support the enhancement of shoreline areas for public use and improved public access. The proposed shoreline improvements and improved pedestrian access will increase the public's safe use of natural resources.

One or more archaeological sites might be lost. However, information recovery will be performed as approved by the State Department of Land and Natural Resources and the Hawaii County Planning Department.

As discussed in Chapter V, the proposed project is in general consistent with all relevant government plans and policies.
CHAPTER VIII
UNRESOLVED ISSUES

The Shoreline Setback Variance application, the Special Management Area application, and the Conservation District Use Application which this environmental impact statement accompanies are three of several permit applications which must be approved before the Ritz-Carlton Mauna Lani can be constructed. Other permit applications are listed in Chapter I, Section 10. Several issues raised by the proposed hotel development and shoreline improvements remain to be resolved. The outcome of some cannot be known in detail until development actually occurs. However, it is expected that all of the issues can be resolved without undue difficulty through mitigation measures. The most important of the issues are identified below.

1. Impact of Shoreline Modifications on Pa'aua Bay Waters. The potential impacts of excavation and construction of the shoreline swimming lagoon and beach improvement area have been fully explored in this document and in the two technical studies prepared for this project, a baseline assessment of the marine environment and an engineering evaluation of ocean and shoreline conditions, both of which are included as appendices to this EIS. Based on these analyses, no significant adverse impacts are expected on the water quality in Pa'aua Bay. However, the exact effects of shoreline area excavation and improvement are unknown at present and cannot be known until construction occurs.

2. Impact of Shoreline Modifications on Marine Species. A conclusion of the marine baseline assessment is that the potential for direct impact to the aquatic communities as a result of Ritz-Carlton Mauna Lani development activities appears to be quite small. However, here again, the exact effects of shoreline area excavation and improvement, as well as hotel facilities operations, on the marine environment are currently unknown.

3. Parameters of a Monitoring Program. A monitoring plan will be implemented according to governmental permit conditions. Specific tasks to monitor potential impacts to nearshore waters and marine species have not yet been determined.

4. Availability of Adequate Employee Housing. Ritz-Carlton Mauna Lani workers are expected to require between 100 and 135 new housing units for the initial 450-unit operation in 1990, and an additional 85 to 95 housing units by 1998 when the 200 hotel units will become operational. Those needing "assisted housing", that is to say those workers from households with incomes lower than 80 percent of the median, are projected to be 25 to 33 in 1990 and 21 to 23 in 1998. The workers with household incomes above 80 percent of the median are expected to find housing within the private housing market. Mauna Lani Resort has assumed responsibility for meeting employee housing requirements for the Ritz-Carlton Mauna Lani project. It is currently involved in discussions with the County Planning Department and the Office of Housing and Community Development to establish the housing requirements for the Ritz-Carlton. At this time, Mauna Lani Resort proposes to expand its existing housing.
development in Waimea by 24 units and to build 200 rental units in Kealakehe in North Kona on land owned by the Hawaii Housing Authority. These units would provide employee housing for Ritz-Carlton employees in need of assistance as well as for employees of future Mauna Lani Resort hotel development. The exact outcome of the housing discussions and the resulting implications for the availability of adequate employee housing are presently unknown. However, it is expected that employee housing requirements will be met through a combination of available housing on the open market and employee housing assistance provided by Mauna Lani Resort.

(5) **Location of Off-Site Population Growth and Facilities.** The exact location of off-site population growth and facilities as a result of hotel operational period employment is undetermined at this time. State and County planning and zoning policies will ultimately determine where a supply of new housing will be permitted. Also to be taken into account are factors such as where private developers will be willing to build new housing and future employees' preferences for residential location.

(6) **Transportation Improvements.** As development continues at Mauna Lani Resort (including the Ritz-Carlton) and at other West Hawaii resort projects, traffic volumes will increase and existing roadways will become congested. The need for improvements to Queen Kaahumanu Highway and other major roadways and critical intersections in the West Hawaii area is a function of projected regional growth, not just the Ritz-Carlton 650-unit (eventual) hotel project. It is expected that the exact design of these improvements and when they will be necessary will be determined by governmental entities concerned with regional infrastructure planning and construction.

(7) **Traffic Study Assumptions.** Traffic projections will vary according to the assumptions made. Those assumptions made for the Ritz-Carlton Mauna Lani traffic study are listed in Section 3.1, Traffic Impact Analysis, of Chapter IV of the EIS. It is recognized that other assumptions might be made in another study or by other individuals, resulting in different projections.
CHAPTER IX
CHAPTER IX

REFERENCES


Families as Allies. (1987). West Hawaii's child protective services: permanent staffing needs to be increased. Xeroxed report, 3 pp.

IX-2


Hawaii County Police Dept. (various years). Annual report. Hilo, Hawaii.


CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
CHAPTER IX
REFERENCES


——. (December 1986). Engineering evaluation of ocean and shoreline conditions at the Ritz-Carlton hotel site, Paauoa Bay, South Kohala, Hawaii. Prepared for Mauna Lani Ritz-Carlton Hotel.


Families as Allies. (1987). West Hawaii's child protective services permanent staffing needs to be increased. Xeroxed report, 3 pp.


----------. (1986). Real property assessment.


Hawaii County Police Dept. (various years). Annual report. Hilo, Hawaii.


IX-3


IX-4


IX-5


IX-6


CHAPTER X
PARTIES CONSULTED AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THE EIS

1.0 CONSULTED PARTIES

The notice of availability of the EIS Preparation Notice (EISPN) for the Ritz-Carlton Hotel was published in the OEQC Bulletin by the Office of Environmental Quality Control on October 8, 1986. The agencies, organizations, and individuals listed below were sent copies of the EIS Preparation Notice (EISPN) with the Environmental Assessment (EA) and were asked to comment on the project. Everyone believed to have an interest in the project or who requested consulted party status was included in the mailing. Those who responded to the request for comments are marked with an asterisk (*) and copies of the correspondence with them are reproduced in Chapter XI.

Federal Agencies
* U.S. Department of the Interior, Water Resource Division
* U.S. Department of the Interior, Fish & Wildlife Service
* U.S. Army Engineering Division
* U.S. Environmental Protection Agency
* U.S. Department of Commerce, National Marine Fisheries Service

State Agencies
* Department of Budget and Finance
* Department of Defense
* Department of Education
* University of Hawaii
* Department of Accounting and General Services (Division of Public Works)
* Department of Planning and Economic Development
* Department of Agriculture
* Department of Social Services and Housing, Hawaii Housing Authority
* Office of Hawaiian Affairs
* Department of Transportation
* Department of Land and Natural Resources
Department of Hawaiian Home Lands, Hawaiian Homes Commission
Department of Taxation
* Department of Health, Environmental Protection & Health Services Division
* Department of Labor and Industrial Relations

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County Agencies

* Department of Parks and Recreation
* County Police Department
* Department of Water Supply
* Department of Research and Development
* Police Department
* Planning Department
* Department of Public Works
  Civil Defense Agency
  Division of Industrial Safety
  Department of Finance
  Hawaii Redevelopment Agency
  Office of Housing and Community Development

Lawmakers

* The Honorable George R. Ariyoshi, Governor
* The Honorable Daniel K. Inouye, U.S. Senate
* The Honorable Spark M. Matsuura, U.S. Senate
* The Honorable Daniel K. Akaka, U.S. Congress
* The Honorable Neil Abercrombie, U.S. Congress
* The Honorable Richard Henderson, Hawaii State Senator
* The Honorable Richard M. Matsunura, Hawaii State Senator
* The Honorable Malama Solomon, Hawaii State Senator
* The Honorable Wayne Metcalf, Hawaii State Representative
* The Honorable Virginia Isbell, Hawaii State Representative
* The Honorable Andrew Levin, Hawaii State Representative
* The Honorable Robert Lindsey, Hawaii State Representative
* The Honorable Harvey Tajiri, Hawaii State Representative
* The Honorable Dwight Takamine, Hawaii State Representative
* The Honorable Dante K. Carpenter, Hawaii County Mayor
* The Honorable James L.K. Dahlberg, Hawaii County Council
* The Honorable Frank De Luz, III; Hawaii County Council
* The Honorable Takashi Domingo, Hawaii County Council
* The Honorable Robert Herkes, Hawaii County Council
* The Honorable Lorraine Jitcheku-Inouye, Hawaii County Council
* The Honorable Russell S. Kokubun, Hawaii County Council
* The Honorable Merle K. Lai, Hawaii County Council
* The Honorable Spencer Kalani Schutte, Hawaii County Council
* The Honorable Stephen K. Yamashiro, Hawaii County Council

Other Organizations

* Hawaii Leeward Planning Conference
* Life of the Land
* Puako Community Association
* Waimea-Kawaihae Community Association
Hawaii Hotel Association, Hawaii Chapter
Kohala Community Association
Kona Conservation Group
Other Organizations

- Kona-Kohala Chamber of Commerce
- Moku Loa Group, Hawaii Chapter Sierra Club
- Na Ala Hele
- Waimea Hawaiian Civic Club
- West Hawaii Committee

Others

* Hawaiian Telephone Company
* Hawaiian Electric Company

2.0 ORGANIZATIONS AND INDIVIDUALS WHO ASSISTED IN THE PREPARATION OF THIS EIS

The Environmental Impact Statement was prepared for the Ritz-Carlton Hotel Company by Belt Collins & Associates with input provided by subconsultants. The following were involved:

Belt Collins & Associates

- James R. Bell - Principal in Charge
- Anne L. Hapes - Contributor/Project Manager
- Glen T. Koyama - Contributor/Planner
- Lee William Sichter - Contributor/Planner
- Ed Iida - Contributor/Civil Engineer
- Thomas Nance - Contributor/Hydrologist
- Clyde Kanehiro - Cartographer
- Karon Uyechi - Graphic Designer
- Lynn Fukuhara - Word Processor

Subconsultants

- Steven Dollar - Marine Survey
- ECMI - Fiscal Impact Analysis
- Community Resources, Inc. - Socioeconomic Impact Analysis
CHAPTER XI
CHAPTER XI

COMMENTS RECEIVED DURING THE EIS PREPARATION NOTICE COMMENT PERIOD AND RESPONSES

The agencies and individuals listed in Chapter X were all sent copies of the Environmental Impact Statement Preparation Notice (EISPN) with the Environmental Assessment (EA) and a transmittal letter requesting comments. Copies of the EISPN and the transmittal letters sent to these organizations and individuals are reproduced along with copies of our responses to them. Some agencies received individualized transmittal letters, requesting specific information relative to their agency's activities and/or responsibilities. Letters to and from these agencies are reproduced after the group of letters from and to the agencies and individuals responding to the standard transmittal letter. Those agencies and individuals responding to the transmittal letter with a "no comment" received no letter in response.

Standard Transmittal Letter Requesting Comments
Environmental Impact Statement Preparation Notice

AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RESPONDING TO THE STANDARD TRANSMITTAL LETTER WITH "NO COMMENT"

Federal Agencies

U.S. Department of the Interior

State Agencies

Department of Budget and Finance
Department of Defense
Department of Education
University of Hawaii
Department of Accounting and General Services (Division of Public Works)

County Agencies

Department of Parks and Recreation
County Police Department

Lawmakers

The Honorable Wayne Metcalf, Hawaii State Representative
The Honorable George R. Ariyoshi, Governor
The Honorable Daniel K. Inouye, United States Senate

XI-1
AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RESPONDING TO THE STANDARD TRANSMITTAL LETTER WITH COMMENTS

State Agencies

Department of Planning and Economic Development
Department of Agriculture
Department of Social Services and Housing, Hawaii Housing Authority
Office of Hawaiian Affairs
Department of Transportation
Department of Land and Natural Resources

County Agencies

Department of Water Supply
Department of Research and Development
Police Department
Planning Department
Department of Public Works

Lawmakers

The Honorable Daniel K. Akaka, U.S. Congress

Other Organizations

Hawaii Leeward Planning Conference
Life of the Land
Pauko Community Association
Waimea-Kawaihae Community Association

Others

Hawaiian Telephone Company
AGENCIES, ORGANIZATIONS, AND INDIVIDUALS SENT INDIVIDUALIZED TRANSMITTAL LETTERS

(++) indicates No Response received
(++) indicates Response without Comment, see above

Federal Agencies
U.S. Department of the Interior, Fish & Wildlife Service
U.S. Army Engineering Division
++ U.S. Environmental Protection Agency
U.S. Department of Commerce, National Marine Fisheries Service

State Agencies
Department of Health, Environmental Protection & Health Services Division
Department of Labor and Industrial Relations

County Agencies
++ Office of Housing and Community Development

Lawmakers
++ The Honorable George R. Ariyoshi

Others
Hawaiian Electric Company
Office of Environmental Quality Control
October 1, 1986
Page 2

Should you have any questions, please feel free to contact our office.

Sincerely,

ALBERT LONO LYMAN
Planning Director

Office of Environmental Quality Control
October 1, 1986

Gentlemen:

Preparation Notice - Environmental Impact Statement

Enclosed please find one original and three copies of an environmental assessment and preparation notice for the proposed resort hotel at Pa`aau Bay, north of the existing Na`ama Lani Bay Hotel, South Kohala, Island of Hawaii (Tax Map Key: K-6-8-721B, p. 7, 9 and 10).

The applicant, the Ritz-Carlton Hotel Company, has filed an application for a Shoreline Setback Variance, thus necessitating compliance with Chapter 343 requirements.

Comments on the RIT Preparation Notice should be sent to the petitioner's consultants:

Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

With copies to:

Mr. Albert L. Lyman, Director
Planning Department
County of Hawaii
25 Anuenue Street
Hilo, Hawaii 96720

AK: aeb
encl.
cc: Belt, Collins & Associates
I. PROJECT DESCRIPTION

PROPOSED PROJECT

The Ritz-Carlton Hotel Company proposes to develop a
luxury-class resort hotel at Mauna Lani Resort at Kailua-Kona's,
South Kohala, Hawaii. The proposed site is situated at Pa'aua Bay
approximately 2,400 feet north of the existing Mauna Lani Bay
Hotel. It contains an area of 32 acres and is identified by Tax Map
Key 6-8-22/8, parcels 7, 9 & 10.

The new hotel will contain up to 450 rooms and include such
amenities as spas, tennis courts, health club, luau area, banquet
and meeting rooms, swimming pool, and two lagoons (see Figures
2-4). Up to 200 additional rooms may be developed at a latter as
yet undetermined date.

The proposed hotel's design theme calls for a classical Hawaiian
architecture reminiscent of the 'turn of the century.' It will have
two wings of guest rooms, each perpendicular to the shoreline and
connected to a main lobby. The hotel wings will be six stories
and enclose a landscaped courtyard and swimming pool area. Parking will
be located near the hotel entrance. Construction of the hotel is
proposed to begin in the spring of 1987 and be completed in late

PROPOSED LAGOONS

Pa'aua Bay is one of three major bays along Mauna Lani Resort's
shoreline. Approximately 80 percent of the 1,400-foot long shore and
tale beach within Pa'aua Bay fronts the proposed hotel property.
Despite the lack of development by a previous owner, the
shoreline area is in its natural state. Access to Pa'aua Bay is by
an existing unimproved pedestrian pathway that extends along the shoreline from just north of Pauna Bay to Honekae Bay in the southern section of Mauna Lani Resort. The access is open to the public and is a part of a comprehensive public access program, provided by the resort, that consists also of three mauka-makai vehicular accesses and parking.

Within the hotel grounds, Sitz-Carlton proposes to develop two lagoons as part of the project landscaping. One lagoon will be located to the north of the guest rooms and the other will be located near the shoreline behind Pauna Bay. The lagoon near the shoreline will serve as a water feature for swimming as well as a visual amenity for the hotel guests. It will encompass an area of approximately 1.2 acres and vary in depth from 4 to 6 feet (see Figures 2 & 7). Its construction will consist of a sand bottom with a subsurface cinder layer of gravel and perimeter of sand and rock capping.

The lagoon will connect to the ocean at two points within Pauna Bay to provide for internal circulation and water clarity. The 30' to 50' wide connections will be carefully selected to minimize any disturbance to the existing natural processes of the bay area.

Additionally, a proposed well near the lagoon will be installed to pump salt water into the inland water feature to aid the natural tidal exchange between the lagoon and ocean.

In preparing the site, maintenance work will be undertaken for the shoreline area. This will involve removal of debris and invasive plants from the beach land and deconstruction and replacement or otherwise undertakings from existing beachline vegetation. An existing rock jetty, constructed prior to the development of the Mauna Lani resort, will be removed to restore the beach to its original condition, and an upgraded pedestrian pathway will be constructed within an existing easement to provide improved access along the shore area. Additional landscaping is also planned to enhance the overall appearance of the oceanfront environment.

The necessary approvals required for Mauna Lani’s proposal are as follows:

- Shoreline Setback Variance Permit
- Change of Zone
- Special Management Area Permit
- Amendment to the Planned Unit Development Permit
- Subdivision Approval
- Conservation District Use Permit
- State Department of Health, Section 401 Permit
- Coastal Zone Management Federal Consistency Determination
- U.S. Army Corp of Engineers Permit

II. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Physical Setting

The 320-acre Mauna Lani Resort site parcel is situated on the south Kohala coast on a gradually rising plain encircled by four volcanoes: the Kohala Mountains, Mauna Loa, Mauna Kea, and Mauna Lani. The resort property slopes gently seaward from an elevation of about 200 feet along Queen Kamehameha Highway to sea level at the coastline. The overall slope of the land is generally less than 10 percent.
The project site is located in the northern section of the Mauna Lani property at Pa'aua Bay in an area that is relatively level and with an average elevation of 20 feet. The site is comprised of a'a lava that essentially has no soil cover; the Agricultural Lands of Importance to the State of Hawaii (ALISH) map shows no classification for the area. Drainage is excellent and erosion of soil is non-existent. There are no discernible drainage patterns nor are there any existing water features, except for a small anehaline pond across the southern boundary line of the property.

The beach area of Pa'aua Bay is comprised of carbonate-basalt material. Offshore is a coarse flat, relatively barreled, limestone area interspersed with highly eroded coral structures.

Construction of the proposed hotel will result in minimal alteration to the terrain. The site is relatively level and the surface material is extremely pliable. Some grading will be required.

The proposed lagoons will result in alteration to the project site. Preliminary estimates show the lagoons will require excavation of rock material from the western and northern portions of the property. Material removed will be used as fill in other areas of the hotel site or stored on the maaka lands.

Excavation will be required also for construction of the two openings between the ocean and the lagoon. The two openings will result in some effect to the shoreline. The connections will allow for improved internal lagoon circulation and water clarity.

**Planta/ Fauna**

Grasses and shrubs predominate the open areas of Mauna Lani Resort between stands of kiawe trees. A greater variety of natural vegetation is found in the shoreline area.

The Mauna Lani Resort site is capable of supporting a variety of birdlife due to the area's diverse and relatively extensive habitat. A number of low-land urban birds and shore birds were observed and recorded during early avian surveys of the project site. Migratory species were also evident in the area. Only one indigenous species, the Pacific Golden Plover, was recorded during a recent survey.

Mongoose, rats, cats and cats of rats are native species observed during a 1994 Fauna survey of the project site. No endangered or rare species of wildlife were observed or are expected to inhabit the area.

**Marine Environment**

The offshore marine waters are relatively flat and barren limestone platform interspersed with highly eroded coral. The barren appearance of this marine environment and the paucity of macrofauna is due to the seasonal high level of wave stress in the bay.

Located at the limestone platform is the Porites-reef building zone. Live coral colonies dominate the bottom surface, forming a solid limestone cover. Species diversity is often higher in this zone than anywhere else on the reef.

The next seaward zone, typically found on lagoon coral reefs, is the Porites compressa-slope zone. At many levels on the west
Coastal resources of Hawaii, the shoreline boundary of this zone is clearly delineated by a sharp increase in reef slope angle. In the Mauna Lani Resort area, however, this zone is not marked by a sharp drop-off. Rather, the Porites compressa zone integrates gradually with the Porites lobata reef building zone.

Offshore in Fauna Bay are a variety of reef fish. Other marine life include macroinvertebrates such as sea cucumbers, sea stars and sea urchins.

The nearshore waters off the coast of Mauna Lani Resort are classified by the State Department of Health as Class AA. Discharges into such areas are prohibited by the Department of Health. It is the objective of this classification to maintain the natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or action. Compatible recreation and aesthetic enjoyment, among others, are the principal uses to be protected in this marine environment.

**Historical/Archaeological Resources**

In a 1985 survey of the project area by Bishop Museum, a few archaeological features were found including multiple caves, abraded manufacturing areas, middens, petroglyphs, L-shaped structures, an alignment of loosely placed lava cobbles, and an oval shaped enclosure. The sites were scattered near the eastern and southeastern boundary of the site. No significant archaeological features were found on the proposed hotel site.

At the request of Mauna Lani, Science Management, Inc., was commissioned to formulate an Interpretive and Management Plan for the historic resources within its property. The plan, which was completed in 1987, was adopted by the owner and is presently being used as a resource management guide for development within the resort.

**Viewplanning**

The proposed hotel will have a maximum height of six stories and thus will be visible from the immediate adjacent lands. On-site landscaping will integrate the proposed hotel improvements with the rest of the site's natural terrain. From the shoreline, the hotel will be setback to provide a gradual transition zone between the shoreline and hotel improvements. The open water element of the lagoon will carry the water character of the shoreline into the hotel site.

Views from the Queen Kaahumanu Highway or the shoreline will not be significantly affected. The highway is more than 8,500 feet from the water's edge and views from the State right-of-way are primarily panoramic.

**Infrastructure**

Access to the proposed hotel will come from Queen Kaahumanu Highway, Mauna Lani Drive and a new connecting road from Mauna Lani Drive to the hotel site. Pedestrian public access will be available along the shoreline via a deeded easement. (The latter two roadways are private rights-of-way.) Construction of the connecting road by Mauna Lani Resort, Inc., is scheduled simultaneously with the hotel construction. All necessary utilities, including water, sewer, telephone, and electricity, will be provided to the site.
**Socio-Economic Considerations**

Operation of the proposed hotel will result in increased direct, secondary and tertiary regional employment. Increased regional employment will also result in an increase in regional population.

The increase in regional population will generate a demand for additional housing in West Hawaii. While it is anticipated that the private housing market is capable of satisfying some of this demand, it is also expected that increased assisted housing will be necessary. Hana Lani Resort, Inc. is working with the County to determine a mutually satisfactory means of providing additional housing units for the region.

In addition to the beneficial effect of the new jobs, consequential secondary effects would result in the island and state economy. Income earned by the new hotel employees will generate increased consumer spending, increased retail sales and new jobs in the retail, wholesale, and service sectors. Furthermore, operation of the hotel will result in increased orders for supplies and distributors of hotel goods and services, both on the island and in the state.

The effects of increased income will also result in increased revenues for the state government in the form of sales and income taxes, while increased property values, from the construction of the proposed motel, will result in substantial increased property tax revenues for the County.

In the short-term, the construction industry would benefit from the mobilization of labor, and suppliers and distributors of construction materials would benefit from increased construction activity.

As with any new hotel development, there will be a need for public services, such as police and fire protection, medical facilities, and recreational facilities. Since guests at the hotel are transient, public facilities such as schools, libraries, neighborhood parks, and community centers would not be significantly impacted.

**III. SUMMARY OF POTENTIAL IMPACTS**

Development of the proposed hotel would involve site grading, vegetation removal, building improvements, new landscaping and infrastructure improvements. The potential exists for significant effects to occur, involving the following:

* Transformation of the terrain and shoreline area used to grading, importation/exportation of soil and landscaping;
* Change in the visual character of some of the physical environment from barren lava and scarce vegetation to landscaped areas and resort use;
* Airborne dust and noise during the construction period;
* Withdrawal and recycle of salt water for lagoon circulation;
* Changes in species composition of flora and fauna;
* Impact on archaeological sites that can be mitigated by limiting research and/or preservation;
* Improved public access to and along the shoreline;
* Increased use of available potable water supplies, as well as public utilities and services;
* Increased short-term and long-term employment;
* Increased personal income and business activity;
IV. ALTERNATIVES TO THE PROPOSED ACTION

NO ACTION

An alternative to the proposed action is to do nothing. This "no action" alternative would result in no hotel, no landscaping, no lagoon and no shoreline improvements. There would be no impacts, positive or negative, on the site and on the surrounding environment.

Alternative Use

The present County zoning permits hotel use on the project site. Although the County zoning ordinance permits other uses under the V-1.25 zoning district, such as residential, open-air theaters, tourist information facilities and offices, the project site is most suitable for hotel development. Mauna Lani resort has considered other uses for the beachfront property during its original planning prior to the 1980's and has since determined that a resort hotel is the most suitable use for the property. Thus, hotel use is and has long been part of Mauna Lani's development plan for the area.

Alternative Location

Although other sites have been considered for the proposed hotel, the present site offers many benefits. It is located on a beachfront property, hotel use is permitted on the site by the present County zoning, and it is situated within the existing resort area of Mauna Lani where plans for roads and utility improvements to the site are currently underway.

V. MITIGATING MEASURES

Construction of the proposed hotel will generate noticeable impacts on the environment, such as noise, dust and possibly soil erosion. Although some impacts will be major, the effects are expected to be very temporary in nature, lasting only as long as the project's construction period. As a precaution, mitigating measures are planned to reduce or lessen these impacts through the use of stringent construction practices and environmental control devices on construction equipment.

Prior to construction of the proposed lagoon, studies will be conducted to determine the most suitable location for the lagoon openings. Selecting the most suitable location would result in the least amount of impact on the surrounding environment. Furthermore, construction procedures will be developed and implemented to minimize any alterations to the marine and shoreline area of the project area.

As mentioned above, it is believed that the private housing market is capable of satisfying some of the housing demand generated by the proposed hotel, but some additional housing will be necessary.
Mauna Lani Resort, Inc. is working with the County to determine a mutually satisfactory means of providing additional housing units for the region.

Recreation

Pauoa Bay is frequently used by the local residents for diving and snorkeling. The hotel is expected to increase public use of the beach, but it would not overburden the sand area, as hotel guests will have a number of beach-related options within the hotel premise to choose from including the hotel's swimming lagoon, pool deck, wet bar and lounge area. Guest of the proposed hotel will also have access to the resort's golf course, tennis club, and historic preserves.

The proposed lagoon openings will include a pedestrian bridge to allow continuous public and guest access along the shoreline from north of Pauoa Bay to Honoapiilani Bay. At the northern terminus of this shoreline access near Pauoa Bay is a planned public beach park and comfort station. Vehicular access over Mauna Lani Resort roadways will be provided from Queen Kaahumanu Highway to the public park.

Historic/Archaeological

Archaeological surveys conducted on the project site by Bishop Museum have indicated a presence of archaeological features. Necessary procedures will be taken to preserve any sites determined by the County or State to be significant and worthy of preservation.

Landscape and Open Space

The planned shoreline open space for the hotel site will ensure a lateral view corridor along the coastal area. Views of the shoreline from the Queen Kaahumanu Highway are expected to be long-range and panoramic. The State right-of-way is located more than 7,500 feet from the proposed hotel. The design of the hotel is intended to be sensitive to the shoreline area and blend with the surrounding environment.

Coastal Ecosystems

The proposed hotel would not significantly damage valuable coastal ecosystems of significant biological or economic importance. Preserving an approximately 150' wide band of open space along the beach area will minimize disruption or degradation of the coastal ecosystem. The proposed lagoon openings, located within the open space, will result in alteration of a portion of the shoreline area, but careful selection of the proposed connections between the bay and lagoon will minimize the impact to the area.

Surface runoff will be minimized by hotel landscaping and drainage systems and by existing natural drainage conditions.

There will be no dumping of commercial or industrial waste nor sewage effluent into the coastal waters. The proposed project will comply with all Federal and State Department of Health water quality regulations.

Economic

The proposed hotel will be developed by a private interest on a site which is considered suitable for hotel development. The proposed facility is resort-oriented, in terms of function, and is dependent upon its location near the shoreline for a viable operation.
Mauna Lani Resort is being developed in several phases over a period of time. The proposed hotel is part of Mauna Lani's long range plan and is a permissible use under County and State land use regulations. The proposed hotel is not expected to generate significant adverse social impacts in a region that is characterized as significantly visitor-oriented.

The proposed hotel will not, to a large extent, preclude the use and enjoyment of beaches and coastal areas by the general public. To ensure the long-term accessibility of the coastal area, existing public beach access and open space buffers along the shoreline will be maintained.

The proposed project will benefit from the contribution to the tourist industry which is a vital element of the state's and county's economy. Moreover, it will create new jobs and generate substantial income in the state and county.

Coastal Hazard

The proposed development will not alter any drainage patterns that would adversely affect adjacent development or downstream properties. A portion of the project site is located in a coastal high hazard flood zone. However, no habitable floor areas of the proposed hotel will be developed in elevations affected by a 100-year tsunami inundation. Also, no portion of the proposed hotel is subject to a potential 100-year riverine flood or to extensive damage from flash run-off.

VI. INDEMNIFICATION AND INDEMNIFIABLE COMMISSION OF AGREEMENTS

Development of the property for hotel use will commit the land to long-term use associated with the proposed project. Private
IX. AGENCIES TO BE CONSULTED IN HIS PREPARATION

Federal Agencies
U.S. Army Corps of Engineers, Pacific Ocean Division
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency, Region 9-San Francisco

State Agencies
Department of Accounting and General Services
Department of Agriculture
Department of Budget and Finance
Department of Defense
Department of Education
Department of Hawaiian Home Lands
Department of Health
Department of Labor and Industrial Relations
Department of Land and Natural Resources
Department of Planning and Economic Development
Department of Social Services and Housing
Department of Taxation
Department of Transportation
Office of Environmental Quality Control
Office of the Governor
Office of Hawaiian Affairs
Congressional Representatives
The Honorable Daniel K. Inouye
The Honorable Spark M. Matsunaga
The Honorable Daniel K. Akaka
The Honorable Neil Abercrombie

State Legislators
Senator Richard H. Hays
Senator Richard H. Matsunaga
Senator Kaalea Solomon
Representative Virginia Smith
Representative Andrew L. Leeds
Representative Robert Lindsey
Representative Wayne Hickey
Representative Harvey Takishi
Representative Dwight Takamine

Hawaii County
Mayor Daniel K. Carper
Department of Public Works
Department of Parks and Recreation
Department of Water Supply
Department of Research and Development

- 17 -
October 26, 1986
86-1977

Dear [Name],

Environmental Impact Statement Preparation Notice
Proposed Resort Hotel
Mauna Lani Resort, South Kohala, Hawaii

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawaii. The proposed site is situated at Puuoo Bay, approximately 2,600 feet north of the existing Mauna Lani Bay Hotel. It consists of an area of 32 acres and is identified by Topo Map Key 6-8-225 & 6, parcels 7, 9, & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lagoon pool, and two lagoons. Up to 200 additional rooms may be developed at a later date as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and snorkeling activities. Two openings are planned to connect the second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISP) was published in the October 8, 1986 issue of the Oahu Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) are being made available for public review and comment.

Last year, an EIS was prepared in conjunction with a State Land Use Commission Petition to allow the expansion of the Mauna Lani Resort. The EIS was accepted by the Land Use Commission in August 1985. Because there is substantial material in the EIS that pertains to the project site, we intend to rely, to a large extent, on the information already provided in the earlier EIS to prepare the present EIS.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility. We are requesting comments on all aspects of the project's probable impacts, as we have determined that the EIS will be submitted by October 1987. At that time the document will be circulated for public review and comment.

As you know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me at 955-1371.

We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Neves

ALM-MF
Attachment

October 24, 1986
86-1977

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we have determined that the EIS will be submitted by October 1987. At that time the document will be circulated for public review and comment.

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me at 955-1371.

We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Neves

ALM-MF
Attachment
Mr. John L. Nagas
Bell, Collins, and Associates
605 Iolani Street
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice, Proposed Resort Hotel, Naioi Lani Resort, South Kohala, Hawaii

We have examined the subject notice and find that no elements in it impinge upon our competence or responsibilities. We, therefore, have no comments to offer on the notice.

Sincerely,

Kenneth Mathiah
Acting District Chief
November 6, 1986

Anne L. Hayes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hayes:

Thank you for your letter of October 24, 1986, regarding the Environmental Impact Statement Preparation Notice for the Ritz-Carlton Hotel to be developed at Mauna Lani Resort in South Kohala, Hawaii.

At present, I have no comments on the proposed project. But please be assured that I will let you know if anything arises.

With warm personal regards,

Sincerely,

WAYNE McCALP
Hawaii State Representative
Third District

November 7, 1986

Ms. Anne L. Hayes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

RE: EIS Preparation Notice for Ritz-Carlton Hotel Co., Mauna Lani Resort, South Kohala, Hawaii

Dear Ms. Hayes:

Comments regarding public access were expressed and resolved during our review of the Mauna Lani Resort Master Plan.

We have no additional comments/concerns to offer and we thank you for the opportunity to provide input during the planning stages of the project.

Sincerely,

Patricia Engelhard
Director

cc: Planning Dept., County of Hawaii
October 28, 1986

Ms. Anne L. Hapes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hapes:

Subject: Environmental Impact Statement Preparation Notice
Proposed Resort Hotel
Mauna Lani Resort, South Kohala, Hawaii

We have no objections to the proposed project. However, the developer shall comply with all provisions of the Uniform Fire and Building Codes and the regulations of the Department of Water Supply.

Thank you for giving us the opportunity to submit our comments.

Very truly yours,

Francis E. Smith
FIRE CHIEF

FRANSIS E. SMITH
FIRE CHIEF

October 29, 1986

Mr. Anne L. Hapes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hapes:

This is in response to the draft environmental impact statement preparation notice for the proposed resort hotel at the Ritz-Carlton Hotel Company at Mauna Lani Resort, South Kohala, Hawaii.

Thank you for the opportunity to comment on the proposal, however, I have no comments to make at this time.

Very Truly Yours,

JOSHUA S. L. BEE
December 22, 1986

Ms. Anne L. Hayes
C/o Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Gentlemen:

Proposed Resort Hotel
Kona Lani Resort, South Kohala, Hawaii

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

Jerry M. Matsuda
Manager, Hawaii Air National Guard
Constr & Eng Officer

cc: County of HI, Planning Dept.

Ms. Anne L. Hayes
C/o Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hayes:

SUBJECT: Environmental Impact Statement Preparation Notice
Kona Lani Resort, South Kohala, Hawaii

Our review of your proposed hotel development indicates negligible
topic impact on Kona Elementary - Intermediate School and Honokaa
High School.

Please keep us informed if there are changes in your development plans so
that we can continue to be sensitive to the future classroom needs of
this area.

Should you require any clarification, please call Mr. Richard Imouye
at 727-4743.

Sincerely,

Francis M. Matsunaka
Superintendent

FINISH
Ms. Anne L. Mapes
Bell, Collins & Associates
600 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Mapes:

Thank you for your letter of October 27, 1986, to Governor Ariyoshi, regarding the environmental impact statement preparation notice for the proposed resort hotel at Naupa Lani Resort, South Kohala, Hawaii. We have shared your letter with the appropriate state agencies.

Sincerely,

Robert M. Werner
Press Secretary

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Ms. Anne L. Mapes
Bell, Collins & Associates
600 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Mapes:

Subject: Environmental Impact Statement Preparation Notice, Proposed Ritz-Carlton Resort Hotel, Mauna Lani Resort, South Kohala, Hawaii

We have reviewed the subject EISP and have no comments at this time. Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

Edwin T. Murakawa
EIS Coordinator

cc: A.L. Lyman, Planning Dept.
County of Hawaii
Ms. Anne L. Hapes
Balt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hapes:

I wish to acknowledge receipt of the copy of the Preparation Notice of the Environmental Impact Statement of the proposed Mauna Lani Resort Hotel.

I appreciated receiving the copy of this preparation notice, and would like to receive a copy of the EIS when it is completed.

Again, thank you for sharing a copy of the preparation notice and the Environmental Assessment Report with me.

Aloha,

[Signature]

United States Senator

DKI:scy

Balt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement
Preparation Notice
Mauna Lani Resort, South Kohala, Hawaii

We have reviewed the subject document and have no comments to offer.

Very truly yours,

[Signature]

TEUANE TONUMA
State Public Works Engineer

fsc
Attachment
cc: Mr. Albert L. Lyman
Ms. Anne L. Waplo
Belt, Collins & Associates
606 Coral Street
Honolulu, HI 96813

ENVIROMENTAL IMPACT STATEMENT PREPARATION NOTICE
THE RITZ-CARLTON HOTEL COMPANY
TAX MAP KEY 6-B-0228, PAR. 7, 9 AND 10

The proposed development's water demand should be addressed in more detail. Muna Lani Resort (MLR) should confirm that the proposed development will obtain its water demand from MLA's allotment through participation in the Lahi Mala Water System.

William E. Young
Manager
QA

cc - Planning Department
The Ritz-Carlton Hotel Company
Muna Lani Resort

Mr. H. William Sewake, Manager
Department of Water Supply
County of Hawaii
23 Anapole Street
Hilo, Hawaii 96720

Dear Mr. Sewake,

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Puuna Bay,
Muna Lani Resort, South Kohala, Hawaii

Thank you for your letter of October 30, 1996 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

As requested, the proposed hotel's water demand will be addressed in more detail in the Draft EIS. Muna Lani Resort confirms that the proposed hotel will obtain its water from Muna Lani Resort's allotment through participation in the Lahi Mala Water System.

Sincerely,

Anne L. Waplo

cc - Douglas McGarthy, Ritz-Carlton Hotel Company
Roger Harris, Muna Lani Resorts, Inc.
October 30, 1986

Belt, Collin & Associates
606 Carol Street
Honolulu, HI 96813

Dear Sirs:

Mauna Lani Resort, Inc. has done an outstanding job in master planning their resort. They have shown tremendous sensitivity to historic and environmental concerns in the process.

The EIS accepted by the Land Use Commission in August, 1985, has substantially all the material necessary concerning this project site. The only new issue deals with the proposed lagoon. We, therefore, feel that this is the only new data that needs to be generated. Would it not, therefore, be possible to submit the previously prepared EIS along with an addendum directed at the specific hotel site and meet the requirements of Chapter 382.

We appreciated this opportunity to comment. If you have any questions, please call me.

Sincerely,

[Signature]

[Name]

President

cc: Al Lyman

Mr. H. Peter L'Orange, President
Hawaii Leeward Planning Conference
P.O. Box 635
Kailua-Kona, Hawaii 96745-0635

March 9, 1987

Anne L. Mapes

ALAw

cc: Douglas McGarity, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
I don't think that hotel use of the Pauna Bay area represents any significant appropriation of a scarce public resource. The creation of the public park area nearby to the north is a valuable contribution to the public's need for facilities by the ocean. However, I hope that the two inlets to the lagoon don't interrupt lateral shoreline access.

I hope these comments prove helpful. Any elaboration or further participation on our part will be gladly given.

sincerely,

Bill Graham
LOG Big Island representative
Mr. Bill Graham
Life of the Land
250 S. Hotel Street, Room 211
Honolulu, Hawaii 96813

Environmental Impact Statement (EIS)
for the Proposed Resort Hotel at Pauna Bay,
Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 2, 1986 commenting on the Environmental
Impact Statement Preparation Notice and Environmental Assessment for the above
project.

We note your aesthetic and technical concerns regarding the proposed project.
The project is an integral part of the overall hotel site design and the need for this
project is essential for the operation of the hotel and its potential impacts on the ocean and marine life will be addressed in
the EIS. As for your concern about public access, lateral shoreline access will not be
interrupted due to the project.

Sincerely,

Anna L. Mapes

ALM/II

cc: Douglas McGarthy, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
November 4, 1966

Ms. Anne L. Hapes
Hoke, Cullen & Associates
606 Coral Street
Honolulu, Hawaii 96813

Re: E.I.S.
Hilton Hotel

Mr. Hapes:

Thank you for your invitation to have the Puako Community Association provide input that will assist in the preparation of the E.I.S. for this project.

Our organization held a special meeting on November 2, 1966, where we were presented with drawings and information by Roger Harris of the Kahua Lani Resort.

After asking numerous questions regarding the location of the hotel, ingress and egress, height of building, parking, sewage treatment, water supply, petroglyphs, public access to shoreline, lagoon development, etc., we voted to approve the project. It is our understanding that all necessary federal, state and county permits will be received before the construction proceeds.

In regard to any specific items that may affect our community, a long discussion was held on whether or not it would be feasible for the Kahua Lani Resort to someday be able to treat the sewage from Puako. As the present time, our homes are connected to cesspools and, due to our close proximity to the ocean, we are concerned about possible pollution of the ocean water. We certainly don't propose this as a condition of approval for the hotel project but, rather, a query as to whether or not it would be a feasible solution to our problem in the future. It appears that their sewage treatment plant has ample excess capacity and it may be that they could treat the sewage from Puako and thus reduce their operating costs. If this falls within the scope of your study, we would be interested in any findings.

Another item that affects our community, as more hotels are constructed, is the noise problem with tour helicopters. This is a substantial problem.

today and as two thousand or more rooms are added in coming years, we are concerned that the helicopter flights will increase in direct proportion.

As you know, the islands of Kauai and Maui have serious noise problems with the tour helicopters and they are seeking legislation as a means of controlling them. Also, the helicopter companies have agreed to try to alleviate the problem by restricting their routes and flying higher. The big question seems to be: how high is safe, and how does the distance relate to the noise generated at ground level?

Noise pollution is an environmental problem and we hope you will address this in your study.

If you have any questions on my comments, please feel free to call me.

Sincerely yours,

Richard L. Keith
President
Mr. Richard L. Keith, President  
Puako Community Association  
7 Puako Beach Drive  
Kona, Hawaii 96743

March 6, 1987  
D-460

Dear Mr. Keith:

Environmental Impact Statement (EIS)  
for the Proposed Resort Hotel at Puako Bay,  
Mokua Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 4, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

I have referred your question on the feasibility of treating sewage from Puako at the Mokua Lani Resort sewage treatment plant to Mokua Lani Resorts. Please note that the applicant for the Puako Bay resort hotel project is Ritz-Carlton Hotel Company, and not Mokua Lani Resorts.

The potential for noise impacts will be addressed in the EIS. There are no plans for a heliport to be constructed at the project site.

Sincerely,

Anne L. Mapes

ALM-11F  
cct Douglas McCarrthy, Ritz-Carlton Hotel Company  
Roger Harris, Mokua Lani Resorts, Inc.
Dear Ms. Hapes,

In response to your letter of 10/14/86 the Waimea-Kawainahoe Community Association has the following comments and requests for information:

Re: EIS Haena Lani Resort (Ritz-Carlton)

Questions on other off-site impacts:

1. The Waimea School appears to be over crowded at 900 students. What is the cumulative effect of all coastal development on the school enrollment at Waimea School as well as Hanalei High School? What are the State's plans for meeting this need and is there any plan for a regional high school to meet this need?

2. We do not expect the addition of traffic signals at the main intersection in Waimea (scheduled for February 1987) will accommodate the traffic congestion we are experiencing. Specifically: What are the projected traffic counts for the main intersection? What are the projected traffic counts assuming the Waimea-Kawainahoe Bypass is built. What are the projected traffic counts assuming a Parker Ranch 20/20 plan loop is built. What are the projected traffic counts assuming the Mud Lane to Waimea Bypass is built in conjunction with the Waimea-Kawainahoe Bypass? Also, if the 20/20 loop is built into it?

We have a gut feeling that this bottleneck will become unbearable if some solution is not reached. We feel there needs to be a way for through traffic (Bamboo to Kohala) to bypass the main intersection. Note: Certain Waimea merchants expressed opposition to a bypass years ago based on fear that the bypass would "pass them by" and they would lose business. Our feeling is that the overall growth pressures are so great that this would not be the case. Town center traffic will increase even with a bypass due to the nature of Waimea as a regional service center.

We are in support of quality development along the coast. We do not intend to hold a master planned resort "hostage" and expect them to provide off-site improvements. However, we see the need to meet the infrastructure's backlog approaching in a matter of proper planning it is imperative that we recognize all of these off-site impacts by coastal development as a whole. Each resort EIS attempts to reflect their impacts alone if they were the only resort. We see the need for a comprehensive compilation of all the resort's impacts. So our comments would apply to each of the other resorts and we are not "picking on" the Ritz-Carlton for any particular reason (we feel it is a good project). It is just that the cumulative effects of prior, present, and many planned future developments must be addressed.

Thank you for the opportunity to comment.

Sincerely,

Willis C. (Will) Morrison
President

cc: A. Hans Lymans
Mr. Willis C. Morris, President
Waimanalo Community Association
P.O. Box 635
Kailua, Honolulu 96733
March 4, 1987

Dear Mr. Morris:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pauoa Bay,
Mauna Lani Resort, South Kohala, Hawaii.

Thank you for your letter of November 6, 1986 containing comments from the
Waimanalo Community Association on the Environmental Impact Statement
Preparation Notice and Environmental Assessment for the above project. Following
are answers to your questions, in the order that they appear in your letter.

Water Supply Availability. We recognize the secondary impacts of resort develop-
ment, specifically the increase in population due to employment generated by the
resort hotel and other resort developments in West Hawaii. There will undoubtedly be
an increase in population in the Waimanalo area, as there will be in other Kohala and
Kona communities. These communities will need increased services, including potable
water supply and distribution. As you know, an exploratory well drilling program is
being pursued by the Division of Water and Land Development at three well sites:
one deep well site and two shallow well sites. If this exploration is successful, potable
water from these sources may be available to residents of the Waimanalo area.

Waimanalo and Honokaa Schools. In a recent communication with the State Depart-
ment of Education, we were informed that the Department plans to construct four
classroom buildings for Waimanalo School in 1987 and six classroom buildings for Honokaa
School in 1987. The impact of the proposed development on public school enrollment
will be addressed in the EIS.

Vehicular Traffic. We are preparing a regional traffic study and the results will be
included in the EIS. Recent communication with the State Department of Transpor-
tation confirms that, although there are construction plans for the bypass road, there are
no funds in the six-year CIP budget for the road. Further, the Department says that
the road will probably not be built within the next 10 years.

Sincerely,

Anne L. Nogas

cc: Douglas McCarty, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
We have reviewed the subject EIS preparation notice and offer the following comments:

1. The proposed development may have potentially significant impacts due to the construction of the proposed lagoon and its connection to the ocean. A determination of the significance (e.g., uniqueness, occurrence, and relative size) of the marine communities should be provided. The impacts to nearshore and offshore waters as well as marine and land-based organisms should be thoroughly assessed particularly as they pertain to lagoon-related impacts. A short- and long-term water quality monitoring system should be proposed and implemented.

2. A scenic and open space policy of the Island Coastal Zone Management (ISZ) Program in to ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms. The creation of lagoons in conjunction with the resort development will alter the natural shoreline in the area. The necessity for creating lagoons should be explained and the impacts relative to dredging, water quality and circulation patterns should be fully assessed.

3. Archeological sites should be inventoried in conjunction with a pre-impact planning. A small maunal site is mentioned across the northern boundary line of the subject property.

4. The EISM states that the private housing market is capable of satisfying some of the housing demand generated by the proposed hotel, but some assisted housing will be necessary. The EIS should address the long-term employee housing requirements of the total Kauai land area and should also discuss the location of new residential area communities to satisfy the employee housing demand generated by resort development.

5. The EISM states that existing public beach accesses and open space buffers along the shoreline will be maintained. It is proposed that the proposed hotel development should contribute to a comprehensive plan to improve public access to the shoreline. In support of the CM policy encouraging the reasonable dedication of shoreline areas with public recreational values, plans for public parks, accessways, and associated facilities such as parking and comfort stations should be fully described in the EIS.

6. The EIS should discuss the relationship of the proposed project to the Kauai State Plan (Chapter 214, HSG). The review should at a minimum discuss the relationship of the proposed project to the following: Economic (Sections 256-1 through 256-6, HSG), Physical Environment (Sections 256-1 through 256-6, HSG), Facility Systems (Section 256-12, HSG) and Socio-Cultural Amenities (Sections 256-13 and 256-14, HSG). Among the relevant Priority Guidelines, the following should be examined: Economic (Sections 256-10(a) and (b), HSG), Regional Growth and Land Resource Utilization (Section 256-10(b), HSG) and Affordable Housing (Section 256-10(c), HSG). The EIS should be reviewed to determine relevance to your project and important relationships should be discussed in the EIS.

Thank you for the opportunity to provide these comments.

Very truly yours,

[Signature]

[Name]

cc: Mr. Albert Low, Lyman, Director
Planning Department, County of Kauai
Office of Environmental Quality Control
March 6, 1997
87-462

Mr. Roger A. Uveling, Director
Dept. of Planning & Economic Development
State of Hawaii
P.O. Box 2259
Hilo, Hawaii 96720

Dear Mr. Uveling:

Environmental Impact Statement (EIS)
for the Proposed Resort Hotel at Paona Bay,
Mamala Bay Resort, South Kohala, Hawaii

Thank you for your department's letter of November 6, 1996 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project. Following are comments on the concerns identified in the order that they appear in Mr. Kekoa's letter.

Impacts of Lagoon. A baseline assessment of the marine environment at Paona Bay and an engineering evaluation of ocean and shoreline conditions at the project site have been completed. The results of these studies and an analysis of potential impact due to the lagoon will be included in the EIS.

Archaeological. There is one archeological pond on-site. It will be retained as part of the overall hotel site development.

Employee Housing Requirements. These requirements will be addressed in the EIS.

Public Access to the Shoreline. Public shoreline access and amenities will be provided at Mamala Bay Resort, of which the proposed hotel will be part. They will be described in the EIS.

Relationship of Proposed Project and State Parks. The EIS will include a discussion of the proposed project as it relates to the plans and specific sections of parks which you identify.

Sincerely,

[Signature]

Anne L. Hoppe

cc: Douglas McGeehan, Alana Carlson Hotel Company
Roger Harris, Mauka Lanai Resort, Inc.
Ms. Anna L. Mapes  
Ms. Anna L. Mapes  
Rutte Collins and Associates  
606 Coral Street  
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice  
(REISN) for Neuma Lani Resort, South Kohala,  
Hawaii  
The Ritz-Carlton Hotel Company  
TDS: 6-8-221 8, Pors. 7, 9 and 10  
Acres: 32

Dear Ms. Mapes:

The Department of Agriculture has reviewed the subject  
document and offers the following comments:

According to the EISN, the proposed development would  
involve the development of a resort hotel and associated  
impacts including tennis courts, swimming pools, and  
extensive landscaping. The subject parcel is located in the  
State Urban District and is zoned for urban uses.

The Draft EIS should include a discussion on the source and  
quantity of potable and irrigation water needed for the proposed  
project and whether water withdrawal will affect agricultural  
uses in the surrounding area.

Based on our review of other resort proposals in the South  
Kohala area, we note that water demand is increasing and the  
trend is likely to continue into the future. Most of the water  
will be withdrawn from groundwater sources tapped with deep  
wells further inland along the South Kohala/North Kona  
coastline. If this method is also utilized for the proposed  
resort, we suggest a comprehensive review of the impacts  
anticipated from groundwater withdrawal on both domestic and  
agricultural users in the affected area.

Thank you for the opportunity to comment.

Sincerely,

Jack K. Suna  
Chairperson, Board of Agriculture

Ms. Anna L. Mapes  
November 6, 1986  
Page 3

Hawaii County Planning Department
March 6, 1987

Ms. Suzanne D. Peterson, Chair
Board of Agriculture
State of Hawaii
P.O. Box 22159
Honolulu, Hawaii 96822-0159

Dear Ms. Peterson:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel athaven Bay,
Mauka Lani Resort, South Kona, Hawaii.

Thank you for your department's letter of November 6, 1986 commenting on the
Environmental Impact Statement Proposal Notice and Environmental Assessment
for the above project.

As requested, the proposed hotel's demand for water will be addressed in the EIS,
as will be the potential impacts from groundwater withdrawal.

Sincerely,

Anne L. Hopes

cc:

Douglas McGarity, Ritz-Carlton Hotel Company
Roger Harris, Mauka Lani Resort, Inc.
Ms. Anne L. Mapes
Holt, Collina & Associates
606 Cable Street
Honolulu, HI 96813

Dear Ms. Mapes:

This is in response to your letter of October 24, 1985, regarding the EIS preparation notice for the proposed resort hotel at the Mauka Lani Resort, South Kohala, Hawaii.

We would like to receive a copy of the EIS when it is completed and will make comments at that time.

Our primary concern in the preparation of the EIS is the section of the socio-economic impact. We would like to see economic data on the effect on the Big Island economy, e.g., employment, payroll, etc. Also, concerns which should be addressed are external impacts such as the effect upon housing, the educational system, etc.

Another aspect which should be examined is the approach to preparing the EIS. Until recently, there has been a tendency to treat resort projects as being isolated developments. We are beginning to see that the success of the impacts of all the resorts may be otherwise. There may be economies of scale to benefit from in dealing with problems on an area-wide basis.

We look forward to working with you and seeing your EIS in the near future.

Dennis M. Yamamoto
Director

Mr. Dennis Yamamoto, Director
Department of Research and Development
County of Hawaii
38 Rainbow Drive
Hilo, Hawaii 96720

Dear Mr. Yamamoto:

Environmental Impact Statement (EIS)
for the Proposed Resort Hotel at Paaua Bay,
Mauka Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 7, 1985 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

A socio-economic impact analysis is being done for the project, with emphasis on employment and housing. The results of the study will be included in the EIS. As requested, a copy of the draft EIS will be sent to you for comment when it becomes available.

Sincerely,

Anne L. Mapes

March 8, 1986

ALAN"
Ms. Anne L. Hapes, B.B. Collins & Associates
605 Coral Street
Honolulu, Hawaii 96813

November 7, 1986

After reviewing the Environmental Impact Statement Preparation Notice (EISP) and the Environmental Assessment (EA), we ask that you consider the following concerns created by the construction of the proposed Ritz-Carlton Hotel at Pa'aua Bay, South Kohalas:

1. The traffic light at the junction of Holome and Kawalae will be installed in early 1987. This will not eliminate congestion resulting from increased traffic due to this construction.

2. The Kawainoa Road is narrow and winding. Semi-trailers travel the road daily and contribute to its congestion as there are few passing zones.

3. As with any growth, criminal activity also increases. Requests for police services in the resort area will also increase.

Thank you for the opportunity to provide our input in this matter.

GUY A. PAUL
CHIEF OF POLICE

WAYNE G. CARVAJAL
DEPUTY CHIEF OF POLICE

March 6, 1987

Mr. Guy A. Paul
Chief of Police
Police Department
County of Hawaii
340 Kapolei Parkway
Hilo, Hawaii 96720

Dear Mr. Paul:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pa'aua Bay,
Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 7, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

Your concerns about traffic congestion and criminal activity will be addressed in the EIS.

Sincerely,

Anne L. Hapes

ALMoff
cce: Douglas McCarthy, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
Ms. Anne L. Mapes
November 7, 1986
Page 2

On page 13 starting at line 6, "The hotel is expected to increase public use of the beach, but it would not overdraft the sand area, as hotel guests will have a number of beach-related options within the premises to choose from ......."

To what extent is it expected that the Ritz-Carlton hotel guests will prefer the hotel's options over the natural beach area?

The consultant's attention is directed to the recently issued draft EIS for the Punüluu Resort prepared by Phillips Brandt Paddick and Associates and dated October 30, 1985. With respect to the EIS being prepared by your firm, we will expect that at a minimum the Ritz-Carlton's EIS section concerning socioeconomic considerations will be as comprehensive as that contained in the Punüluu Resort. In the Ritz-Carlton's EIS, we shall expect the socioeconomic considerations to be addressed both with respect to those directly attributable to the proposed hotel and the cumulative impacts of resort development in the South Kohala-North Kona region.

Should you have any questions on the above comments, please feel free to contact us.

Sincerely,

[Signature]

ALBERT LINDY LINHAN
Planning Director

Ms. Anne L. Mapes
November 7, 1986

Environmental Impact Statement Notice of Preparation
The Ritz-Carlton Hotel Company
Mauna Lani Resort, South Kohala, Hawaii

We have reviewed the subject environmental impact statement notice of preparation for the proposed resort hotel project in South Kohala, Island of Hawaii, and submit the following comments.

The creation of the lagoon and the operation/maintenance of the lagoon as described will be a significant environmental impact. Although unstated, it appears that the developers intend to pump "salt water" into the lagoon as a means of having warmer water for the users of the lagoon. The source and quality of the "salt water" will be important. The connection and operation/maintenance of the lagoon with direct connection to the ocean will have some legal questions. Please discuss further the impacts/mitigations on this issue.

Water quality of the near shore waters is an issue which we should closely follow. In paragraph 3 on page 7, in order to achieve what is best to be the developer's objective of maintaining "the natural pristine state as nearly as possible while maintaining the quality from any human-caused source of action," a monitoring program is essential.
Mr. Albert Loo Lyman, Director
Planning Department
County of Honolulu
25 Apana Street
Honolulu, Hawaii 96820

Dear Mr. Lyman:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pauoa Bay,
Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 2, 1984 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

The EIS will address the impacts of hotel construction and operation on the environment, particularly the nearshore waters. Relevant soundscapes impacts are being analyzed in a study being prepared for the project, including cumulative impacts. The analysis is being performed using methodology suggested by your department.

We shall be in contact with your department during the preparation of the EIS to ensure that the report addresses all of your concerns.

Sincerely,

[Signature]

Anne L. Mapes

ALM

cc: Douglas McCormick, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
November 10, 1986

Mr. Anna L. Mapes
Hawaiian Telephone
600 Coral Street
Honolulu, Hawaii 96813

Dear Mr. Mapes:

RE: EISPW - Mauna Lani Resort

Hawaiian Tel’s support for the proposed development remains steadfast. We recommend that we formal plans for the development be drafted, the developers contact our Telephone Planning Consultants in Honolulu to go over the telephone facilities (underground conduit, etc.) required for any telephone system to be installed.

Hawaiian Tel’s primary concern is that often the telephone planning aspects with a project are overlooked and/or limited to intra-building electronic systems and intra-building cabling designs. The facility planning for the cable service layout designs for the entire resort needs to be addressed at the outset to avoid possible delays in the activation of a telephone network.

If you have any questions, please call me at 935-9509.

Duane Tanouye
Engineering & Construction Manager - Hawaii

DTE prol

---

Mr. Duane T. Tanouye
Engineering & Construction Manager - Hawaii
Hawaiian Telephone
P.O. Box 449
Hilo, Hawaii 96720

Dear Mr. Tanouye:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 10, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

By copy of this letter, your recommendation for early coordination with Hawaiian Telephone is being passed on to the developer. Specifically, you recommend that a formal plan for development be drafted, the developer should contact your Telephone Planning Consultants in Honolulu to go over the telephone system and facilities required.

Sincerely,

Anna L. Mapes
ALM

cc: Douglas McCarrick, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
Mr. Ann L. Mapes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Mapes:

Thank you for notifying me of the Ritz-Carlton Hotel Company's proposed resort development plans at the Maua Lani Resort in South Kohala, Hawaii.

I appreciate the invitation to comment on the Company's proposed resort development. I believe one of the major concerns expressed by my constituents on the Island of Hawaii, especially from the community in South Kohala, has been the need for adequate water supply development to meet both current and future domestic and agricultural demands. I trust that your EIS will include an examination of this particular concern.

I look forward to reviewing your EIS when made available in January of next year. Once again, thank you for bringing the Ritz-Carlton Hotel Company's proposed development plans to my attention.

Aloha pumehana,

Daniel K. Akaka
Daniel K. Akaka
Member of Congress

March 6, 1987

The Honorable Daniel K. Akaka
U.S. House of Representatives
Prince Kuhio Federal Bldg., Room 5104
P.O. Box 50164
Honolulu, Hawaii 96850

Dear Congressman Akaka:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pauoa Bay, Maua Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 20, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project. Your West Hawaii constituents' concern about adequate water supply development will be addressed in the EIS. The draft EIS is expected to be available in April and a copy will be sent to you for review.

Sincerely,

Anne L. Mapes

ALakf

cc: Douglas McGarity, Ritz-Carlton Hotel Company
Roger Harris, Maua Lani Resort, Inc.
November 21, 1986

Mr. Anna L. Hayes
Bailey, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Hayes:

Thank you for the opportunity to provide input to the preparation of the Environmental Impact Statement (EIS) for the subject project.

The Hawaii Housing Authority is concerned with the impact of the proposed project on housing in West Hawaii. We therefore request that the EIS address the following areas:

1. The overall effect on housing demand in West Hawaii resulting from the operation of the proposed hotel and related services.
2. The proposed assisted housing plan, if any, including the number of units to be provided, dwelling type (for sale or rent), and targeted income group.

If you have any questions, please contact Colette Sakoda of my staff.

Sincerely,

Russell R. Fujimoto
Executive Director

cc: Mr. Albert Lono Lyman

March 9, 1987

Mr. Russell N. Fukumoto
Executive Director
Department of Social Services & Housing
Hawaii Housing Authority
State of Hawaii
P.O. Box 17937
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Puako Bay, Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 21, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

We note the Authority’s concern with the impact of the proposed project on housing in West Hawaii. A housing study is now being performed for the EIS and the results will be summarized in the report. Details for an assisted housing plan or employee housing are being discussed between Mauna Lani Resort and the appropriate governmental agencies.

Sincerely,

Anna L. Haynes

cc: Douglas McCurry, Fitch-Carlon Hotel Company
    Roger Harris, Mauna Lani Resort, Inc.
Mr. Glen T. Koyama  
December 2, 1986

Page 2

and/or coordinating with local Hawaiian community organizations who may be interested and committed, for maintaining the Hawaiian sites: conducting tours, picking up trash; preventing vandalism, and planting and caring for endemic Hawaiian plants. The funding for such a position/program should come from the Dept. of Land & Natural Resources, which is responsible for managing the state land on which the Puako petroglyph field is located, as well as being responsible for the preservation and management of archaeological sites.

At some time in the future, our Cultural Affairs Officer, Nicole Chan, would like to visit the petroglyph field to learn more about the proposed development of the petroglyphs for public use.

The socio-economic section of the preparation notice says that the project will create new jobs, increase the regional population, and foster new housing developments. It also says that public facilities such as schools, libraries, neighborhood parks, and community centers will not be significantly impacted. This sounds like a contradiction.

We hope these comments will be helpful in preparing the Environmental Impact Statement for the current Puuma Lani Resort project. If our office can be of any further assistance, please feel free to contact Nicole Chan at 588-3960.

Sincerely,

Kumukai A. Kamahameha III  
Administrator

cc: Hawaii County Planning Dept.
    Mr. Albert L. Lyon
    Mr. Kenneth Brown
    Mrs. Frances Duncan
    Ms. Annelle Neuzil
population at the resort. However, indirect effects will include increased regional population and the associated demand for housing, as well as increased demand for public facilities and services. It is expected that public revenues generated from the project will offset public costs necessary to provide the added services and facilities. 

Sincerely,
Anne L. Moore

Mr. Kamakri A. Kauhele III

March 6, 1987

Administrator
Office of Hawaiian Affairs
State of Hawaii
567 S. King Street, Suite 100
Honolulu, Hawaii 96813

Mr. Kamakri A. Kauhele III

March 6, 1987

Dear Mr. Kauhele:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Paoo Bay, Moomu Lani Resort, South Kula, Hawaii

Thank you for your letter of December 3, 1986 commenting on the Environmental Impact Statement Preparations Notice and Environmental Assessment for the above project.

As requested, we are sending you two copies each of the 1986 Welch report and the 1982 Science Management, Inc. Interpretive and Management plan. We do not have a copy of the 1982 Tamanori-Temperature report in our office, but will ask for a copy from Moomu Lani Resort. Two copies of this report will be sent to you later.

You also requested two copies of the 1985 Bishop Museum survey report mentioned in the EIS Preparation Notice. The report referred to is actually the May 1979 B.P. Bishop Museum publication, "Marine Exploration in Prehistoric Hawaii: Archaeological Investigations at Kiholo Bay on Hawaii Island." Pacific Anthropological Records No. 29. The date was inadvertently mistated in the EIS Preparation Notice. Your office must likely have a copy of the B.P. Bishop Museum bound report or you might obtain one from the museum. Please let us know if you are not able to obtain the report.

Please note that the EIS which we are now preparing addresses the development of one project site within Moomu Lani Resort. Potential impacts on archaeological sites within the entire resort have been addressed in the 1985 EIS for the Moomu Lani Resort.

We have sent a copy of your letter and suggestions to Moomu Lani Resort for their consideration.

The socio-economic impact section of the EIS will contain analysis of the project's effect on public facilities. The EIS Preparation Notice states: "Since guests of the hotel are transient, public facilities such as schools, libraries, neighborhood parks, and community centers would not be significantly impacted." We anticipate that these services would not be greatly affected directly as a result of increased de facto
Mr. Anne L. Mapes  
Beit, Collins & Associates  
606 Coral Street  
Honolulu, Hawaii 96813

Dear Ms. Mapes:

EIS Preparation Notice  
Proposed Maua Lani Resort  
South Kohala, Hawaii

The EIS should include a discussion on traffic generation and the potential impact that the subject proposal will have, in relation to other developments, on the Queen Kaahumanu Highway corridor.

Thank you for this opportunity to provide comments.

Very truly yours,

Edward Y. Hirota  
Director of Transportation

Mr. Edward Y. Hirota, Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Mr. Hirota:

Environmental Impact Statement (EIS)  
for the Proposed Resort Hotel at Puuna Bay,  
Maua Lani Resort, South Kohala, Hawaii

Thank you for your letter of December 17, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

A traffic study is being prepared for the EIS and the analysis will take into consideration other resort developments planned for the region.

Sincerely,

Anne L. Mapes

ALM-OL

c: Douglas McGregor, Ritz-Carlton Hotel Company  
Roger Havila, Maua Lani Resort, Inc.
Mr. Anne L. Hapes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Mr. Hapes:

SUBJECT: Environmental Impact Statement (EIS) Preparation Notice, Proposed Resort Hotel, Mawana Lani Resort, South Kohala, Hawaii

Thank you for the opportunity to comment on the subject EIS Preparation Notice. The proposed project will develop 33 acres for resort use including ultimately a 650-room hotel, associated improvements, and two man-made lagoons. Our review has resulted in the following:

Historic Sites Concerns

The Environmental Assessment states that a few historic features were present, but these are not listed by number or located on a map. Also, it is said none of these features was significant. Our records indicate that there are 2 sites in the immediate vicinity: E1-304, -305, -306, -307, and -312. We do not see which are in the project area. We believe that sites 304, 306, 307, and 312 are significant for their information content, while 305 has had its significant information recorded and is not longer significant.

Given this information, we believe that a mitigation plan should be agreed to which either preserves the 4 significant sites or which calls for archaeological data recovery of their sites or which calls for archaeological data recovery of their significant information. Archaeological data recovery would be small in scale. It should involve full descriptions and vector mapping of each site; a representative surface collection and/or excavation of deposits (artifacts, midden) at 304, 307 and 312; scale drawings of the petroglyphs at 306 and 312; scaled photographs and/or drawings of representative sherds manufacturing depressions at 306, 307, and 312; laboratory analyses of recovered sediment; new dating; and report write-up.

We recommend the following:

1. The applicant determine which of 5 known, nearby sites are in the project area, and
2. The applicant work with our office and the County Planning Department in preparing and executing a mitigation plan to handle the significant sites in the parcel.

The significant sites in the project area need to be identified in the EIS, and an acceptable mitigation plan needs to be presented.

Recreation Concerns

There are no known shoreline recreation resources of significant value at Wauna Bay. However, we would like to review and comment on any proposed public park development in the subject area. We note public shoreline access is being retained.

Aquatic Concerns

We suggest that the EIS thoroughly describe the activities planned, the aquatic resources of the project site and nearby areas which may be affected, existing levels of public use of these resources, and the anticipated effects of the proposed activities on these resources and uses. The means by which activities on these resources and uses are to be prevented, reduce or mitigate adverse effects should be addressed.

More specifically, the following resources should be considered: anchoring ponds, beachfront, coastal waters and bottom, and the aquatic resources inhabiting them. The following uses should also be examined: fishing, boating, gathering shellfish, swimming, scavenging, bushwhacking, and other water-oriented activities. We suggest that these be discussed in light of contamination, and the aquatic organisms inhabiting them. The following uses should also be examined: fishing, boating, and nutrient enrichment, and modification to existing and new custom usage of access to the shore. This information is necessary to evaluate the development impacts on aquatic resources.

Finally, we recommend an outlined plan for collecting and analyzing the two proposed impacts, and addressing specific mitigation measures on adverse impacts to aquatic communities and uses activities such as fishing, should be included in the draft EIS.
Water and Land Development Concerns

The draft EIS should clearly indicate potable and non-potable water sources for the project, anticipated demand and potential impacts to regional water sources.

Two saltwater lagoons will be developed, one of which will be connected to the ocean at two points by channels cut through the existing beach. Potential impacts to the shoreline and sandy beaches should be addressed and mitigation measures proposed.

We understand the applicant intends to drill a salt water well near the makai lagoon to supply water to the makai lagoon. Additional information on the location, depth and quantities of water to be pumped should be provided in the draft EIS. A well drilling permit will also be required from the Department of Land and Natural Resources under Title 13, Chapter 166.

We note that an anchialine pond is mentioned on page 5 of the Preparation Notice in describing the existing physical setting. The location of the pond should be identified on project plans and the applicant’s intentions on management of the pond discussed in the draft EIS.

We hope these comments will be of assistance in the preparation of the EIS.

Very truly yours,

WILLIAM W. PATY, Chairman
Board of Land and Natural Resources

cc: Mr. Albert L. Lyman, Planning Dept., County of Hawaii

March 31, 1997

BEIT COLLINS & ASSOCIATES
591 Canal Street, Honolulu, Hawaii 96813 • Phone 808/524-3444 • Fax 808/524-3447
Honolulu, Hawaii • Singapore • Australia • Colorado • Hong Kong • Japan

Mr. William W. Paty, Chairman
Board of Land and Natural Resources
State of Hawaii
P.O. Box 221
Honolulu, Hawaii 96809

Dear Mr. Paty:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Poa no Bay
Mount Loi Resort, South Kohala, Hawaii

Thank you for your letter of January 12, 1997 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project. Since the Preparation Notice appeared in the OESC Bulletin, the engineering evaluation of ocean and shoreline conditions at the Ritz-Carlton hotel site has been completed, and the proposed beach improvements have been modified based on the study. The engineering study’s recommendations include the construction of a swimming lagoon with one 150-foot wide opening in Poa no Bay rather than two connections to Poa no Bay of 30 feet and 50 feet, as described in the Preparation Notice. Also proposed is the expansion of the shoreline beach at the southern end of the bay to provide a safe, natural-looking swimming area. Further details can be found in the engineering study, which was part of two recent submissions for the Ritz-Carlton Maui Lani; a Conservation District Use permit application submitted to your department on February 19, 1997, and a U.S. Department of the Army permit application submitted to the U.S. Army Corps of Engineers on February 19, 1997.

Also, since the publication of the Preparation Notice, the makes and bounds description of the Ritz-Carlton Maui Lani hotel site has been prepared by R.M. Fawell, providing a more accurate depiction of the project site.

Historic Sites Concerns. Archaeological features at the project site and vicinity will be identified in the EIS and located on the site plan. Four archaeological sites identified in the 1973 Krich report seem to be within the 50-acre Ritz-Carlton site; Site E1-304, E1-305, EX-35, a shelter area, and Site EX-24, a shelter area. In the vicinity of the Ritz-Carlton site are four other archaeological sites; E1-31, a c-shaped structure on the edge of the lava flow northeast of the project site, and three sites near the southwestern part of the project site. These latter sites are a destroyed site E1-206 near the beach improvement area on Mauna Lani property; E1-307 which you mention in your letter, near the anchialine pond and E1-308, a shelter site complex which you also mention.
The location of each archaeological site will be verified before development occurs. An archaeologist will examine the sites and the applicant will work with your office and the County Planning Department in preparing and executing a mitigation plan to handle the significant sites in the parcel. The plan will also be coordinated with the Department of the Army, Honolulu Engineer District.

Recreation Concerns. No public park is planned for the project area. However, Moana Lani Resort proposes to develop a public shoreline park north of the Po'oua Bay hotel site, beyond a golf course site (see Moana Lani Resort's master plan), in State Conservation Land. Your department will undoubtedly have an opportunity to comment when the park plan is submitted to you for review.

Aquatic Concerns. The EIS will address the aquatic and shoreline resources that might be affected by the project. It will include analyses of potential impacts and mitigation measures as described in two studies prepared for permitting associated with the hotel projects: a baseline assessment of the marine environment of Po'oua Bay and the engineering evaluation previously mentioned. The EIS will contain an outline plan for constructing and maintaining the shoreline lagoon. The proposed lagoon is actually a conceptual landscape water feature.

Water and Land Development Concerns. The EIS will examine potable and non-potable water usage and potential impacts. A salt water well will not be necessary for the current shoreline lagoon plan. The location of the existing pond near the swimming lagoon will be identified and the management of the pond will be discussed.

Please let me know if you require further clarification on the above concerns or if you have additional comments. We are available to meet with you or your staff to discuss the project. You can reach me at 521-5361.

Sincerely,

Anne L. Mages

Al Mift

c/c Douglas McCurry, Ritz-Carlton Hotel Company
Roger Harris, Moana Lani Resort, Inc.
**Memorandum**

TO: Planning Department

FROM: Chief Engineer

SUBJECT: Ritz-Carlton Hotel - EIS Preparation Notice

Hana Lani Resort, South Kohala, Hawaii

DATE: January 15, 1987

The ocean frontage of this property is in the Coastal High Hazard Area. This means that it is subject to high velocity waves. The extent of the

The proposed shoreline buildings will be within the inundation area. The

The shoreline will be interrupted by the 30' and 50' wide connection for the

The bridge should be designed to withstand a tsunami.

cc: Belt Collins & Associates

---

March 31, 1987

Mr. Hugh Y. Ono, Chief Engineer
Department of Public Works
County of Hawaii
25 Apani Street
Hilo, Hawaii 96720

Dear Mr. Ono:

This is in response to your comments of January 15, 1987 to the Hawaii County Planning Department on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

The requirements of Chapter 27 Flood Control of the County Code will be

Since the Preparation Notice appeared in the OEDC Bulletin, the engineering evaluation of ocean and shoreline conditions at the Ritz-Carlton hotel site has been completed, and the proposed beach improvements have been modified based on the study. The shoreline logo now proposed will have one 110-foot wide opening to Puaa Bay. A bridge is no longer part of the design.

Sincerely,

Anne L. Marez

cc: Douglas McCarty, Ritz-Carlton Hotel Company
Roger Harris, Hana Lani Resorts, Inc.
The Honorable George R. Ariyoshi  
Office of the Governor  
State Capitol  
Honolulu, Hawaii  96813  

Dear Governor Ariyoshi:

Environmental Impact Statement Preparation Notice  
Proposed Resort Hotel  
Mauna Lani Resort, South Kohala, Hawaii

The Ritz Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawaii. The proposed site is situated at Puu Oo Bay, approximately 2,400 feet north of the existing Mauna Lani Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key K-8-22-6, parcels 7, 8, and 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lawn area, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date, as yet undetermined.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and sunbathing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISPAN) announcing the intention to prepare an EIS in accordance with Chapter 303, Hawaii Revised Statutes, was published in the October 8, 1996 issue of the Office of Environmental Quality Control Bulletins. Copies of the EISPAN and the Environmental Assessment (EA) on which it was based are attached to this letter for your information. Copies of the EISPAN and EA have also been sent to your department heads for their review and comment.

If all goes as planned, the EIS will be available in January 1997, at which time the document will be circulated for public review and comment.

Should you or your staff have any questions regarding the Ritz-Carlton Mauna Lani project, please do not hesitate to contact us.

Sincerely,

[Signature]

John L. Maple

Attachment
October 29, 1986
86-1999

Mr. Ernest Kosaka, Project Leader
Office of Environmental Services
Fish and Wildlife Service
U.S. Department of the Interior
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Environmental Impact Statement Preparation Notice

Proposed Resort Hotel
Mooma Lani Resort, South Kohala, Hawaii

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mooma Lani Resort in South Kohala, Hawaii. The proposed site is situated at Waunak Bay, approximately 2,400 feet north of the existing Mooma Lani Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-B-298-4, parcels 7, 9, and 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lagoon area, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date, as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and snorkeling activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 343, Hawaii Revised Statutes, was published in the October 8, 1986 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) on which it was based are attached to this letter for your use. The EIA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commission Permit to allow the expansion of the Mooma Lani Resort. The EIS was accepted by the Land Use Commission in August 1985. Because there is substantial material in the EIS that pertains to the project site, we intend to rely, to a large extent, on information already provided in the earlier EIS to prepare the present EIS.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analyses are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Do you anticipate negative impact to coastal water quality as a result of the project, as described?

2. Based on your experience, is there likely to be an impact on nearshore resources, given the proposed project with lagoon?

As you may already know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1987. At that time the document will be circulated for public review and comments.

If you have any questions regarding the project or the kinds of impact which would be most useful to us in preparing the EIS, please call me or Glenn Koyama at S2-1-5361. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Mapes

ALMerr

Attachment
Ms. Anne L. Napea
Belt, Collins, and Associates
200 Coral Street
Honolulu, HI 96813

Re: Environmental Impact Statement (EIS) Preparation Notice,
Proposed Resort Hotel at Paapea Bay, South Kauai, Hawaii

Dear Ms. Napea:

We have reviewed the referenced document and offer the following

General Comments

Our primary concern with the proposed project is the potential
for adverse impacts to anchialine ponds, water quality, and reef
fisheries resources from construction of the swimming lagoon and
resort.

Specific Comments

The proposed resort includes the construction of a 1.3-acre
swimming lagoon that opens into Paapea Bay at two points. These
connections would be approximately 35-50 feet wide and provide
for circulation and flushing of the lagoon. The lagoon would
consist of a sand bottom with a subsurface choker layer of gravel
and a sand beach inside the lagoon. A pump would be installed to
increase flushing rates within the lagoon.

To date there is little information on the direct and indirect
impacts of constructing a swimming lagoon on nearshore coastal
water quality and fisheries resources. The proposed resorts at
Paapea Bay, Kauai and Molokai, Hawaii include lagoons in their
designs, however, these lagoons have not yet been constructed.
Regarding lagoon construction, we recommend the following topics
be discussed in the Draft EIS:

a. The results of the report, A Decade of Ecological
Studies Following Construction of Keawaula Small Boat Harbor,
[Redacted] (U.S. Army Engineer District, Pier Shafter, Hawaii,
September 1983) may provide information on potential impacts of
lagoon construction on water quality and fisheries resources in

Paapea Bay. In addition, we recommend that the results of the
lagoon construction monitoring program at West Beach, Oahu be
used to identify potential impacts to nearshore water quality and
fisheries resources and to refine mitigation measures during lagoon
construction. The monitoring program for West Beach is described
in the Department of Army permit #1300-0 1012-52. We also
recommend that you discuss the monitoring program with the U.S.
Army Corps of Engineers.

b. The potential for sand movement out of the lagoon into
adjoining waters should be determined. We are concerned that
continuous long-term loss of sand and gravel from the lagoon may
affect or occur adjacent coral reef habitats.

c. The effects of lagoon construction and ground water
movement and seawater blocks in the affected area should be
discussed. The lagoon may concentrate ground water discharge and
alter the salinity and nutrient conditions in the nearshore areas
fronting the lagoon. Changes in water quality may affect existing
inshore marine resources, particularly algae resources.

d. The effect of resort and lagoon construction and
operations on the endangered humpback whale (Megaptera
novaeangliae) and the threatened green sea turtle (Chelonia
mydas) should be discussed. We recommend that lagoon
construction and mitigation measures be coordinated with the
National Marine Fisheries Service and the State Division of
Aquatic Resources.

There is conflicting information on the distribution of
anchialine ponds in the project site. The Draft EIS for the
North Shore Hotel for Paapea Bay (May 1986) indicates a
single anchialine pond in the southwest corner of the proposed
hotel site. The Anchialine Pond Survey of the Northeast Coast
of Hawaii Island (Kilgore & Associates, Inc. 1978) indicates no
ponds occur in the proposed hotel site. The
Abuat Survey of the Kona Coast Ponds, Hawaii Island (J.A.
Napolea and R. E. Risch, April 1984) indicates a small cluster of
anchialine ponds in the southwestern end of the project site. We
suggest that the Draft EIS discuss the following topics regarding
anchialine ponds:

a. Determine conclusively whether anchialine ponds exist on
the site.

b. Direct and indirect impacts to anchialine ponds from
construction and operation of the lagoon, resort, and sewage
treatment plant, and potential for introduction of alien fish into
the ponds should be discussed.

Save Forest and You Save America!
c. The location of the pump for the lagoon should be identified, and its potential effect on groundwater movement affecting anehaline ponds should be discussed.

A site drainage plan that prevents direct discharge of surface stormwater runoff from the development directly into coastal waters and anehaline ponds should be included in the Draft EIS. We recommend that green areas, dry wells, and sediment ponds be used to collect stormwater runoff.

In addition to the baseline assessment of marine resources conducted for the Revised Master Plan for Mauna Lani Resort, we suggest that information from the paper, "The Coastal Resources, Fisheries, and Fishery Ecology of Puako, West Hawai'i (Hawai'i Cooperative Fishery Research Unit Technical Report 82-1 March 1982)" be included in the Draft EIS.

We appreciate the opportunity to comment.

Sincerely yours,

[Signature]

Ernest Koakoa
Project Leader
Office of Environmental Services

cc: NMFS - WPO
DEQD, Planning Office
DAD
BPBD, OPM Program
CR, Operations Branch

BELL COLLINS
& ASSOCIATES
5th Cour Street, Honolulu, Hawai'i 96813, Phone 847-4704, Fax 847-4747

March 9, 1987

Mr. Ernest Koakoa, Project Leader
Office of Environmental Services
Fish and Wildlife Service
U.S. Department of the Interior
300 Ala Moana Boulevard
P.O. Box 50142
Honolulu, Hawai'i 96850

Dear Mr. Koakoa:

Environmental Impact Statement (EIS)
for the Proposed Resort Hotel at Puako Bay,
Mauna Lani Resort, South Kohala, Hawai'i

Thank you for your letter of November 26, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

Your concerns on the potential adverse impacts to shoreline and marine resources will be addressed in the EIS. Dr. Steven Dula has prepared a baseline assessment of the marine environment at Puako Bay, which addresses potential impacts due to shoreline modification and project construction and operation. Also, Bell Collins & Associates has prepared an engineering evaluation of ocean and shoreline conditions at the proposed hotel site. The results of both studies will be included in the EIS.

Thank you for bringing to our attention the U.S. Army report on the Hohokam Small Boat Harbor and the lagoon construction monitoring program at West Beach. For your information, on February 19, 1982, we submitted an application for a Corps of Engineers permit to construct shoreline improvements associated with the construction of the proposed hotel. We expect to address Corps of Engineers concerns during permit processing.

We have identified an anehaline pond at the project site adjacent to the proposed shoreline lagoon. Potential impacts on this pond will be addressed in the EIS.

Stormwater runoff and drainage will be addressed in the EIS.

Sincerely,

[Signature]

Anne L. Hapes

cc: Douglas McGarrity, Flitz-Carlin Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
Mr. Anne L. Mapes
Belts, Collins & Associates
601 Coral Street
Honolulu, Hawaii 96813

Re: Environmental Impact Statement (EIS) Preparation Notice
Proposed Resort Hotel, Mauna Lani Resort, South Kohala, Hawaii

13 JAN 1987

Mr. Mapes:

Thank you for forwarding a copy of the EIS Preparation Notice to us for our review. We offer the following comments to assist you with preparation of the Draft EIS.

We recommend that the Draft EIS include a full discussion of the fish and wildlife which inhabit terrestrial, intertidal and marine areas within the project area. Specifically, this discussion should address use of the area by the endangered humpback whale (Megaptera novaeangliae) and hawksbill sea turtle (Eretmochelys imbricata), and the threatened green sea turtle (Chelonia mydas). It is advisable to address the direct, secondary and cumulative impacts of all facets of resort construction and operation upon these species and their habitats. A discussion of proposed mitigation measures and site resource management plans would greatly enhance the Draft EIS.

We appreciate this opportunity to comment, and look forward to receiving a copy of the Draft EIS.

Sincerely,

[Signature]

Ernest Kauka
Project Leader
Environmental Services

cc: Albert A. Lymann, Hawaii County Planning Department

[Signature]

Anne L. Mapes

Mr. Ernest Kauka, Project Leader
Environmental Services
U.S. Department of the Interior
Fish and Wildlife Service
300 Ala Moana Boulevard
P.O. Box 50147
Honolulu, Hawaii 96850

March 31, 1987

Dear Mr. Kauka:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pa'auilo Bay, Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of January 13, 1987 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

The EIS will include a discussion of the fish and wildlife which inhabit the marine and land areas of the project sites.

Sincerely,

[Signature]

Anne L. Mapes

AL Moli

cc: Douglas McCarron, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.
Mr. Klauck Cheung, Chief  
Environmental Division  
Department of the Army  
U.S. Army Engineer District, Honolulu  
Fort Shafter, Hawaii  96858

Oct 29, 1986  
E-1979

Dear Mr. Cheung:

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Maua Lani Resort in South Kohala, Hawaii. The proposed site is situated at Puako Bay, approximately 2,000 feet north of the existing Maua Lani Bay Hotel, in the area of 32 acres and is identified by Tax Map Key 6-3-271b, parts 7, 9 & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, ballroom and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and bathing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 363, Hawaii Revised Statutes, was published in the October 8, 1986 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) on which it was based are attached to this letter for your use. The EA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commission Petition to allow the expansion of the Maua Lani Resort. The EIS was accepted by the Land Use Commission. In August 1985, because there is substantial material in the EIS that pertains to the project site, we joined to rely, in a large extent, on information provided in the earlier EIS to prepare the present EIS.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction, responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analyses are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Do you anticipate negative impact to coastal water quality as a result of the project, as described?

2. Based on your experience, is there likely to be an impact on nearshore resources, given the proposed project with lagoon?

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1987.

If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me or Gail Kayama at 311-3361. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Mapes

ALMII  
Attachment
November 10, 1986

Mr. Anne L. Mapes
Belt, Collins and Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Mr. Mapes:

Thank you for the opportunity to review and comment on the EIS Preparation Notice for the Resort Hotel, Mauna Lani Resort, South Kohala, Hawaii. The following comments are offered:

1. A Department of the Army permit will be required to construct the lagoon if the lagoon is connected to the ocean as proposed. Belt, Collins and Associates and Mauna Lani Resort representatives have been meeting with Operations Branch concerning the scope of the project with the Corps regulatory authority. No anaehilane ponds will be filled or other work assumed of the existing mean high water mark is currently proposed. Please contact the Operations Branch at 430-9250 for future Corps coordination on this project.

2. According to the National Flood Insurance Study for Hawaii County by the Federal Emergency Management Agency dated May 3, 1982, a portion of the property is situated in the coastal flood plain and is subject to 100-year tsunami inundation (enclosure 1). The 100-year event has a one percent chance of being equalled or exceeded in any given year. Portions of the property are in Zone V1 and Zone A4 (zone designations are explained in enclosure 2). The base flood tsunami elevation is 8 feet above mean sea level in the coastal flood plain.

Sincerely,

[Signature]

Environs

March 4, 1987

Mr. Klark Cheung
Chief, Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 250
Ft. DeRussy, Honolulu 96810-5940

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Puakea Bay,
Mauna Lani Resort, South Kohala, Hawaii

Thank you for your letter of November 10, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

As suggested, we will contact the Operations Branch for future Corps coordination on the proposed hotel project. The project as it relates to the coastal flood plain will be addressed in the EIS.

Sincerely,

[Signature]

Anne L. Mapes

cc: Douglas McGarrity, Elite- Carlton Hotel Company
    Roger Harris, Mauna Lani Resort, Inc.
Mr. Shoji Sowada, Chief  
Environmental Protection & Health Services Division  
Department of Health  
State of Hawaii  
P.O. Box 3278  
Honolulu, Hawaii 96801

Dear Mr. Sowada,

Environmental Impact Statement Preparation Notice
Proposed Resort Hotel
Munna Lani Resort, South Kohala, Hawaii

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at M ofu Lani Resort in South Kohala, Hawaii. The proposed site is situated at Pauoa Bay, approximately 7,200 feet north of the existing M ofu Lani Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-8-271-A, parts 7, 9 & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lagoon area, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for free activities such as swimming and sailing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 343, Hawaii Revised Statutes, was published in the October 1, 1984 issue of the Office of Environmental Quality Control bulletin. Copies of the EISP and the Environmental Assessment (EA) on which it was based are attached to this letter for your use. The EA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. The EA also summarizes the kinds of impacts that may result and indicates the kind of additional analysis that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commission decision to allow the expansion of the M ofu Lani Resort. The EIS was accepted by the Land Use Commission in August 1985. Because there is substantial material in the EIS that pertains to the project site, we refer to it as a reference point.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analyses are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Do you anticipate negative impact to coastal water quality as a result of the project, as described?
2. Based on your experience, is there likely to be an impact on nearshore resources, given the proposed project with lagoons?

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1987. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the basis of input which would be most helpful to us in preparing the EIS, please call me or Glenn Koyano at 521-5561. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Migel

Attachment
November 24, 1986

Ms. Anne L. Mapas
Bally, Collins & Associates
666 Coastal Dr.
Honolulu, Hawaii 96813

Dear Ms. Mapas:

Subject: Environmental Impact Statement Preparation Notice for Proposed Resort
Hotel, Mauna Lani Resort, South Kohala, Hawaii

Thank you for allowing us to review and comment on the subject environmental impact statement preparation notice. We provide the following comments for your consideration:

Air Pollution

The EIS should include the potential impact on the ambient air quality as a result of increased vehicular activity from the proposed project and all other projects which were previously approved but have not started construction. Projections on the increased traffic volume and the impact on the ambient air quality should be for the associated corridors, roadways, and highways. The results should be compared to the State and Federal ambient air quality standards. Should a potential violation be determinable, the EIS should address the mitigating actions which shall be implemented.

Water Quality

Any discharges from the lagoon (not directly connected to the ocean) located north of the proposed hotel guest rooms should be addressed.

For the lagoon located near the shoreline with two connections to the ocean, the two connections should be carefully selected to minimize additional groundwater discharge to the ocean that may affect the boathouse community. Monitoring of the water columns should be required before, during, and after construction to assess the short-term environmental impact of the construction. The present groundwater discharge and groundwater discharge due to construction should be determined and feasible methods to control any discharged should be addressed.

The impact on the coastal water quality will depend on the additional amount of groundwater discharge caused by the construction, estuarine capacity in Pauma Bay, and the water circulation in the proposed connected lagoon and Pauma Bay. Reports on the marine resources should not be a problem, except for areas of poor estuarine capacity and additional increases in groundwater discharge.

Wastewater

The treatment and disposal of wastewaters should be addressed.

Drinking Water

The EIS should fully discuss and describe the potable water system for the hotel. This discussion should include:

a. the general location of the proposed new wells and
b. who will be responsible for the proposed well construction and operation.

The above information will be useful to assess any possible groundwater contamination cases, as well as assess operational cost to the government sector should the water system be operated by the county government.

Agency approvals should include our requirements for reviewing new drinking water system improvements.

The Department of Health is vested with the responsibility to assure that public water systems in the State are providing water which is in compliance with the State's drinking water regulations known as Chapter 29, Title 11, Administrative Rules, and in compliance with all other applicable terms and conditions of Chapter 29. A public water system is defined as a system serving 25 or more individuals at least 60 days per year or having a minimum of 15 service connections. To the extent that the new well is intended to serve these minimum numbers of persons or service connections, please be advised that the well and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively.

Specifically, Section 11-20-29 of Chapter 20 requires all new sources of potable water serving public water systems to be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the satisfactory submission of an engineering report which adequately addresses all concerns as set down in Section 11-20-29. The engineering report must be prepared by a registered professional engineer and be filed or for and upon application.

Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director of Health. Such approval depends upon the submission of plans and specifications for the project prior to construction and the demonstration that the new or modified portion of the system is capable of delivering potable water in compliance to all minimum contaminant levels as set down in Chapter 20 upon the distribution system or modification is completed.

Should you have any questions regarding Chapter 29, Title 11, Administrative Rules, please contact the Drinking Water Program at 948-7215.
We realize that our comments are general in nature due to preliminary plans being the sole source of discussion. We reserve the right to impose future environmental restrictions on the project when final plans are submitted to this office for review.

Sincerely yours,

SHIGI SONOKI, Chief Environmental Protection & Health Services Division

X-49

cc Mr. Albert L. Lyman,
Hawaii County Planning Department

BELT COLLINS & ASSOCIATES
501 Cool Street, Honolulu, Hawaii 96813 • Phone (808) 522-1591 • Fax (808) 522-1602

Ma, April L. Mapes
November 24, 1986
Page 3

Mr. Shigji Sonoda, Chief Environmental Protection and Health Services Division
Department of Health
State of Hawaii
P.O. Box 5388
Honolulu, Hawaii 96801

Dear Mr. Sonoda,

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Pa'au Bay, Mauna Lani Resort, Kohala, Hawaii

Thank you for your letter of November 29, 1986 commenting on the Environmental Impact Statement Preparation Notice and Environmental Assessment for the above project.

The potential impact on ambient air quality will be assessed based on findings of a traffic study which is currently being conducted for the EIS.

A baseline assessment of the marine environment at Pa'au Bay has been performed by Dr. Steven Delius. The study will serve as the basis for future analysis of impacts due to biotic modifications.

The treatment and disposal of wastewater will be addressed in the EIS.

Potable water for the proposed hotel at Pa'au Bay will be obtained from Mauna Lani. Mauna Lani's allocation from the Laminolohi wells is sufficient to supply the hotel.

Sincerely,

Anne L. Mapes

cc Mr. Albert L. Lyman,
Hawaii County Planning Department

ALAN II

ccs Douglas McGrath, Ritz-Carlton Hotel Company
Roger Harris, Mauna Lani Resort, Inc.

March 9, 1987
87-472
U.S. Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, California 94105

October 28, 1986

Dear Sirs:

Environmental Impact Statement Preparation Notice

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawaii. The proposed site is situated at Pauna Bay, approximately 2400 feet north of the existing Mauna Lani Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-8-220-2, parts 5, 7, 9 & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, luau area, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date as yet undetermined.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and sunbathing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISPIN) announcing the intention to prepare an EIS in accordance with Chapter 343, Hawaii Revised Statutes, was published in the October 8, 1986 issue of the Office of Environmental Quality Control Bulletins. Copies of the EISPIN and the Environmental Assessment (EA) on which it was based are attached to this letter for your use. The EA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commission Petition to allow the expansion of the Mauna Lani Resorts. The EIS was accepted by the Land Use Commission in August 1985. Because there is substantial material in the EIS that pertains to the project site, we intend to rely, to a large extent, on information already provided in the earlier EIS to prepare the present EIS.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analyses are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Do you anticipate negative impact to coastal water quality as a result of the project, as described?
2. Based on your experience, is there likely to be an impact on nearshore resources, given the proposed project with lagoon?

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1987. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kinds of impact which would be most helpful to us in preparing the EIS, please call me or Glenn Kawai at 521-5361. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Maple
AL Maple
Attachment

U.S. Environmental Protection Agency
Page two
October 28, 1986

88-1999
Mr. Doyle E. Gates, Administrator
U.S. Department of Commerce
National Marine Fisheries Service
Southwest Region
Western Pacific Program Office
P.O. Box 3019
Honolulu, Hawaii 96812

Dear Mr. Gates:

Environmental Impact Statement Preparation Notice
Proposed Resort Hotel
Mauna Loa Resort, South Kohala, Hawaii

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mauna Loa Resort in South Kohala, Hawaii. The proposed site is situated at Paniau Bay, approximately 2,600 feet north of the existing Mauna Loa Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-8-32b 8, parcels 7, 9 & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, spa area, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and snorkeling activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparation Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 343, Hawaii Revised Statutes, was published on the October 8, 1986 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) on which it was based are attached to this letter for your use. The EA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commissions

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analysis are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Do you anticipate negative impact to coastal water quality as a result of the project, as described?
2. Based on your experience, is there likely to be an impact on nearshore resources, given the proposed project with lagoons?

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1987. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me or Gian Karyna at 521-1361. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Mapes

ALMF
Attachment

Mr. Doyle E. Gates, Administrator
Page Two
October 29, 1986
BE-1999
December 24, 1986

Belt, Collins and Associates
606 Coral Street
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement (EIS) Preparation Notice, Proposed Resort Hotel, Mauna Lani Resort, South Kohala, Hawaii

The National Marine Fisheries Service (NMFS) has reviewed the subject EIS Preparation Notice for the luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawaii. The proposed 12-acre development site is located at Pa'aua Bay, approximately 2,400 feet north of the existing Mauna Lani Bay Hotel. We offer the following comments for your use in preparing the Draft EIS.

Our major concern with the proposed new resort hotel complex is the planned construction of two lagoons at the site. In particular, we are concerned with the proposed swimming lagoon in the southern portion of the development which will connect to the ocean at two points within Pa'aua Bay. A well would be installed near the lagoon to pump salt water into the inland portion of the lagoon to aid in natural tidal exchange between the lagoon and ocean.

The EIS should address the dredging, blasting and other construction activities in Pa'aua Bay and their potential impacts on marine resources and habitat within the bay. On December 3, 1986 an underwater site inspection of Pa'aua Bay was conducted by a biologist on my staff. The nearshore area was comprised of a secured limestone platform with few live coral colonies. However, large numbers of juvenile reef fish, particularly Scaridae (parrot fish) and Acanthuridae (coral fish), were observed in schools foraging on algae in this nearshore zone. Pa'aua Bay, like many of the small protected bays along the Kona Coast of Hawaii, apparently contains important juvenile reef fish habitat. Impacts to this habitat from construction and "operation" of the lagoon should be addressed in the EIS.

Potential impacts from construction of the swimming lagoon on threatened and endangered species should be discussed in the EIS. The endangered humpback whale (Megaptera novaeangliae) occurs seasonally off this coastline, and the endangered hawksbill turtle (Eretmochelys imbricata) and threatened green

turtle (Chelonia mydas) can be found year-round in or near Pa'aua Bay.

Several man-made lagoons associated with resort development in Hawaii are either under construction (Waikoloa, Hawaii) or will be shortly (West Beach, Oahu). NMFS recommends these projects be discussed with the U.S. Army Corps of Engineers and the respective developers to determine potential impacts, planned mitigation, and monitoring programs established to aid in determining and minimizing impacts on the marine environment from lagoon construction and operation.

Thank you for the opportunity to review the proposed project at this early, pre-EIS stage. Should you require additional information, please contact Mr. John Haughton of my staff. We look forward to receiving a copy of the Draft EIS as soon as it becomes available.

Sincerely yours,

Douglas L. Holton
Administrator

CC: F/DNR, Terminal Is., CA
F/M4, Washington, D.C.
 Corps of Engineers, Honolulu
FWS, Honolulu
EPA, Region 9
Hawaii State Div. of Aquatic Resources
County of Hawaii (Mr. Albert Lyman)
Mr. Doyle E. Gates, Administrator
National Marine Fisheries Service
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
250 Delaware Street
Halalima, Hawaii 96822-2396

Dear Mr. Gates:

Environmental Impact Statement (EIS)
for the Proposed Resort Hotel at Ponoa Bay,
Kona District, Hawaii

Thank you for your letter of December 24, 1986 commenting on the Environmental Impact Statement Notice and Environmental Assessment for the above project.

We note your particular concern about the proposed shoreline lagoon and the offshore marine environment. Dr. Steven Dall has prepared a baseline assessment of the marine environment at Ponoa Bay, which addresses potential impacts due to shoreline modification and project construction and operation. Also, Bilt Collins & Associates has prepared an engineering evaluation of ocean and shoreline conditions at the proposed hotel site. The results of both studies will be included in the EIS.

For your information, on February 19, 1987, we submitted an application to the U.S. Army Corps of Engineers to construct shoreline improvements associated with the construction of the proposed hotel. We expect to address Corps of Engineers concerns during permit processing.

Sincerely,

Anne L. Hoopes

cc: Douglas McCarroll, Ritz-Carlton Hotel Company
Roger Harris, Manele Land Resort, Inc.
Mr. Robert C. Gilkey, Director

Environmental Impact Statement Preparatory Notice
Proposed Resort Hotel
Mauna Lani Resort, South Kohala, Hawaii

The Wailea Marriott Hotel Company proposes to develop a luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawaii. The proposed site is situated at Pa'aua Bay, approximately 2,400 feet north of the existing Mauna Lani Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-8-708, parcel 7, 9 & 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lawn area, banquets, and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date or as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and sailing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparatory Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 383, Hawaii Revised Statutes, was published in the October 8, 1985 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) on the hotel property are available for public review at the hotel offices.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and providing information on the proposed project as it relates to the EIS. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You can help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analysis are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate receiving your department's labor market analysis of the Kohala and Kona areas as well as your projections of labor availability.

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1986. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me or Glen Kiyama at 521-5341. We will be happy to provide you with any additional information or guidance.

Sincerely,

Anne L. Motes

ALMII
Attachment

October 28, 1986
86-2000
November 12, 1986

Mr. Anne L. Hapes
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Mr. Hapes:

This is in response to your letter of October 28, 1986, regarding the environmental impact statement preparation notice for a proposed resort hotel at Manoa Land Resort.

A project as large as this will require a substantial number of workers during the construction period as well as the operational period. Although Hawaii County has had the highest unemployment rate in the state for the past 22 years, unemployment in West Hawaii (census tracts 213-215) has been about 2.0 percentage points lower than in East Hawaii.

This department does not have any projections of labor availability; however, currently there is an abundance of available applicants registered with the Kona Employment Service local office. In the past, finding workers to fill job vacancies has not been a problem, but with the growing importance of the resort industry in West Hawaii, several major development projects are being proposed or are under way in this area. This could result in a shortage of workers in certain occupational areas.

This department's Research and Statistics Office staff prepared a labor market analysis of the Kona-Kohala area in January 1981. Since then, the report has not been updated. While the most current data will reflect different figures, the trends are expected to remain about the same. A copy of the 1981 report is enclosed for your use.

Thank you for providing us with the opportunity to review the environmental impact statement preparation notice. If you need more information or have any questions, please call me at 348-3150 or Frederick Piek, Chief, Research and Statistics Office at 348-7957.

Sincerely,

Robert C. Gilley
Director

Enclosure
Mr. A. Scott Leithead
Housing Administrator
Office of Housing and Community Development
County of Hawai'i
2001 S. King Street
Honolulu, Hawai'i 96814

Dear Mr. Leithead:

Environmental Impact Statement Preparatory Notice
Proposed Resort Hotel
Mauna Lani Resort, South Kohala, Hawai'i

The Ritz-Carlton Hotel Company proposes to develop a luxury-class resort hotel at Mauna Lani Resort in South Kohala, Hawai'i. The proposed site is situated at Puako Bay, approximately 200 feet north of the existing Mauna Lani Bay Hotel. It contains an area of 32 acres and is identified by Tax Map Key 6-8-329-6, parcel 7, 9, 9A, 10.

The new hotel will have up to 450 rooms and include such amenities as shops, tennis courts, health club, lounge areas, banquet and meeting rooms, swimming pool, and two lagoons. Up to 200 additional rooms may be developed at a later date as yet undetermined date.

One lagoon will be located in a landscaped setting on the north side of the new hotel structure. The other lagoon will be located near the shoreline and will be designed for recreational use involving swimming and sunbathing activities. Two openings are planned to connect this second lagoon to the ocean to allow improved water circulation and clarity.

An Environmental Impact Statement Preparatory Notice (EISP) announcing the intention to prepare an EIS in accordance with Chapter 345, Hawaii Revised Statutes, was published in the October 8, 1986 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISP and the Environmental Assessment (EA) on which it was based are available to this letter for your use. The EA provides a description of the proposed development, the governmental permits that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

Last year, an EIS was prepared in conjunction with a State Land Use Commission Petition to allow the expansion of the Mauna Lani Resort. The EIS was accepted by the Land Use Commission in August 1985. Because there is substantial material in the EIS that pertains to the project site, we intend to rely, to a large extent, on information already provided in the earlier EIS to prepare the present EIS.

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and/or analysis are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate receiving your department's housing market analysis of the Kohala and Kona areas as well as your projections of housing availability.

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of receipt. If all goes as planned, it is expected that the EIS will be available in January 1991. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me or Anne Mapes at 321-5381. We will be happy to provide any additional information or guidance.

Sincerely,

Anne L. Mapes

ALMap

Attachment

October 28, 1986
Page two
Hawaii Electric Light Company, Inc.

Page 2

We request that you or your organization assist us in preparing the current EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed and the reasons why you believe the requested data and analyses are important. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

In addition to identifying any particular concerns you may have regarding the proposed project, we would appreciate answers to the following questions:

1. Please briefly describe the existing electrical generation and transmission system serving Mounu La'i Resort. Are there plans to expand the system?

2. Please indicate your projections of the percentage of power generated by non-renewable resources: fossil, fuels, biomass, etc.

3. What energy conservation features might be suitable to lower energy consumption at the hotel?

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. If all goes as planned, it is expected that the EIS will be available in January 1997. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kind of input which would be most helpful to us in preparing the EIS, please contact John Kingman at 521-3641. We will be happy to provide you with any additional information or guidance.

Sincerely,

Ann L. Hayes

Attachment
Belt Collins & Associates
December 24, 1986

Subject: Environmental Statement Preparation Notice

Proposed Resort Hotel
Mauna Lani Resort, South Kohala, Hawaii
Tax Map Key 6-B-22B, pors. 7, 9 & 10, 0.04 Acres

This is in reply to your letter of October 28, 1986. In that letter you
asked our organization to assist you in the preparation of an EIS relating to the proposed development of a 450 room luxury-class resort hotel at the
Mauna Lani Resort in South Kohala, Hawaii.

You specifically asked that our reply identify any particular concerns that we might have and also include answers for the three questions listed below.

We have no particular concern regarding this project other than to recommend that this new hotel take full advantage of waste heat recovery equipment to
cycle and reheat the waste heat rejected by the hotel's air conditioning and refrigeration equipment. If this equipment is incorporated in the hotel's original design, the amount of energy and resulting costs to operate the hotel will be substantially reduced and the need to burn imported petroleum-based fuel (such as propane or diesel oil) at the site will be substantially reduced or possibly eliminated.

The existing Mauna Lani Hotel, Sheraton Royal Kona and the Mauna Kea Beach Hotel all have installed waste heat recovery, heat exchangers and/or
heat pump water heaters to reduce their cost of operation and to reduce the amount of propane or oil that they must burn on-site to support their
operation.

The following is our response to the three questions listed below:

1. Please briefly describe the existing electrical generation and transmission system serving Mauna Lani Resort. Are there plans to
   expand the system?

2. Please indicate your projections of the percentage of power generated by non-renewable resources: fossil, nuclear, hydro, etc.

3. Existing System

   HELCO's power generation system presently has a total firm capacity of
   1,527 megawatts. HELCO purchases a total of 26 megawatts of firm
   power from two privately-owned biomass generators, Puna Biomass and Hilo
   Coast Processing Company, and from one geothermal generator owned by Research
   Corporation of the University of Hawaii. The balance of 1,501 megawatts is
   produced by steam units, diesel units, a gas turbine and
   hydraulic units at six power plants owned by HELCO. These power
   plants are located at Kohala, North Kona, Waimea, South Kohala, and
   Waimea, Hilo, Puna, and Hilo, Puna Peninsula and Kamehameha, South Hilo.

   HELCO has three levels of transmission voltages to deliver energy to the
   Big Island. First, there are three 69KV cross-island transmission
   lines. The northern line connects Pahoa to Waimea on the highway
   along the Hamakua Coastline. A middle line connects Kamuela to Kamuela
   along the Saddle Road. On the southern side, several lines connect
   Kamehameha to Keaau along the highways through the Puna and Kau Districts. Next, there are five 34.5KV transmission lines that serve
   smaller communities located some distance from the route of the 69KV
   lines. Finally, there are three 12KV transmission lines that connect the
   shipyard and Kamehameha Plants.

   Future Plans

   HELCO will continue to support the development of alternate energy
to decrease dependence on imported oil. In 1982, additional biomass
generation is anticipated with Hamakua Sugar providing 19 megawatts of
firm power. A private enterprise is committed to the development of an
additional geothermal power plant by 1989. Any private companies are
also studying the feasibility of developing hydroelectric power at various
sites along the Hamakua coast.

In the fall of 1984, HELCO will begin construction of its first 138KV
transmission line paralleling the existing 69KV line along the Saddle
Road. This line is required to maintain an acceptable voltage level in the
West Hawaii area and to improve system reliability. Preliminary
planning has also begun to add additional cross-island transmission
lines within the next 5-10 years based on projected load growth in the
West Hawaii area. A dependable cross-island transmission system is a
necessity because while new developments are expected to increase
dramatically in West Hawaii, and therefore the demand for electricity,
most of the generating sources are in East Hawaii.

All Hawaii Electric Light Company

December 24, 1986

Page 2
3. What energy features might be suitable to lower energy consumption at the hotel?

As indicated earlier, this new 450 room hotel should make maximum use of waste heat recovery, heat exchangers and/or heat pump water heaters.

Ideally, the hotel should specify waste heat, recovery heat exchangers (or two bundle condensors) on its main air conditioning chillers, refter boxes and freezer and also on its ice makers.

The waste heat from these refrigeration devices should be used to preheat this hotel's potable hot water supply to 90 - 110°F. This preheated water should be stored in a "tempered water tank."

The hotel also should be equipped with a "high lift lead chiller heat pump" that will extract waste heat from the chilled water system return line and use this energy to raise the temperature of the water drawn from the tempered water tank to 125°F for use by the hotel kitchen and by its guests. If higher temperature water is needed for dishwashing purposes, a small conventional electric water heater should be located in the immediate vicinity of the dishwash to boost the 125°F hot water to the required dishwashing temperature.

If these suggestions are followed, the following benefits will be realized:

a. The new 450-room hotel will be competitive with the other hotels in the South Kohala area because these existing hotels are now taking advantage of the waste heat recovery technologies described above.

b. The new hotel will be able to totally eliminate the consumption of imported propane or diesel oil for water heating purposes and will be taking full advantage of recyclable waste heat energy available at the site as well as energy from geothermal, geothermal snow, hydro and wind that will be available through the Hawaii Electric Light Company System.

c. If the waste heat from the refter boxes, food freezers and ice machines are recycled and used for water heating purposes, this will reduce the air conditioning load in the kitchen and improve employee comfort in these work areas. If electric heating equipment is specified, this will further reduce the air conditioning load in the kitchen, because the hot products of combustion from gas or all electric cooking equipment, will not have to be removed by the air conditioning system.

d. If properly sized, the "high lift lead chiller heat pump" could handle the total hotel air conditioning load after midnight, and in any event, would minimize the number of hours when the main air conditioning system would have to be operating.

We would also like to suggest that an ice storage air conditioning system be evaluated for this new hotel. A properly sized ice storage air conditioning system could utilize smaller refrigeration chillers that would operate around the clock. At night (while the high lift lead chiller is heating water and cooling the hotel) the main chillers will be making ice. During the day, the ice will melt and assist the smaller chillers with the hotel's air conditioning load.

By utilizing continuously running smaller chillers, the hotel's kw demand charges will be reduced. Also, the hotel will be making better use of alternate energy because, during early morning hours Hawaii Electric Light will not be able to accept the full output of the geothermal, hydro and wind energy that is available at that time. Thus, any additional electric loads that remain on the system after midnight will be utilizing electric energy produced almost exclusively for locally available, renewable, non-fossil fuel energy resources.

In addition, we would also recommend that fluorescent lighting (equipped with high efficiency ballasts) be used throughout the hotel Interior, that metal halide lamps be used for the tennis courts and that sodium lighting be specified for parking lots and roadways. Outdoor lighting fixtures should be carefully specified to ensure that very little light is directed up into the night sky. This is important for efficiency reasons and also to minimize the stray light that might interfere with the operation of the astronomical observatories on the summit of Mauna Kea.

We certainly hope these comments and suggestions will be helpful to you and the designers of this new hotel. As you can see, we believe that waste heat recovery technology is a very important consideration in our somewhat unique sub-tropical service area, you will find enclosed two technical papers and an article describing the performance of these devices in Hawaii.
Belt Collins & Associates
December 24, 1986
Page 5

Please be advised that Hawaii Electric Light Company is fully prepared to serve the electrical loads of this new 450-room hotel and also to work with you and the hotel architects and engineers to provide rate analyses as needed to evaluate the various alternatives discussed in this letter.

Contact Kelvin Yamaki at 989-0223 for questions 1 and 2 and Mr. Alan Lloyd of NECD at 940-6810 for question 3.

Very truly yours,

Clyde H. Nogata
Sr. Electrical Engineer
Planning Division

Belt Collins & Associates
4th Floor, Hawaii Electric Light Company Building, Honolulu, Hawaii 96813
Phone: 948-5000, Ext. 1123, Fax: 948-5004

March 6, 1987

Mr. Clyde H. Nogata
Senior Electrical Engineer
Planning Division
Hawaiian Electric Light Company, Inc.
P.O. Box 1027
Hilo, Hawaii 96721-1027

Dear Mr. Nogata:

Environmental Impact Statement (EIS) for the Proposed Resort Hotel at Waauapuna, Hawaii

Thank you for your letter of December 24, 1986 commenting on the Environmental Impact Statement Preparatory Notice and Environmental Assessment for the above project. Your letter was most helpful and I have passed on your comments and concerns to the architectural consultant for the hotel project. We were informed that your recommendations will be taken into consideration in the design of the hotel. In particular, waste heat recovery technology will be incorporated into the project to the extent possible.

Sincerely,

Anne L. Mapes

cc: Alan Lloyd
John Corbelli
Kelvin Yamaki

cc: Douglas McGilley, Ritz-Carlton Hotel Company
Roger Harris, Hana Lani Resort, Inc.
Donald Goo, Winsmith Whitamond and Allison Tang & Goo

HEI
CHAPTER XII
CHAPTER XII
COMMENTS RECEIVED DURING THE
DRAFT EIS COMMENT PERIOD AND RESPONSES

CONSULTED PARTIES

An announcement of the availability of the Draft Environmental Impact Statement (DEIS) for the proposed Ritz-Carlton Mauna Lani hotel project was published in the OEGC Bulletin by the Office of the Environmental Quality Control on May 23, 1987. The agencies, organizations, and individuals listed below were sent copies of the DEIS with a request for their comments on the project. Those believed to have an interest in the project or who requested consulted party status were mailed a copy of the report. Parties that replied with a "no comment" statement are marked with an asterisk. Those marked with two asterisks made substantive comments and these letters are reproduced, along with responses to them, in the following pages. Parties who submitted substantive comments after the June 25, 1987 deadline are indicated with a dashed line. Responses to these letters are also included in this chapter.

Federal Agencies

U.S. Army Corps of Engineers, Pacific Ocean Division
U.S. Army, Facilities Engineering - USASCH
* U.S. Department of Agriculture, Soil 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 Transportation, Coast Guard
U.S. Navy

State Agencies

* Department of Accounting and General Services
* Department of Agriculture
* Department of Defense
** Department of Health
** Department of Land and Natural Resources
DLNR, State Historic Preservation Officer
** Department of Planning and Economic Development
DPED, Energy Division
Department of Social Services and Housing
** Office of Environmental Quality Control
Office of Hawaiian Affairs
State Archives

University of Hawaii - Manoa

** Environmental Center
Marine Programs
* Water Resources Research Center
Hawaii County

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

Community Organizations and Other Groups/Individuals

American Lung Association
* Hawaii Leeward Planning Conference
  Life of the Land, Big Island Chapter
  Na Ala Hele
** Puako Community Association
Waimea Kawaihae Community Association
U.S. Senator Daniel K. Inouye
U.S. Representative Daniel K. Akaka

Libraries

Bond Memorial Library
Department of Planning and Economic Development Library
Hilo Regional Library
Kailua-Kona Library
Kaimuki Regional Library
Kaneohe Regional Library
Legislative Reference Bureau
Lihue Regional Library
Pearl City Regional Library
State of Hawaii Main Library
Thelma Parker Memorial Library, Waimea
U.H. Hamilton Library, Hawaiian Collection
U.N. Hilo Campus Library
Waialuku Regional Library

Media

Honolulu Star-Bulletin
Honolulu Advertiser
Hawaii Tribune Herald
West Hawaii Today - Kona
Mr. Albert Lono Lyman  
May 27, 1987  
Page 2

4. Anchialine ponds do not have a direct connection with the ocean, but are influenced by tides. We wish to know if the close proximity of the swimming lagoon will affect the anchialine pond especially during excavation.

Thank you for the opportunity to review this EIS.

Sincerely,

[Signature]

John C. Lewis, M.D.  
Director of Health  
for Director, OKGC

cc: Belt, Collins & Associates

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Mr. Albert Lono Lyman  
May 27, 1987  
Page 2

Dear Mr. Lyman:

Subject: Draft Environmental Impact Statement for the  
Biltmore Mauna Lani, Mauna Lani Resort, South  
Kohala, Hawaii

We have reviewed the subject EIS and offer the following comments for consideration:

1. Page II-13, Figure II-9 indicates that a 115-foot wide channel will be excavated to Pauoa Bay. The purpose and dimensions (length and depth) of this channel should be discussed. Specifically, we wish to know if the purpose of the channel is for flushing or for navigation of thrill craft and other vessels.

2. If explosives will be used in the creation of the lagoon, its use should be restricted during the humpback whale migration and calving season. Sound travels well through water and loud explosions may have an adverse effect upon the whales.

3. Several holes filled with grout are being proposed around the Hoopoo Fishpond at intervals of 15 feet. We wish to know the number of these grout-filled holes.
July 13, 1987

Mr. John C. Lewis, M.D.,
Director of Health
for Hawaii, Oahu Office of Environmental Quality Control
State of Hawaii
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Lewis:

Draft Environmental Impact Statement for}
the Kihe-Kartlen Mauna Lani, Mauna Lani Resort
South Kohala, Hawaii

This letter is in response to your letter of May 27, 1987 to Mr. Albert Leno Lyman, Director of the Hawaii County Planning Department, concerning the above project. Your comments are addressed in order of appearance in your letter.

1. As described on page II-11 of the Draft EIS, the seawater swimming lagoon will have a 110-foot wide opening in Puano Bay, which would allow incoming wave energy to reduce the length of the lagoon beach. The opening would extend to a seaward 50-foot wide beach area which would improve circulation and the cleaning of fines.

2. The applicant fully expects to accomplish excavation without blasting. Excavation and grading will be done by bulldozer or backhoe. Resulting water with hydraulic rams to break the material. However, explosives might be used if hard spots result in large blocks by hydraulic rams. Only those blocks that would be small explosive charges (10 to 15 pounds) be used to break the rock so that it can be dropped and removed by hydraulic shovels. The use of explosives in offshore waters would be restricted during the humpback whale migration and calving season.

3. and 4. We do not know at present whether the swimming lagoon's proximity to the fishpond will affect the food web and what potential impact it might have on the number of grass-fed fish, which will be placed around Kona Bay Fishpond, or even if they will be needed. If the currently low salinity in the pond (2.0 to 4.0 parts per thousand) increases to an unacceptable level as a result of lagoon excavation, certain grading will be undertaken to reduce the extent of salinity intrusion. The number of holes will be determined based on salinity level monitoring and the recommendations of the engineering consultants.

Sincerely,

[Signature]
Ann L. Mapes
The Honorable Albert Lono Lymam  
Planning Director  
Planning Department  
County of Hawaii  
21 Anuenue Street  
Hilo, Hawaii 96720

Dear Mr. Lymam:

       Subject: Draft Environmental Impact Statement, Ritz-Carlton  
       Hotel, Mauna Lani Resort, South Kohala, Hawaii

       We have reviewed the subject Draft EIS and offer the following  
       comments.

Sand Mining Impacts and Alternatives

On page II-15, the Draft EIS refers to the possible importation of  
5,000 cubic yards of calcareous, medium to coarse gravel sand from  
Hokulea in Hau, or from Waihe'e in Kohala.  

The Final EIS should address the environmental impacts of mining  
from these non-renewable sources and specify potential alternative  
and storage sites.  Government permits involved in these "off-island"  
activities should be identified.

Impacts to Surf Sites

The Final EIS should address the impact of the proposed project,  
particularly the excavation of the flushing channel, and any surf sites  
in the area.

Given the above points, we recommend that you write to the  
Department of Planning and Economic Development.

Sincerely,

Roger A. Ulrling

cc: Mrs. Anne L. Yoppe,  
        Holt, Collins & Assc.  
        Office of Environmental Quality Control  
        Planning Department, County of Hawaii
Mr. Roger A. Ulveling, Director
Department of Planning and Economic Development
State of Hawaii
P.O. Box 2139
Honolulu, Hawaii 96804

Dear Mr. Ulveling:

Draft Environmental Impact Statement for
the Ritz-Carlton Mauka Lani, Mauka Lani Resort
South Kohala, Hawaii

This letter is in response to your letter of June 16, 1987 to Mr. Albert Loo Lyman, Director of the Hawaii County Planning Department, concerning the above project. Your comments are addressed in their order of appearance in your letter.

1. Sand mining impacts and alternatives. The source of sand for the proposed project has not yet been determined, but it is currently thought unlikely that sand will be imported from Monsun on Molokai. Specifications for the sand have to be prepared and, in the end, economics (including the cost of permitting) will determine the source of sand to be imported to the site. Since the site where sand will be obtained is unknown, the impacts of removing the sand would be best be addressed as a later date when a specific site has been designated. At that time, a grading permit will be required, and there is a possibility that an application for a Special Management Area permit will need to be submitted.

2. Impact to surf sites. There are no surf sites within Pehua Bay. However, there are seasonal surf sites off the point at the southern boundary of the project site as well as north of the project site. Specifically speaking, these surf sites are suitable only during a few days in the winter when the northwest swells are large enough. It is expected that there will be no impact on these surf sites outside the embayment during construction of shoreline improvements. The impact after the Ritz-Carlton Mauka Lani and the shoreline beach park are completed will be to increase accessibility to the surf sites.

Sincerely,

Anne L. Mapes
MEMORANDUM

To: Mr. Albert Lono Lyman, Director
   Planning Department, County of Hawaii

From: Draft Environmental Impact Statement (DEIS) for Ritz-Carlton Mauna Lani, Mauna Lani Resort, South Kohala, Hawaii

Subject: Draft Environmental Impact Statement (DEIS) for Ritz-Carlton Mauna Lani, Mauna Lani Resort, South Kohala, Hawaii

June 17, 1987

Thank you for allowing us to review and comment on the subject DEIS. The following are our comments for the proposed projects:

Air Pollution

The DEIS states that an air quality assessment, which was prepared for the 1983 Mauna Lani Resort, includes the indirect impacts attributable to the Ritz-Carlton project. The study should be revised in the appendix. Since the study indicated that the State standards for carbon monoxide will be exceeded at the Mauna Lani Drive-Queen Kaahumanu Highway intersection, the DEIS should present those mitigating measures which shall be implemented to prevent the exceedances from occurring.

Water Pollution

The proposed monitoring plan for assessing short-term and long-term impacts on the water quality standards should be addressed.

cc: Ohiol Sanitarian, Hawaii
   Ms. Anne L. Mapes, Belt Collins & Assoc.

JOHN C. LEWIS, M.D.

July 13, 1987

Mr. John C. Lewis, M.D.
Director of Health
Department of Health
State of Hawaii
P.O. Box 3378
Hilo, Hawaii 96721

Dear Dr. Lewis:

Draft Environmental Impact Statement for the Ritz-Carlton Mauna Lani, Mauna Lani Resort
South Kohala, Hawaii

This letter is in response to your memorandum of June 17, 1987 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, concerning the above project. Your comments are addressed in their order of appearance in your memo.

1. Air pollution. The maximum 650 hotel units at the Ritz-Carlton Mauna Lani (500 initial units and up to 200 additional units) are approximately one-fifth of the hotel units expected to be ultimately developed at Mauna Lani Resort. An air quality impact analysis for the entire resort was prepared by J.W. Morrow in May 1982. By the year 2000, due to traffic attributable to Mauna Lani Resort development (including the Ritz-Carlton Mauna Lani), State standards for carbon monoxide will be exceeded at the Mauna Lani Drive-Queen Kaahumanu Highway intersection. Mitigation measures include, although controls are not built in the Ritz-Carlton Mauna Lani Draft EIS. A copy of the report is enclosed for your information.

2. Water pollution. The applicant intends to work with County, State and Federal agencies to implement an appropriate monitoring program, according to permit conditions. Please refer to Chapter IV, Section 1.4.2.2.5 in the Final EIS for a description of what such a plan might entail.

Sincerely,

Anne L. Mapes

Enclosures
Mr. Albert Leau Lyman, Director
County of Hawaii Planning Department
75 Anuenue Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

We have reviewed the Draft Environmental Impact Statement (EIS) and offer the following comments for your consideration.

Our letter of April 30, 1987 to the U.S. Army Corps of Engineers regarding the construction of a swimming lagoon and swimming beach for the Ritz-Carlton Hualalai Resort Hotel at Puunene Bay is provided for your information.

We remain concerned about the long-term cumulative impacts to nearshore fishery habitat and water quality due to shoreline modifications associated with resort developments along the West Kona coastline. We recommend that the Monitoring Program be conducted to evaluate potential changes in water quality, nearshore fishery and coastal resources, and the associated pool, nearshore fishery and coral resources, and the shoreline features. This information will assist in determining the magnitude of changes associated with construction and operation of these shoreline features.

In addition to the construction measures described on page 11-15 of the Draft EIS, we recommend that the shoreline be removed only when the turbidity level of water within the excavated lagoon basin approximates that of the nearshore waters. This process will ensure that the opening of the newly excavated basin will not introduce excessive amounts of fine sediment into coastal waters.

We appreciate this opportunity to comment.

Sincerely,

Ernest Kosaka
Project Leader, Environmental Services
Pacific Islands Office

cc: Anne Mares, RDA

Save Energy and You Serve America!
Ms. Anna L. Naper
Deli, Collins and Associates
666 Cural Street
Honolulu, HI 96813

Dear Ms. Naper:

Draft Environmental Impact Statement (EIS) for the proposed Ritz-Carlton Mauna Lani project in Kohala, Island of Hawaii, has been submitted to the County of Hawaii Planning Department for review.

We have reviewed the subject Draft EIS and have the following comments:

1. Purpose of This Document

In Chapter V, the Draft EIS states that a Conservation District Use Permit Application (CDUA) was filed in February 1987 with the Board of Land and Natural Resources due to the proposed use of state-owned lands and activities nearshore and shoreline areas that lie within the conservation district. On page V-3, the document further states that the Draft EIS was included as part of the CDUA application. Section 1.0 of Chapter I needs to be amended to reflect these statements.

2. Historic/Cultural Resources

With respect to the project description and archaeological section, more extensive maps delineating the extent of boundaries of specifically two site complexes (E1-306 and E1-31) are needed. It is difficult to really assess what the impacts will be due to the close proximity to the proposed swimming lagoon and improved beach/sand area. The discussions within the Draft EIS do not indicate whether the impacts will be to the Historic District. Napa Lani Resort intends to preserve any of the sites. We note that Hirsch (1979) recommended the preservation of site E1-33. Other possible mitigative measures should be further considered and discussed. Since the development process is for the special management area level, the applicant needs to be as detailed as possible.

3. State-Owned Lands

The applicant proposes to use state-owned submerged lands as well as lands north and south of the project site for improvements. Alternative development scenarios need to be included for the purposes of obtaining the necessary approvals to enter, lease, excavate, etc., the state-owned lands. These approvals from the Board of Land and Natural Resources should also be noted in the permit approvals sections. Since the EIS is also intended to be used as a CDUA submittal, the issue of use of state-owned lands should be discussed in detail in all of its aspects. The public's legal rights of access along the Kawalae/Rhodo trail and use of the proposed improvements need to be more fully addressed.

4. Shoreline Access and Public Shoreline Path

The Draft EIS mentions that the shoreline pedestrian trail will be improved to enhance traversability. It further states that the shoreline trail straddles along the seaward boundary and that portion will be rerouted (as far as the proposed swimming lagoon area. However, the Draft EIS has not fully described the extent of the improvements nor has it discussed the approvals necessary for the relocation of the trail. Further, along the existing trail the position of the certified shoreline and the proposed lagoon is essential to the proposal of the lagoon, the Draft EIS proposal is to reroute water on the northern side of the certified shoreline. Further, lateral access should be shown on the water side of the certified shoreline.
On Page IV-137, it states "the new public park north of Mauna Kea is projected for completion at about the same time as the Ritz-Carlton Mauna Lani." The Draft EIS does not discuss any time schedule when Mauna Lani Resort will be seeking government approval. While we recognize the maka’akai shoreline access and public path to the north of the Ritz-Carlton site, this does not preclude or exclude further consideration of other maka’akai access to the shoreline or other related improvements in the area.

In particular we note that according to the Draft EIS, Pa’aua Bay is approximately 850 feet wide and the public park/parking area is proposed to the north of the project site. Does the public need to travel such distance in order to enjoy the recreational opportunities at the proposed swimming lagoon/beach area? The applicant should consider and discuss other maka’akai vehicular public access and parking areas/facilities much closer to the proposed lagoon/beach areas.

5. Water Quality

There is concern on the possibility of the numerous planned resort developments along the Kohala and Kona coastlines incorporating similar swimming lagoons and the need to evaluate the cumulative impacts on our nearshore waters and coral reefs. A definitive water quality baseline and monitoring program will be needed to ascertain whether the impacts anticipated/discussed in the EIS pages IV-22 to IV-25 are occurring or whether unanticipated impacts have arisen or that further mitigation measures are to be considered.

6. Public Services and Facilities

The Draft EIS has understated the level of impacts to be generated by the proposed hotel project. It describes impacts which are attributed only to the direct employment to be generated by the hotel, and has not considered indirect and induced employment.

Further, it has not adequately discussed the impacts on the school system and other infrastructure or services. There was no mention of student population projection and existing conditions or capacity of the affected schools. Since the socio-economic impact study also developed age-cohort projections, this information could also be utilized to assess impacts to the schools.

7. Traffic Impact

In the traffic analysis, the methodology assumes that for the years 1993 and 1999 the only increase will be due to hotels and Kohala Ranch. This assumption is incorrect as there will be traffic increases in any event. There is need to project ongoing growth.

If there were any 24-hour counts taken we would like to see the results to compare it with previous DOT counts. We would like to have the A.M. and P.M. peak counts as well as all other turning movement counts since even during periods of less than maximum peak specific intersections may experience problems.

What was the occupancy for the Mauna Kea and Mauna Lani hotels for the day of the count (1/21/87)? Were there markedly different employment patterns on those days? Were there any assumptions relating to road improvements in the analysis? What, if any, was the relationship between the traffic impact analysis and the employee survey which was also conducted especially as it relates to place of residence?

8. Coastal Hazards and Emergency Management

According to the Draft EIS, on-site population will vary from 599-655 persons (not including employees). Is the current sirens warning system sufficient? Have adequate evacuation routes been planned and will they be well posted? The Draft EIS has not discussed in-depth emergency management and planning as it relates to coastal hazards.
9. **Endangered Species**

Visual monitoring for endangered species should not be the only mitigating measure. Blasting should occur during off-season migration.

10. **Other comments**

Page 1-5, the approvals for Shoreline Setback Variance and Special Management Area permits are obtained from only the Planning Commission.

Page IV-30, Kalalau pupa's is an ill of Makalos (shupus'a) and not an hupu's itself as noted. Reference is made to page 207, Font Contact Period 1630-1880, of the Makalos Beach Resort REV, 1976.

Page IV-106, it should be noted that the updated Hawaii County General Plan is still at the draft level and has not been adopted as yet.

Tax Map Key identification should be noted in the project description.

Should you have any questions or wish to discuss any of these comments in detail, please do not hesitate to contact us.

Sincerely,

[Signature]

Planning Director

Mr. A. Louis Lymann, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lymann:

Draft Environmental Impact Statement for the Ritz-Carlton Maua Lani, Maua Lani Resort
South Kohala, Hawaii

This letter is in response to your letter of June 22, 1987 concerning the above project. Your comments are addressed in their order of appearance in your letter.

1. **Purpose of this document**

Section 1.0 of Chapter I will be amended as you suggest.

2. **Historical/cultural resources**

Section 1.7 of Chapter IV, Historical and Archeological Resources, will be entirely rewritten in light of DLNR's Historic Sites Section recommendations based on continuing consultation with us and a site visit to the Ritz-Carlton Maua Lani project site along with personnel from your department. The applicant intends to follow the mitigation plan proposed by the Historic Sites Section, as approved by the County Planning Commission or the Hawaii County Planning Department.

3. **State-owned lands**

The applicant, The Ritz-Carlton Hotel Company, seeks a CDUA permit to perform work in state-owned submerged lands. It will also seek construction rights-of-way to be approved by the State Board of Land and Natural Resources. The applicant does not plan to seek exclusive use of the improved area. Maua Lani Resort proposes to use State land north of the project site to develop two golf courses and a public shoreline park. Lands south of the Ritz-Carlton project site are owned mainly by Maua Lani Resort, except for the area seaward of the certified shoreline; some of this land will be used for the beach improvement project. The applicant does not, however, intend to lease these lands, which would be for public use. The public's legal rights of access along the shoreline trail and the use of proposed improvements will be addressed in the final EIS.

If the applicant is unsuccessful in obtaining a CDUA permit, it will have to reevaluate the entire project. Alternatives include abandoning the plan to develop the project site or developing a hotel project wholly within privately owned lands. This might include an inland beach-like setting development or the construction of a very large swimming pool. These alternative improvements are deemed to be far inferior to the proposed project and would probably not be economically acceptable to the applicant, leading it to abandon the project.
Mr. A. Lewis Lyman  
July 13, 1987 - page 2

There is an existing land court easement in favor of the public for pedestrian access by way of the shoreline trail, identified as the Kawailoa-Kahala trail. The Kawailoa-Kahala shoreline trail on the Ritz Carlton Mauna Lani site is legally described by recorded instrument on Land Court Map 87, Land Court Application 1758, authorized and approved by order of the judge of the Land Court, dated September 3, 1984. The map shows the trail identified as Easement "B", a 10-foot wide footprint for public easement.

4. Shoreline access and public shoreline park. It is the applicant's intent to keep the pedestrian shoreline trail as natural looking as possible, and therefore improvements might include mostly clearing and grading. After the swimming lanes are constructed, the applicant will provide public access around the lane, on the sand. Any County Planning Department conditions that may be prescribed by the SMA or ZSV permits will be followed. Lateral access will be shown on the mauna side of the certified shoreline in the EIS.

Mauna Lani Resort has obtained the necessary plan changes to proceed with the public shoreline project north of Waimea Bay, SSHA Use Permit No. 239, issued on October 30, 1983; an accepted EIS in 1983; and a CEQA permit in November 1983. No other plan changes are required. Grading and building permits are needed before construction begins.

In addition to the existing access at Mauna Lani Resort, Mauna Lani will construct the mauna approach to the proposed shoreline park north of the Ritz Carlton site, and, where access to Honokoa Bay. We agree that this does not include consideration of other mauna approaches to the shoreline at Mauna Lani Resort, although no other access is planned for the Ritz Carlton site. Other mauna approaches include an access north of the hotel site on Mauna Lani Road. Access north of Waimea Bay will be closer than access from the current means of access from the end of Waimea Bay Road or from the mauna side of the site. Furthermore, mauna approaches at Mauna Lani Resort have agreed to construct and maintain a public park with parking, restrooms, showers, and picnic facilities. This is the public shoreline project which will provide access both to the Ritz Carlton-Mauna Lani resort site and the Waimea bay area north of the park.

5. Water quality. The applicant will work with your department, State and Federal agencies to implement an appropriate monitoring program, according to permit conditions.

6. Public services and facilities. The impacts on public services and facilities generated by the proposed hotel project will be fully addressed in the Final EIS. As suggested, student population projections will be considered.

7. Traffic impacts. In Sections 3 and 6 (noting the impact of traffic generated by all projects in 1993 and 1998, respectively), the traffic projected is traffic generated by the known projects in the area (the Ritz Carlton-Mauna Lani, South Kohala Resort, the Hyatt Regency Waikoloa, Kohala Ranch, and an assumed 300-room hotel in the vicinity of the Kohala Airport) added to the existing traffic (1987 traffic counts). It was assumed that the identified project would cause traffic growth in the South Kohala/Kohala area. It was assumed that the identified project would cause traffic growth. An assumption was made in the analysis that traffic would not increase with additional development, and we identified the additional development that is likely to occur, if the traffic generated by the identified developments is added to some estimate of "normal" growth, traffic generated by those developments would be added twice, once as "normal" growth, and a second time as traffic generated by the developments.

Mr. A. Lewis Lyman  
July 13, 1987 - page 3

To examine "normal" growth of traffic and traffic projected from the developments, attached are graphs showing regression equations based on traffic counts taken by the State Department of Transportation from 1974 to 1984 and plots of projected traffic from the traffic study for four intersections. These graphs are included in Appendix C of the Final EIS.

The regression equations were derived from counts for vehicles entering the intersections from 1974 to 1984. These equations could be considered an indication of "normal" traffic growth in the area. If the assumption is made that past traffic growth is an indication of future traffic, a comparison of future traffic based on the regression equation and projected traffic from the traffic study can be made.

For the intersection of Waimea-Kahului Road and Queen Kahumanu Highway, the traffic projected in the traffic study is greater than that projected using the regression equation. Traffic at this intersection should be higher than "normal" growth, since much of the traffic to and from the identified developments is expected to pass through this intersection.

At the intersection of Manalosio Highway and Lindsey Road, the projected traffic is slightly below the regression line. This difference is not significant, and therefore it appears that traffic growth at this intersection will continue according to the growth trend of the past.

At the intersection of Queen Kahumanu Highway and the Road to Kahului Airport, the projected traffic is expected to be higher than the estimated traffic, in the traffic study, it is estimated that the traffic growth would be higher in the past because development along the South Kohala/North Kona coast would cause heavier use of the airport and more traffic from the identified developments would pass through this intersection.

At the intersection of Queen Kahumanu Highway and Palani Road, the traffic projection is lower than the regression line. This is expected because of the distance from the new developments to this intersection and hence the relatively smaller amount of traffic from the developments to pass through this intersection during the peak hour.

The 24-hour traffic counts taken at the Lindsey Road/Manalosio intersection, the Palani Road/Queen Kahumanu Highway intersection, and on Queen Kahumanu Highway near the airport, as well as 12-hour turning movement counts taken at 12 intersections, were sent to the Department of Public Works, County of Hawaii. As requested, we will also send you these counts.

On January 28, 1987, the date of the traffic count, occupancy was 85.7 percent at the Waimea Mauna Kea and 91.1 percent at the Mauna Lani Bay Hotel. The employment patterns on that day did not appear to be markedly different than they are otherwise.

In the traffic analysis, it was assumed that no changes to the existing roadway system were made.

The analysis used the Waimea Mauna Kea and Mauna Lani Bay Hotel employee surveys at the basis for the changes made to employee trip generation, beginning and end points. The distribution of employee residence location was adjusted according to assumptions on the distribution of future housing.
8. **Emergency plans and response management.** The current flood warning system is operated by the County. It is our understanding that the County of Hawaii is in the process of formulating procedures for emergency management. The applicant and Mauna Lani Resort will coordinate with Hawaii County Civil Defense to implement these procedures.

9. **Endangered species.** On July 2, 1987, Tom Nance, the author of the shoreline engineering study, and I met with Aquatic Resources staff and a representative of the Conservation Office at the State Department of Land and Natural Resources to discuss Aquatic Resources concerns on potential impacts due to shoreline construction, as stated in DLNR's letter of June 22, 1987 to your department regarding the Draft EIS. We are maintaining ongoing consultation with DLNR to come to an understanding on the concerns. Please see our response to the DLNR comment letter on the Draft EIS for further details.

10. **Other comments.** Changes will be made to the Final EIS as suggested.

Sincerely,

[Signature]

Anne L. Mapes

Attachment

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**Figure C-10**

REGRESSION EQUATIONS AND PROJECTED TRAFFIC: INTERSECTIONS OF LINDSEY ROAD AND MAMALOA HIGHWAY AND WAIMEA-KAIAHAE ROAD AND QUEEN KAUMANA HIGHWAY

RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-17
REGRESSION EQUATIONS AND PROJECTED TRAFFIC: INTERSECTIONS OF QUEEN KA'AHUMANU HIGHWAY AND PALANI ROAD AND QUEEN KA'AHUMANU HIGHWAY AND AIRPORT ROAD
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Honorable Albert Lono Ige
Director
Planning Department
County of Hawaii
25 August Street
Hilo, Hawaii 96720

Dear Mr. Ige,

We have completed our review of the draft Environmental Impact Statement for the proposed site-Carleton Hauna Lani Resort, South Kohala, Hawaii. Our comments are as follows:

Forestry and Wildlife:

Although the section on "Terrestrial Flora" (1.5, Page 4-26) states that there were no proposed, listed and/or candidate endangered and threatened plant species existing within the proposed development area based on a 1984 survey, the draft EIS does not include a botanist's survey report to determine the adequacy of the survey. Maps showing the routes surveyed within the proposed development area, information on (1) which routes were used to sample vegetation, (2) botanist qualifications in Hawaiian threatened and endangered field surveys, (3) the amount of time spent doing the surveys, the methodology, and the results of the survey including a checklist of flowering plants encountered within surveyed area should be included as an appendix to the EIS.

Disclosure of wildlife present (1.6, page 4-28) appears adequate, but a checklist of wildlife species (birds, mammals) should be included in an appendix. Restoration of the pond should produce benefits to wildlife associated with coastal brackish waters. The Division of Forestry and Wildlife has no records of the presence of non-migratory indigenous birds frequenting the site.

Aquatic Resources:

The Draft EIS has provided some information on mitigating possible impacts on shoreline access and recreational use, nutrient enrichment and wastewater disposal. To further minimize adverse impact at the project site, we suggest the following precautionary measures be implemented:

1. Initial clearing should be performed during a period of extreme low tides and as quickly as possible to limit the amount and duration of sediment transport;

2. All shoreline modifications and dredging should be suspended during periods of strong onshore wind or large swells;

3. Clearing should not be conducted beyond 60 feet seaward from the water's edge;

4. A silt curtain should be deployed as necessary to prevent excess sedimentation and;

5. The flushing channel should not be opened to the sea until dredging of the existing lagoon has been completed and the lagoon water is clear.

Work plans for the two proposed lagoons including opening(s) into Pa'au Bay, specific area(s) of blasting activity, and any changes to shoreline modifications as currently described in the Draft EIS shall be submitted to the Department for review, outlining specific mitigation measures proposed for potential impacts to aquatic communities and public activities.

Precautions should be taken to prevent petroleum products, pesticides, herbicides, construction materials, debris and other contaminants from flowing, blowing or leaching into Pa'au Bay, especially during the shoreline modification operations.

Finally, we suggest that a monitoring plan be established for Pa'au Bay and the restored Keauhou Flats pond, to be conducted annually by the applicant for at least two years after the project is completed, to determine environmental impacts such as the stability of the impacted sand, and the possibility of excessive increase in salinity beyond the normal criteria of coastal brackish waters. These reports should be submitted to the Department and the County of Hawaii for review and information.
Historic Sites:

Pages 11-20 through 11-34 cover historic preservation matters. At this time, we do not believe that this EIS adequately identifies significant sites in the project area, impacts to those sites, and acceptable mitigation plans. Our Historic Sites Section has been working with Belta, Collins & Associates and Hana Lani on this matter. We believe all these matters can be quickly resolved, but it will require considerable revision of the EIS text.

We recommend the following changes for the EIS to be acceptable:

1. Section 1.7.1. The Hana Lani Resort historic preservation interpretive and management plan primarily addresses the significant sites that were targeted for preservation in the early 1980s and how to interpret them. As the Draft EIS states on p. 11-39, none of the sites so targeted are in this project area. Rather than a brief statement to this point, we recommend all references to the management plan be deleted as they are not relevant. This also means all of Section 1.7.1.1 should be deleted.

2. The key factor for this area is that a number of known sites not scheduled for interpretive preservation still contain significant information on the prehistory of this area. These sites need to be protected during development or undergo archaeological data recovery prior to construction. This historic preservation concern is clearly stated in the Revised Master Plan for Hana Lani. This should be noted in Section 1.7.1.

3. Section 1.7.1.2. is good. It identifies and describes four sites known in the project area. Five sites, however, are in the area. The fifth known site, the Keanapec Fishpond, must also be discussed here. Much of paragraph 2 under Section 1.7.1. which describes the fishpond must be moved to this section. A mid-May fieldcheck showed that EI-306 and -307 are caves attached to the pond, so these should be kept in the text and discussed with the pond. Sites EI-306 and EI-308 are outside the project area; their discussion should be deleted.

4. A new Section 1.7.1.2 should address the significance of these sites according to the criteria of the National and Hawaii Registers of Historic Places. Our Historic Sites Section believes their significance can be determined without further archaeological work, and offered significance assessments in an April 13, 1987 letter to Ms. Ann Hayes of Belta, Collins & Associates, as follows:

   a. EI-305: "No longer significant." This site did not contain some information significant on the history of the area, but this information was adequately recorded by Kirch (1979).

   b. EI-304, EI-30, EI-33: Significant solely for their information content. These are small sites with some shallow and spatially restricted deposits (Kirch 1979). The significant information in these sites includes the architectural data and information contained in the deposits (including dates).

   c. Keanapec Fishpond: Significant for its information content (architectural details and possible fishpond sediment) and as a good example of a site type, a fishpond established in an existing pond.

In sum, there are four significant historic sites in the hotel parcel, in our opinion.

If the applicant agrees with these evaluations and has checked with the County Planning Department, all that needs to be done is for the applicant to simply present these evaluations in the EIS, and note the historic sites section and the County are in agreement. Significance needs to be established in an EIS in order for impacts on significant sites to be evaluated. Until this is done, we believe that the EIS process related to historic preservation cannot be completed.
5. Section 1.7.2 on Impacts or Effects. This section needs revision and simplification. Only impacts to the significant historic sites should be discussed here. The permit applications emphasize that the fishpond is to be restored, so it will be affected. This should be clearly stated in this section of the EIS. As the Draft EIS states, our Historic Sites Section has determined that this will be a "beneficial effect" if the restoration is properly done. The impacts of the other three significant sites have yet to be determined. If they are avoided, there will be "no effect" if they are adequately protected. If they cannot be avoided, then a "no adverse effect" would result, if acceptable archaeological data recovery is done. The applicant needs to decide what the impact will be and state it in this EIS.

In brief, this section needs to state what the effects to significant sites will be, and the fact that the Historic Sites Section and the County Planning Department have been consulted and agree.

6. There is no section on Mitigation Measures. Some discussion is given under Section 1.7.2. A section 1.7.3 should be added to cover mitigation measures. This should at least include the fishpond and its two caves. The three inland significant sites should be included only if they are to be affected. In an EIS, minimally, we wish to see a commitment to acceptable mitigation treatments for each significant site -- e.g., a sentence or two that says we will properly preserve/restore the fishpond and conduct acceptable archaeological data recovery for the three inland sites. This is lacking at present. A statement that our office and the County Planning Department have been consulted and agree should also be included. When the mitigation plan section is only a brief summary of acceptable mitigation treatments, we also insist upon two conditions:

a. Submittal of detailed restoration and archaeological data recovery plans for review and approval by the County Planning Department and our Historic Sites Section.

b. Verification of the acceptable completion of these plans by the same two offices.

The EIS does include these latter two conditions (p. IV-24). It simply needs to include the general commitment to appropriate treatments before mentioning the conditions.

Again, we believe that these concerns can be easily met, but it will require revision of the EIS text.

Recreation Concerns:

We note that public shoreline access is being retained including access to the swimming lagoon being created as part of the development. We will comment on the proposed adjacent public park improvements during CDA review for that project.

Thank you for this opportunity to comment.

Very truly yours,

[Signature]

WILLIAM W. RATH, Chairperson
Board of Land and Natural Resources

cc: Ms. Anne Mapes, Salt Collins & Associates
Mr. William W. Puy
July 6, 1987 - page 2

3. The applicant plans to work behind the natural outcrops to maintain the stability of the sand, about 160 feet offshore. We discussed the reasons for going beyond the 60 feet suggested in your letter, and Aquatic Resources staff agrees that limiting work to the area within the outcrops is reasonable.

4. Whether a silt curtain should be used to prevent excess sedimentation is an unresolved issue. Since our meeting with Aquatic resources staff, the Corps of Engineers has confirmed that it does not propose the use of silt curtains in the offshore area as a condition for permit approval.

5. As you suggested, the flushing channel will not be opened to the sea until dredging of the swimming lagoon has been completed and the lagoon water is clear.

Work plans for the shoreline area as described in the EIS will be submitted to your department for review, with appropriate mitigation measures. Precautions will be taken to prevent contaminations from entering Paona Bay, particularly during construction.

The applicant will work with County, State and Federal agencies to implement an appropriate monitoring program, according to permit conditions. The parameters of the monitoring program have not yet been determined. The applicant does propose to monitor the stability of Kanepu Flatwood. Reports will be submitted to your department and the County of Hawaii for review.

Historic sites Based on the recommendations contained in your letter and comments resulting from the historic preservation review process, we will re-write section 1.7 in Chapter IV of the EIS. We shall consult with the County Planning Department as to agreement with the Historic Sites Section on the evaluation of significant historic sites at the Ritz-Carlton Mauka Lani project site.

The applicant intends to conduct archaeological data recovery for the three archeological sites identified by your department as being significant culturally for their information content. The mitigation plans you proposed in the DLNR letter of June 19, 1987 to Beth Collins will be followed, subject to concurrence of the County Planning Department.

Sincerely,

[Signature]

Anne L. Mapes

Enclosure
A. Luna Imazu, Planning Director
Planning Department
County of Hawaii
25 Apaau Street
Hilo, Hawaii

Aloha:

The Puako Community Association has reviewed the Environmental Impact Statement filed by Belt Collins & Associates in behalf of Mauna Lani Resort for the Ritz-Carlton Mauna Lani.

We are extremely concerned over the failure of the applicant to provide any realistic estimate for construction of employee housing. The issue is lodged in Chapter VIII of the EIS entitled "unsolved issues," and essentially indicates that "Mauna Lani Resort has assured responsibility for meeting employee housing requirements for the Ritz-Carlton." There are vague proposals to build some housing on State land, and there is no firm proposal at all, and no indication that one will be forthcoming before approval is expected.

Our community is now experiencing the impact of developments along the coast. Many are shifting upward at an alarming rate, and well-paid and sometimes subsidised employees are paying them. Long-term local residents are being priced out of the housing market already, and the problem is just beginning.

We see no reason why this developer should be permitted to begin construction until firm and substantial commitments are made to provide employee housing. That is the Developer's obligation, and it is supposed to be a part of its costs of the project.

We are in exactly this position; to the extent the Planning Director does not require the Ritz and Mauna Lani to live up to their legal obligations here, residents of the surrounding communities are going to suffer. They are already suffering, and the situation can get much worse.

We are unwilling to accept vague promises of future possible housing action from the developer, and we strongly request that the Planning Director insist upon clear, firm and enforceable commitments from the developer in this respect before any permission is granted to proceed.

We are also concerned over Section 1.3, which states that the developer intends to dig "new borrow water wells located on Mauna Lani Resort property." The EIS states here that these will have the potential to affect salinity levels. We are concerned that there be no adverse effect upon the ground water of Puako and the area makes because much of the livability of our community depends upon the known forests which grow between us and the highway. The developer should not be permitted to affect anyone's water adversely, and we request that very clear guidelines be imposed to ensure that our quality of life is not sacrificed to provide water for the development's shrubs.

Finally, we are concerned with the substantial ocean dredging which is proposed. Although the developer has had a meeting with this Association in the past, it appears that the scope of dredging now envisioned was not discussed with us. We would hope to be very sure that no adverse effects are being taken with the underwater habitat and that we can be fully assured that no adverse effects are possible along the coast north and south. Should clear and unequivocal assurances be given, we urge that the proposed dredging not be allowed. It is really not that important to the overall project and those of us who reside on the coast should be allowed to assume the risks when the developer could as easily resolve the matter with a large swimming pool.

We appreciate the opportunity to provide our input. We trust our remarks, which have involved a good deal of time and study on our parts, will be given serious consideration.

Very truly yours,

Richard McMahon, Jr.
President

cc: Belt Collins & Associates
July 14, 1987
87-1443

Mr. Richard Schulze, Jr., President
Pukau Community Association
118 Pukau Beach Drive
Kauai, Hawaii 96733

Dear Mr. Schulze:

Draft Environmental Impact Statement for
the Ritz-Carlton Mauna Lani, Mauna Lani Resort
South Kohala, Hawaii

This letter is in response to your letter of June 22, 1987 to Mr. Albert Loo, Lyman, Director of
the Hawaii County Planning Department, concerning the above project. Your comments are
addressed in their order of appearance in your letter.

1. Employee housing. Conditions of permits previously obtained by Mauna Lani Resort, Inc.
place it under legal obligations to provide tenant housing associated with the development of
parcels at Mauna Lani Resort. Mauna Lani Resort, Inc., has an agreement with The Ritz-Carlton
Hotel Company that it will provide assisted housing, as required by conditions placed on any
permits obtained by The Ritz-Carlton Hotel Company for the Ritz-Carlton Mauna Lani and as
required by conditions of permits previously obtained by Mauna Lani Resort, Inc.

2. High rents. Please refer to Figure IV-10 of the EIS and to the accompanying text which
discusses periods of shortage.

3. Reworked water wells. In general, groundwater flows in a westerly direction. As shown
in the Mauna Lani Report master plan, most of the golf course is south of Pukau, and therefore not
in the flow lines to Pukau. However, the continued operation of the Pukau shaft (5 years of
operation without adverse effects), new reworked breakwater sources will be south of Pukau;
therefore, they will not influence the groundwater in the Pukau area. Because of the thin basal
layer, the amount taken at any single site must be limited; otherwise, the water becomes too salty.
This constraint limits that the water will not be overpumped.

4. Extent of ocean dredging. We acknowledge that the plan has changed and regret any
misunderstandings. We do feel that the change makes for a better project. The applicant's
consultant would be happy to meet with association members to explain the technical aspects of
the project, if so desired.

Sincerely,

Anne L. Mapa
University of Hawaii at Manoa
Environmental Center
Crawford 107 • 260 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 956-2960

June 23, 1987
REI-0467

Mr. Albert Lono Lymann, Director
Planning Department
County of Hawaii
25 Anapiu Street
Kona, Hawaii 96720

Dear Mr. Lymann:

Draft Environmental Impact Statement
Kona Lani, The Hai-Claro
Kona Lani Resort
South Kohala, Hawaii

The above referenced document proposes building a 450-unit luxury resort total on 36 acres at Puawai Bay. Proposed changes to the shoreline and marina beach include expansion of the existing shoreline beach; restoration of an existing anchialine pond; excavation of a seawater swimming lagoon; creation of a 130-foot wide opening to Puawai Bay through the existing shoreline; excavating a 50-foot wide flushing channel toward the center of Puawai Bay; and installation of barge access slabs on both sides of the flushing lagoon. The 36 acres for the proposed development are part of the Kona Lani Development Plan which was the subject of a 1985 EIS.

This review was prepared with the assistance of Richard Brock, Hawaii Institute of Marine Biology; Hans-Willem Brock, Ocean Engineering; Jon Natafska, Sociology; and John Harrison, Pamela Bacon and Steven Arora, Environmental Center.

Anchialine Pond

The Draft EIS lacks valuable information regarding the anchialine pond, which is a comprehensive analysis of the potential impacts. We suggest the final report includes the following:

1. A complete inventory (as quantitative as possible) and description of the existing pond and its inhabitants, including emergent vegetation, surrounding vegetation, and the aquatic species present.

2. The planned methodology for closure of the pond should include the amount of material to be removed, whether it will go into a settling pond and if so, where the pond will be located in relation to the other anchialine ponds in the vicinity.

3. Once the pond is closed, how will it be managed? Who will pay for the management, and how much money will be allocated each year? Will it receive fish? Will it be left in its natural state, and if so, will there be adequate management to keep unwanted fish out?

4. Once completed, what will be the destination of the ponds? How deep will it be? What is the anticipated vertical salinity gradient in a no-wind situation?

5. What will be the surrounding developments (both fine scale and on a larger scale) relative to the anchialine pond? How will these developments affect the anchialine pond and its biota?

The methods suggested to reduce the salinity if an water intrusion is increased (p. XI-15) are not likely to be needed. Since we do not know the species inventory of the pond, we cannot make a definitive recommendation, however, the anchialine pond species that probably occur here are euryhaline and are found in a wide range of salinities, so they should be unaffected by a change in salinity. Further study would be needed on the possible effects of the suggested introduction of green algae into these ponds. This action could affect the species that live in the water table. Our anchialine pond specialists would be pleased to assist in offering guidance or suggestions on management options.

Finally, there is a number of developments on the Kona coast that are either in close proximity to or covering (euryhaline) anchialine ponds. This EIS should attempt to delineate the impacts expected by this project and relate them to other projects on the North Kona-Kohala districts relative to the anchialine pond resource.

Social

The social impact section of this Draft EIS is very thorough in its scope of coverage and is exceptionally well put together. The Final EIS might discuss population mobility and composition in regard to the effects of this development on life styles and cultural values in the area, both for the present and in the future. A broadly based survey of written comments from Kohala residents regarding their perception of the impacts would be helpful in identifying social issues surrounding this project. Statistics of solid waste and household costs in Table 10 of the Draft EIS are believed to underestimate actual costs. It is our understanding that social workers in the Kohala area are overworked, which may contribute to some cases not being reported. For your information, we have attached a report compiled by a group of Kona parents that was written in response to the need for permanent staffing for West Hawaii Child Protective Services.
Seawater Swimming Lagoon

Each sand at the proposed swimming lagoon may be transported beyond
the lagoon. As a contingency against this type of impact, the Final EIS
should indicate the grain size of the beach sand and introduce either a
physical or analytical model indicating wave energy and estimates of
potential sand transport.

Thank you for the opportunity to comment on this Draft Environmental
Impact Statement. We hope our comments will be helpful in completing
the final document.

Yours truly,

Jacqueline M. Miller
Associate Environmental Coordinator

Attachment

CO: OEQC
Anne L. Napua
Beck Collins and Associates
L. Stephen Lau
Richard Krock
Hana-Kinayan Krock
Jun Nakamura
John Harrison
Pamela Bahnsen
Steven Awa

University of Hawaii at Manoa
Environmental Center
Crawford 337, 100 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 956-7301

June 24, 1987

Mr. Albert Lone Lyaun
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96726

Dear Mr. Lyaun:

Review of Draft Environmental Impact Statement
Keau Lani, The Ritz-Carleton

The enclosed document is the referenced attachment for our review on
Keau Lani dated June 23, 1987 which was not included with your copy of the
report. We are sorry for any inconvenience this may have caused you.

Thank you very much.

Yours truly,

Jacqueline M. Miller
Associate Environmental Coordinator

Attachment

CO: Office of Environmental Quality Control
Anne Napua, Beck Collins & Associates
Page 2

Ronnie District (Cont.)
- 1 aide is on staff with an immediate need for a second aide.
- Paperwork has just begun to fill the vacant clerical typist position for Mrs. Kuno.
- Both the 2 secretaries and clerical typists already in place should be adequate clerical support for Mrs. Kuno.
However, turnover will still exist as long as Waimea/Kohala requires clerical support from Roni staff.

Unit 3B - Post-Release and Case Management (Unit covers North & South Kona, Waimea & Kohala Districts, an area west of the Island of Hawaii)

- 1 social worker covering 250 cases.

Unit 3B Staff:
- 1 clerical worker covering 250 cases.

Kona District (Cont.)

- 1 crisis CIS worker who has been the sole crisis worker since July 1979.
- Reports a caseload of 591.
- Other new cases.
- 10 new cases.
- Worker is the National Association of Social Workers (NASW) member.
- Another crisis worker is in process of being hired.
- 1 additional new case is closed.
- 2 new cases.
- Closed due to worker illness.
- Crisis worker is in process of being hired.
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C. **STATE HEALTH DEPARTMENT**

Santa Clara district was the fastest growing district of the Big Island and a

residential population that nearly tripled between 1960 and 1970. Hilo district, the

largest urban center of the island, grew at a slower rate. The population of the

island between 1960 and 1970. However, the population of the island grew

during the 1970s, but at a slower rate due to factors such as increases in

population growth rate. The growth trend is expected to continue.

D. **RECOMMENDATION**

A West Hawai'i Branch, independent of the East Hawai'i Branch, should be created

and its own branch Administrator. This recommendation is due to the

depending on the recommendations of the branch Administrator. The

sanitation and housing services are not kept pace with the population growth, and

the trend is expected to continue.

**IMMEDIATELY**

The above-mentioned positions are needed immediately

to meet current workload demands!!

---

Questions regarding the content of this report may be addressed to:

Deborah Chang Abreu

"Families in Action"

202-0033
2. Social

Thank you for the positive comments in regard to the social impact section of the Draft EIS. As per your suggestions in regard to population impacts on current lifestyles and cultural values, we will add the following new paragraph at the end of Section 2.2.7.1.3 (Worker In-Migration and Related Population Change):

In migrating new population could also have impacts on existing lifestyle and cultural values, particularly in the direction of more “mainland/farther” and less “local/mauka.” However, the extent to which this actually happens will depend on, among other things (1) the location of future new residential development (i.e., whether in-migrants are widely dispersed among existing communities or are concentrated in new communities); and (2) the actual demographics of the newcomers. While Maui and West Hawaii resort expansion in the 1960s and 1970s attracted mostly young, mainlanders, several major Neighbor island resorts in the 1980s have made an effort to recruit Hawaii-born residents. Such targeted recruitment, as well as job training for disadvantaged West Hawaii residents to minimize need for in-migration, represents one of the major recommended forms of socioeconomic mitigations (see Section 2.2.8).

In regard to the suggestion that a broadly based survey of written comments from Kohala residents... would be helpful in identifying social issues surrounding this project,” we might note that written responses to the Draft EIS and the original Prehearing Notice provide exactly such a record. The key concerns expressed in both letters have mostly related to shoreline issues within the socioeconomic domain, there has been a sensitivity to housing issues (although more in regard to cumulative impacts than from the Ritz-Carlton Mauna Lani project alone).

Finally, thank you for the input from “Families as Allies” on West Hawaii child abuse statistics. In the Final EIS, we will make note of this by modifying the second paragraph of Section 2.2.7.2.3 as follows:

“Child abuse figures must be treated with great caution because ... (3) reported cases are also partly a function of the number of caseworkers who are present to record the reports, and an organization of Kona parents recently prepared a report suggesting that — due to staffing problems — West Hawaii caseworkers have much higher caseloads than official State statistics would indicate (Families as Allies, 1987).”

3. Scavenger swimming (lanceo) -- The grain size of sand will be well sorted, medium to coarse calcareous (see page 23 of the Draft EIS).

The existing conditions in the portion of Pasaa Bay where improvements will be made are those of a very stable sand beach which does not move seasonally, either in and out or laterally. The factors contributing to stability include (1) the orientation of the embayment, (2) the relatively shallow water in the bay, and (3) the extensive emergent/marsh land which will not be changed by construction. All work will be done inside, leaving outcropping in place to ensure stability. We do not expect the sand to move.

As to your suggestion for modeling the existing beach as a full-scale prototype of a stable beach. The light colored sand at the existing beach area does not mix with the dark striped sand further north; it is expected that the non-mixing of elements will be maintained after construction of shoreline improvements.

Sincerely,

Anne L. Mapes
Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

June 23, 1987

Dear Mr. Lyman:

Subject: Draft EIS - Ritz-Carlton Mauna Lani

The above-mentioned document has been reviewed as requested by the Kailua State Office of Environmental Control. Comments are as follows:

1. Proposed construction will increase sedimentation of neighboring water that makes it important to have a dry well made or "natural levee" (pp 14-15) available before start of major construction; also, to reduce dust problems with use of sprinklers during construction.

2. Until a permanent ground cover can be established, a temporary cover such as read rye is recommended. This will help protect against wind and water erosion.

3. The lagoon should be opened to the bay only after they are completed to cut down on the amount of sediment that would reach the bay.

4. Page 12. Deposition of sediment - Sediment pumped out of the pond should not be deposited in the ocean or where it can wash into the ocean.

5. Placement of sand on the beach should be limited because of the possible damage to inshore reef ecosystems.

6. Page 11-12. The developer may take sand for the beach from the Mo'omomi area of Waikiki. This area is the site of the Mo'omomi Knows which are widely known for their ecological and archaeological significance and their environmental sensitivity. The importance of this area has recently heightened in a special report by Honolulu Public Television and also in the "Baron's March 1987 Article on the Nature Conservancy Magazine". Members of the Bishop Museum staff have made several palaeontological finds that they regard significant. If there is any doubt as to the fragility of this ecosystem, we would suggest that the developer contact the Bishop Museum in Honolulu.

Sincerely,

Richard E. Mapes  
State Conservationist

cc: Anne L. Mapes, Belt, Collins & Associates, 605 Coral St., Honolulu, HI 96813

July 16, 1987  
87-1144

Mr. Richard N. Duncan  
State Conservationist  
Hawaii Department of Agriculture  
P.O. Box 5005  
Honolulu, Hawaii 96810

Dear Mr. Duncan:

Draft Environmental Impact Statement for the Ritz-Carlton Mauna Lani, Mauna Lani Resort  
South Kohala, Hawaii

This letter is in response to your letter of June 23, 1987 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, concerning the above project. Your comments are addressed in the order of appearance in your letter.

1. We agree with your suggestions.

2. The project site is almost completely devoid of soil and therefore no ground cover is needed.

3. We agree that the lagoon will be opened to the bay after it is essentially constructed.

4. Sediment will be pumped onto a land site, away from any archaeological sites, and ultimately, will be hauled away.

5. The project area is one of decommissioned stability. The existing conditions in that portion of Waiakea Bay where improvements will be made are those of a very stable sand beach which does not move in and out or laterally. Factors contributing to this stability should be (1) the orientation of the move in and out or laterally. Factors contributing to this stability should be (2) the existence of a man-made embayment, (3) the relative depth of water in the bay, and (4) the extensive emergent/semiaquatic vegetation which will not be changed by construction. All work will be done inside, leaving outcropping in place to ensure stability. We do not expect the sand to move.

6. A site for the sand has yet to be selected, but it is unlikely to be the Mo'omomi area of Waikiki. The site chosen will be based on specifications established for the sand, as well as on economic considerations, including the cost of permitting.

Sincerely,

Anne L. Mapes
June 24, 1987

Mr. Albert Leon Lyman
Planning Department
County of Hawaii
25 Anapuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Draft Environmental Impact Statement (DEIS)
Ritz-Carlton Maui Lani
Mauna Lani Resort, South Kohala, Hawaii

We have the following comments concerning the subject proposed developments:

1. Normally, we forecast traffic impacts over a 20-year time frame rather than the 10-year time frame requested by the County of Hawaii. The results of a 20-year analysis will be significantly more adverse than for a 10-year analysis.

2. Were all proposed developments in this region included in the traffic analysis? If not, how were the determinations made which developments should be included in the traffic analysis?

3. We are interested in the traffic counts taken by the developer's consultant which should have been included in the DEIS.

4. For scenarios 1, 2, 3 & 5, what are the "existing traffic" conditions for the years 1993 & 1998? Also, how were these "existing traffic" values derived?

5. Level of Service H for a rural area is normally considered unacceptable. If the consultant's analysis is correct, then we will have significant problems on Helana-Kaualii Drive and Queen Kuhio Highway from Palani Road to the Helana-Kaualii Road. All major intersections in this region will also be affected. Funding constraints will no doubt preclude us from completing the improvements needed to accommodate the traffic projected by the consultant. Therefore, we will be seriously considering methods to obtain developer assistance in funding these necessary transportation improvements.

6. Mitigation measure(s) for the Ritz-Carlton Maui Lani Resort hotel access at Queen Kuhio Highway will be required, based on scenario 6 for the year 1998. The DEIS should contain a discussion on what improvements would be necessary at this intersection and the developer's commitment to fund these improvements in a timely manner.

7. All improvements contemplated within the State highway right-of-way will be subject to review and approval by the State Highways Division.

We appreciate this opportunity to provide comments.

Very truly yours,

[Signature]

Dako

Edward Y. Hirata
Director of Transportation

Ms. Anne Hapes, Bilt, Collins & Associates
Mr. Edward Y. Hinata
Department of Transportation
State of Hawaii
659 Punchbowl Street
Honolulu, Hawaii 96813

July 14, 1987
87-1445

Dear Mr. Hinata:

This letter is in response to your letter of June 24, 1987 to Mr. Albert Le Sue Lyman, Director of the Hawaii County Planning Department, concerning the above project. Your comments are addressed in their order of appearance in your letter.

1. Traffic impacts were forecast over a period of ten years at the request of the Hawaii County Planning Department and it was felt that a 10-year forecast would be more accurate than a 20-year forecast. Growth in traffic is a function of development in an area and no development schedules are available for projects beyond the next ten years. We agree that, given continued growth in the region, traffic impacts in 20 years' time will be greater than in 10 years' time. However, the magnitude of the impact cannot be reliably predicted.

2. Only those projects likely to be developed within the 10-year timeframe were included in the traffic analysis. They are the Ritz-Carlton Mauna Lani, South Kohala Resort, the Hyatt Regency Waikoloa, Kohala Ranch, and an expanded hotel in the North Kohala area.

3. The traffic counts will be submitted to your department upon request.

4. "Existing traffic" conditions for 1993 and 1998 are based on traffic counts taken by Ritz Carlton engineering staff in 1987.

5. We agree that funding for roadway improvements is an issue for discussion and negotiation between public and private entities.

6. The left turn out of Mauna Lani Resort onto the northbound segment of Queen Kamehameha Highway is expected to operate at level of service "F" in 1998. It is projected that 240 vehicles per hour will make this turn during the PM peak hour. However, the delay will occur on the Mauna Lani Road leg of the intersection and no delay is expected on Queen Kamehameha Highway.

7. We agree that improvements within the State highway right-of-way will be subject to review and approval by the State Highways Division.

Sincerely,

Asa L. Mapes
CHAPTER XIII
OTHER CORRESPONDENCE

Letter of April 13, 1987 from State Parks Administrator, DLNR, to Belt Collins & Associates


Letter of June 17, 1987 from State Parks Administrator, DLNR, to Belt Collins & Associates
Mr. Anne Hapes
April 13, 1987

Dear Ms. Hapes:

SUBJECT: Historic Preservation Review -- Biltmore Hotel at Mauna Lani
Kohala, South Kohala, Hawaii

This letter follows your April 8, 1987, meeting with Dr. Ross Cordy of our Historic Sites Section.

We have been involved in historic preservation reviews for this hotel project for the following actions: a State Conservation District Use Application (CDUA 84-2039), a U.S. Army Corps of Engineers permit (PRDOO-0 1977-D), an EIS Preparatory Notice, and a County of Hawaii Special Management Area permit (SMAP 86-20). We corresponded similarly to all these actions (copies attached). Basically, we needed information on which historic sites are in the hotel parcel, so historic preservation review steps could be initiated.

Based on the April 4th meeting, it is now clear that 5 historic sites are within the borders of the hotel's parcel -- EI-304, EI-32, EI-33, E1-35, and the fishpond which is in our records as Keahalani. To cover historic preservation review steps for each permits, it now needs to be determined (1) which sites are significant, (2) if any significant sites will be impacted and, if so, the nature of the impact, (3) what kinds of mitigation plans to any impacted significant sites will be appropriate. We cover these items below.

Significance Assessments

We have limited descriptions of these sites in our Hawaii Inventory of Historic Places (Kiech 1979 for the first 4 sites; Kikuchi 1973 and Apple & Kikuchi 1975 for the fishpond). However, based on this information, we have reached the following significance assessments:

1. EI-304: "No longer significant." This site did contain some information significant on the history of the area, but this information was adequately recorded by Kiech (1979:20).

2. EI-32, EI-33: Significant solely for their information content. These areas are sites with some shallow and spatially restricted deposits (Kiech 1979). The significant information in these sites includes the architectural details and information contained in the deposits (including dates).

3. Keahalani Fishpond: Significant for its information content (architectural details and possible fishpond sediments) and as a good example of a site type, a fishpond established in an anchialine pond.

In sum, these are significant historic sites in the hotel parcel, in our opinion. All seem to be in the SMA application areas; only the fishpond seems to be in the CDUA and Corps permit application areas.

For each permit action, the relevant parties will need to agree in writing on these significance assessments, or meetings need to be held to reach an agreement.

Determinations of Effect

The fishpond is again in all permit application areas. The applicant proposes to preserve and restore the fishpond, so there will be an effect to this site. However, this will be a beneficial effect, a "no adverse" effect, if the restoration is done properly. For the Corps of Engineers permit, this determination of effect must be in writing from the Corps to our office in order to comply with the National Historic Preservation Act. Also, the U.S. Advisory Council on Historic Preservation must review the materials leading to this decision and certificate. The Corps submits this documentation.

In our meeting, you were unsure if the 3 island sites in the SMA application area would be affected or not. If they will be avoided, "no effect" to these 3 sites will occur, and historic preservation review ends for these sites. If they will be impacted, then an "adverse effect" will occur.
However, if acceptable archaeological data recovery takes place to recover the significant information in these sites, then we believe a "no adverse effect" determination would result. You should consult with the County Planning Department to see if they agree with this determination. Please let us know which option the applicant selects.

Mitigation Measures

For the SNA, if the three inland sites will be impacted and data recovery is to occur, data recovery needs to be acceptable. This means that a short, but concise, data recovery plan should be devised and reviewed and approved by the County's Planning Department, which usually asks our review also. We can advise you in the preparation of this plan.

Also, the Planning Department will need to verify the successful execution of the data recovery plan. Again usually asking our verification also. For the SNA, usually the applicant simply has to commit to data recovery, with the stated conditions of plan review and execution verification. The plan review and the execution verification can often simply be a condition of the SMA permit.

Given the small size of these sites, it is quite clear that data recovery will be fairly simple and can be rapidly concluded. (Our letter of November 6, 1986 to Mr. Lyman of the County of Hawaii offers some suggestions for data recovery.)

For the fishpond, again, restoration needs to be done properly to avoid damaging the integrity of the site. For all the permits, several steps are needed to ensure proper restoration. One, the pond needs to be better described and studied by an archaeologist in order to establish its dimensions, architecture, the possible presence of fishpond sediment, and other features. Two, given the findings, any resultant restoration plans should ensure that restoration is consistent with the pond's original architecture. Three, if the fish pond contains fishpond sediments and if these will be dredged out and thus damaged, some very minor archaeological data recovery needs to occur, usually a core or two with laboratory analysis and dating of the sediments. The key step here is clearly the improved archaeological description. The findings and the plans need to be revised and approved by our office, the County's Planning Department and the Corps of Engineers.
June 16, 1987

Mr. John O. Emerson  
Chief, Operations Branch  
Construction-Operations Division  
Department of the Army  
U.S. Army Engineer District, Honolulu  
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Emerson:

SUBJECT: National Historic Preservation Act Compliance  
Permit FUCDO-9 1977-SD, Ritz-Carlton Hotel (Mauna Kea  
Lani Resort)  
Kahuhui Kai, South Kohala, Hawaii


We agree with your determination of "no effect". No historic sites are within the permit area. The fishpond, which is adjacent to the area is significant and likely to be eligible for the National Register of Historic Places, but the fishpond is outside the permit area and will not be affected by the proposed project.

You are correct in understanding that the fishpond and other historic sites in the Ritz-Carlton parcel will be handled under County and State permits. These permits will ensure that the fishpond will be appropriately restored and that 3 inland sites will be preserved or undergo archaeological data recovery.

In sum, we concur that you have complied with the procedures under Section 106 of the National Historic Preservation Act.

Sincerely yours,

WILLIAM M. PATY  
Chairman and State Historic  
Preservation Officer

CC: A. Mapa, Belt, Collins & Associates  
R. Hartig, Mauna Kea  
A.L. Lyman, Planning Dept., County of Hawaii
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF DIRECTOR
P. O. BOX 200
HONOLULU, HAWAII 96813

June 17, 1987

Ms. Anne Napes
Senior Planner
Bolt, Collino & Associates
405 Coral Street
Honolulu, Hawaii 96813

Dear Ms. Napes:

SUBJECT: Historic Preservation Review -- Hilt Carlton Hotel at Mauna Lani
Kaupuna'a, South Kohala, Hawaii

This letter follows a May 19, 1987 field check of the historic sites in the project area. Rose Cordy of our staff, Michael Connelly of Mauna Lani, and Albert Lono Lyman, Tim Lui-Kwan, and Connie Kilou from the County Planning Department participated in this field check. Additionally, Michael Lee of the U.S. Army Corps of Engineers was involved in the check of the coastal fishpond.

The significance determinations for these sites are unchanged from our April 13, 1987 review letter. Some additional information was gathered on the fishpond and its associated sites (El-306, 307) and on 2 of the 3 inland significant sites, El-32 and 35. The findings for the inland sites showed them much as described by Kitch in his 1973 study. For the fishpond, it appears that the pond does not include any architectural walls, unless there is a wall on the beach side under the sand which blocks off an original entrance to the sea. Rather it is in a depression with a natural pahoehoe drop-off on one side. There are some minor, unrecorded archaeological features on the edge of this drop-off -- besides manufacturing basins -- and caves El-306 and El-307 are on this side, with 307 actually leading to the pond. Both these sites should be considered a unit with the fishpond. The rest of the pond's edge has been altered by past building, so no other associated archaeological sites are present. The pond's specific shape and size cannot be determined easily without clearing; it does contain fishpond sediments.

Determinations of effect remain the same, with one important exception. The Corps of Engineers permit does not include the pond area, so a "no effect" determination to historic sites has been worked out between the Corps and our office, with the notification that the adjacent fishpond will be properly restored in other projects and its visual integrity will be preserved. This means that the federal historic preservation law will not come into effect. A "no adverse effect" ("beneficial effect") determination contingent on proper restoration still applies for the fishpond for the CUGA and County permits. For the inland sites, again, the applicant will have to decide either to avoid or to conduct archaeological data recovery. The first is "no effect", the second "no adverse effect".

Mitigation measures remain unchanged. They can be further specified, and Attachment I provides more details on what would be needed for archaeological data recovery of the inland sites and for proper restoration of the fishpond.

In sum, with the Corps of Engineers' permit area having "no effect" on significant historic sites, your applicant will solely have to work with our office and the County Planning Department. This should simplify matters.

If you have any questions or would like to meet with our staff to discuss the project further, please feel free to contact our office. Mr. Cordy will be our contact person, but as you know he is now on vacation until July 1st.

Sincerely yours,

[Signature]

HALSTON K. NAKADA
State Parks Administrator
Attachment
cd: N. Lee, Operations Branch, U.S. Army Corps of Engineers
A.L. Lyman, Planning Department, County of Hawaii
MUTATION PLAN

Kalahupua Fishpond. The following tasks are recommended to ensure proper restoration. Item 5 must be done by a professional archaeologist.

1. Clearing of vegetation. This does not need an archaeologist present, as long as no heavy machinery is taken to the edge of the pond. It probably will be desirable not to clear out all the trees; for example, coconut and others probably can be left for shade and aesthetic effect.

2. Locate any additional archaeological features (such as adzes of grinding basins) on the pahoehe or the edge of the pond. This is a very easy task which should take no more than a few hours.

3. Map the fishpond's borders, including sites El-306 and 307 and any archaeological features found on the edge of the pond.

4. Document the appearance of the pond, with photographs.

5. Take 2 cores of the sediments, analyze the sediments, and attempt to radiocarbon date the initial use of the pond for aquaculture.

6. Produce an archaeological report documenting the archaeological work.

7. Remove sediments as desired, with heavy equipment allowed only where archaeological features are not present and with care to have such vehicles not near the pahoehe edge of the pond.

8. Restore the pond to operating conditions with care not to damage the archaeological remains and with care not to alter the visual integrity of the site.

INLAND SITES

The information in these sites will be applicable to a few general research questions on the prehistory of Kalahupua'a. Such research questions need to be clarified before fieldwork. And it should be clear just what information will be gathered from these sites to answer these questions.

1. El-306 - Ti'itoi C-shaped Enclosure. Data recovery should include:
   a. A scale map of the site.
   b. Representative collection of archaeological remains on the surface (shell middens, artifacts, manufacturing debris, volcanic glass, etc.).
   c. Test excavation of 3 m² (15%) of deposits are present. Stratigraphic profiles, with soil descriptions, of each layer, must also be given.
   d. Laboratory analysis and description of food remains, artifacts, etc. -- including radiocarbon and/or volcanic glass hydration dating.
   e. Interpretations.

2. E2-37 -- Complex with 4 C-shaped enclosures, an oval enclosure and test area, petroglyph and grinding basins. Archaeological data recovery should include:
   a. Scale map of the site and its features.
   b. Detailed map of the oval enclosure and its associated terrace.
   c. Scale drawings of each petroglyph.
   d. 3 m² of excavations in the oval enclosure (c. 20% sample). Stratigraphic profiles, with soil descriptions, of each layer, must also be given.
   e. Representative test excavations in C-shaped enclosures which include deposits to further establish the range of time over which this site was used.
   f. Laboratory analysis and description of food remains, artifacts, etc. -- including radiocarbon and/or volcanic glass hydration dating.
   g. Interpretations.

3. E2-33 -- Cave with external walled area. Data recovery at this site should include:
   a. Scale map of the site.
   b. 20% excavation sample of the cave and test excavation outside. Stratigraphic profiles, with soil descriptions, of each layer, must also be given.
   c. Laboratory analysis and description of food remains, artifacts, etc. -- including radiocarbon and/or volcanic glass hydration dating.
   d. Interpretations.

A concluding section in the archaeological data recovery report should discuss the findings of the data recovery work related to the general research questions. This must at least refer back to an evaluation of Kalahupua'a-wide patterns.
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The contours and elevations are based on the 1-mile grid and are derived from topographic surveys by U.S. Coast and Geodetic Survey. The elevations are referenced to mean sea level and are shown in feet above the National Geodetic Vertical Datum of 1929. The contour intervals are 20 feet. Any errors due to coarseness of the contour lines are shown by slight color variations. 

Figure 3

Offshore Bathymetry and Shoreline Topography at Paia Bay, West Maui
Figure 4 presents the results of sieve analyses conducted in the shallow waters of the bay, as well as at various sites along the coast. The analyses were performed on samples collected from different locations within the bay, from the shoreline to deeper depths. The results show the percentage distribution of different grain sizes, ranging from silt to coarse sand. The data are represented in a graph with grain size on the x-axis and cumulative percentage on the y-axis.

The graph indicates that the majority of the sand samples fall within the fine to medium sand categories, with a peak around 0.05 mm. This suggests that sediments in the bay are predominantly fine to medium-grained, which is typical for areas with moderate wave action and currents. Further analysis of the data would provide insights into the sediment dynamics and potential ecological implications of these findings.
There are several locations in the lava flows around the periphery of the bay where cracks and bilaters in the lava extend below the groundwater table. Salinity of groundwater in the anchialine pond on the south side of the bay was 3.8 ppt at a small hole in the center of the bay and 150 feet from the shoreline; it was 4.0 ppt; and in another hole on the north side and 70 feet from the shoreline, it was 4.5 ppt. All temperatures were from 25.0°F to 25.5°F (7.2°C to 7.5°C).

Quantifying groundwater discharge into the bay is difficult because it cannot be directly measured and any estimate is of obviously limited accuracy. Studies of groundwater in South Kohala have established the probable range of flow between three and seven million gallons per day (MGD) per coastal mile (Bowles, 1974; Nance, 1981; and Kaneko and Peterson, 1977). Those wells which are inland of Pauna Bay and may influence shoreline groundwater discharge currently pump a total of 3.1 MGD. Three of these wells lie on the southern coast of Pauna Bay (3.0 MGD) and the remaining one is on the southern coast of Pauna Bay (0.7 MGD). Based on these figures and on observations of the discharge itself, it is estimated that at least one million gallons per day of groundwater is discharged into the 0.15 miles of the coastal that the bay occupies.

WAVE CLIMATE

Prevailing Deepwater Waves

Wave types in Hawaiian waters and their relationship to Pauna Bay are depicted on Figure 5. Keahole Point, which is 25 miles south of Pauna Bay, intercepts waves from the southwest to bearing 225°. Maui, Oahu, Molokai, and Maui to the northwest provide shielding of waves from north of bearing 300°. This limits the direct wave exposure at Pauna Bay to the sector from 225° to 300°. Wave types within this sector include North Pacific swells from west-northwest and north-westerly and with southerly swell waves from west-southwest.

When other wave conditions prevail, the ocean off Pauna Bay is relatively calm.
Since the actual waves occurring outside of Pauoa Bay have never been directly measured, a review of available wave data for the region was conducted. Wave statistics developed for the OTC coldwater pipe testing program off Keahole Point were found to be the most representative of conditions outside Pauoa Bay. Two sets of these wave statistics will be presented. The first is a hindcast of wave directions, heights, and periods derived from meteorological conditions which occurred during the 20-year period from 1956 to 1975. This hindcast was originally developed by the U.S. Army Engineer Waterways Experiment Station (WEH) and was subsequently modified by Evans-Hamilton, Inc. (EHI) for conditions along the leeward coast of Hawaii. Modifications by EHI were based on sheltering effects and the inclusion of southern swell waves which are missing from the WEH data set. Results are summarized in Table 1. Wave heights of two feet or less occur 63 percent of the time, four feet or less for 29 percent of the time, and higher waves for the remaining 17 percent of the time. Wave periods of 10 to 16 seconds predominate. Most of these are associated with relatively low swell waves.

The second set of wave statistics was derived from a wave danger buoy which was anchored in 120 feet of water off Keahole Point. Waves measured by the buoy for the year from June 1975 through May 1976 are summarized in Table 2. As well as being a direct measurement, these incorporate diffraction and decay effects which occur as waves move away from their generating winds and interact with the submerged masses of the islands. The summary in Table 2 indicates that wave heights less than two feet occurred 47 percent of the time, wave heights less than four feet for 29 percent of the time, and higher waves for the remaining 25 percent of the time. Wave periods were generally less than 12 seconds. Major differences of this data with the WEH-EHI hindcast are that the percentage of wave heights over four feet is significantly less and that wave periods are generally shorter. Effects of diffraction and decay generally produce lower wave heights. It is also evident that short period waves generated by local winds, which are generally missing from the WEH-EHI hindcast, were a significant fraction of the prevailing wave climate measured by the wave danger buoy.

To apply the Keahole Point wave data to Pauoa Bay, further modification may be appropriate. Keahole Point has a broader exposure, both to the north and
Table 2
Summary of Wave Data in 130-Foot Deep Water
Off Keahole Point, June 1961 to May 1965
(Adapted from Edward K. Noda and Associates, 1966)

<table>
<thead>
<tr>
<th>Wave Period (Seconds)</th>
<th>Percent Occurrence of Significant Wave Heights (feet)</th>
<th>Total For All Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0.1 to 2</td>
</tr>
<tr>
<td>Calm</td>
<td>.3</td>
<td>.0</td>
</tr>
<tr>
<td>&lt;6</td>
<td>.0</td>
<td>4.5</td>
</tr>
<tr>
<td>6 to 8</td>
<td>.0</td>
<td>23.9</td>
</tr>
<tr>
<td>8 to 10</td>
<td>.0</td>
<td>14.3</td>
</tr>
<tr>
<td>10 to 12</td>
<td>.0</td>
<td>4.3</td>
</tr>
<tr>
<td>12 to 14</td>
<td>.0</td>
<td>.1</td>
</tr>
<tr>
<td>14 to 16</td>
<td>.0</td>
<td>.1</td>
</tr>
<tr>
<td>&gt;16</td>
<td>.0</td>
<td>.0</td>
</tr>
<tr>
<td>Total</td>
<td>.3</td>
<td>47.2</td>
</tr>
</tbody>
</table>

Deepwater Storm Waves

Storm waves approaching Paua Bay from its 215° to 300° sector of exposure occur intermittently in winter and very infrequently in other seasons. Those of concern are Kona storm waves, high swells from storms in the Pacific northwest, and hurricane waves. Previous studies which were consulted to delineate the range of extreme wave conditions include: Marine Advisors, 1953; U. S. Army Engineer District, 1967; Gayman and Greenbaum, 1968; Nodell, 1972; Sea Engineering, Inc., 1956; and Evans-Hamilton, Inc., undated. Storm waves from these references are tabulated below:

Summary of Storm Wave Heights and Frequencies of Occurrence

<table>
<thead>
<tr>
<th>Return Period (Years)</th>
<th>Evans-Hamilton, Inc. (Undated)</th>
<th>Sea Engineering (1956)</th>
<th>Nodell (1972)</th>
<th>All Deepwater Waves (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WWN Swells (Feet)</td>
<td>Kona Storm (Feet)</td>
<td>WWN Swells (Feet)</td>
<td>Kona Storm (Feet)</td>
</tr>
<tr>
<td>2</td>
<td>17.0</td>
<td>10.2</td>
<td>10 to 15</td>
<td>17.0</td>
</tr>
<tr>
<td>10</td>
<td>15.2</td>
<td>15.1</td>
<td>10 to 15</td>
<td>15.2</td>
</tr>
<tr>
<td>25</td>
<td>21.6</td>
<td>15.0</td>
<td>20 to 25</td>
<td>21.6</td>
</tr>
<tr>
<td>50</td>
<td>22.6</td>
<td>16.2</td>
<td>20+</td>
<td>22.6</td>
</tr>
<tr>
<td>100</td>
<td>23.8</td>
<td>17.5</td>
<td>--</td>
<td>23.8</td>
</tr>
</tbody>
</table>

Kona storm waves from southwest to west typically occur once or twice a winter but have occurred as often as six to seven times. Wave heights up to 10 feet in any given year are expected. Heights in the range of 15 to 20 feet have occurred historically but have an average recurrence of 10 to 25 years. Wave periods of eight to 10 seconds are typical for Kona storm waves. North Pacific storm swells, with periods of 12 to 20 seconds and heights in the 15-foot range, are a normal expectation in any given year. Only those from WW are of concern at Paua Bay, however. More extreme waves with heights
From 20 to 25 feet have an average recurrence of more than 10 years for the entire sector of North Pacific swell waves. Average recurrence at Puu Bay would be significantly longer than 10 years.

Hurricane-generated waves at the South Kohala coast are strongly dependent on the path the storm follows. Breitenbach (1953) developed hurricane parameters for a 50-year event: 55 knot sustained winds, 20 nautical mile radius of maximum winds, and a forward speed of 12 knots. Such a storm would produce wave heights of 37 feet and periods of 12 seconds (height and period are for the significant wave, defined as the average height and period of the highest one-third of all waves). If the storm followed the typical track in Hawaiian waters which is to the north and west, its waves would not be significant at Puu Bay. However, a track to the northeast similar to the path of Hurricane Iwa in 1982 but at a lower latitude could produce damaging waves. The probability of such an event is obviously more remote than once in 50 years.

Wave Transformation and Breaking

As deepwater waves move into the shallower water near Puu Bay, they are altered by refraction and shoaling until they ultimately break. Some of these reform as smaller, shorter period waves which penetrate further into the bay, perhaps to a second break at the shoreline. Refraction, which is the changing of wave direction in response to the shape of the ocean bottom, can result in a convergence or divergence of wave height and energy. Figures 6 through 10 are refraction diagrams for 6, 12, and 20 second waves from SW to NNE. For waves from WSW (305°) and W (270°), there is a pronounced convergence at each point of the bay and a divergence or diminishing of wave height and energy in the center of the bay. This effect is greatest on short period waves. For waves from NW (225°), focusing occurs on the north point and northern third of the bay's shoreline. It is likely that this wave condition is responsible for the steep, cobbled and boulder beach which exists there.

Shoaling generally results in higher wave heights in shallow water, an effect which is most pronounced on long period waves. Table 3 shows this effect for periods of 6, 12, and 20 seconds. It also shows the combined...
Table 3

Summary of Computed Shoaling and Refraction Coefficients for 8, 12, and 20 Second Waves Approaching the Center of Pauoa Bay from Southwest (225°) to Northwest (305°)

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>8 Second Waves From 225°</th>
<th>8 Second Waves From 270°</th>
<th>12 Second Waves From 225°</th>
<th>12 Second Waves From 305°</th>
<th>20 Second Waves From 305°</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_s$ $K_r$ $M/H_0$ $K_s$ $K_r$ $M/H_0$ $K_s$ $K_r$ $M/H_0$ $K_s$ $K_r$ $M/H_0$ $K_s$ $K_r$ $M/H_0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.94 0.57 0.94 0.94 1.00 0.94 1.06 0.77 0.82 1.06 0.85 0.90 1.12 0.77 1.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>0.96 0.48 0.96 0.96 1.00 0.96 1.11 0.72 0.80 1.11 0.79 0.83 1.18 0.76 1.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>1.01 0.38 1.01 1.01 1.00 1.01 1.17 0.67 0.78 1.17 0.70 0.82 1.18 0.75 1.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1.08 0.29 1.08 1.08 0.69 0.73 1.20 0.55 0.70 1.20 0.45 0.59 1.63 0.77 1.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1.35 0.20 1.35 1.35 0.52 0.66 1.51 0.44 0.66 1.51 0.37 0.52 1.93 0.61 1.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Wave height in shallow water relative to height in deepwater, $M/H_0$, is the product of the shoaling ($K_s$) and refraction coefficients ($K_r$):

$$M/H_0 = K_s \times K_r$$

2. The shoaling coefficient has been taken from Table C-1, Appendix C in Coastal Engineering Research Center (1954).

3. Refraction coefficients have been determined graphically by the method in Coastal Engineering Research Center (1954) 2-62 to 2-70.

CURRENTS

Currents within the bay are controlled by the prevailing wind condition. Currents within the bay are controlled by the prevailing wind condition. The current direction is from the northeast to the southwest. The current speed is about 1.5 knots. The current direction is from the northeast to the southwest. The current speed is about 1.5 knots. It is also possible to be increased by the wind. Observed speeds were a few knots to one-half knot.

The currents within the bay are controlled by the prevailing wind condition. The current direction is from the northeast to the southwest. The current speed is about 1.5 knots. The current direction is from the northeast to the southwest. The current speed is about 1.5 knots. It is also possible to be increased by the wind. Observed speeds were a few knots to one-half knot.
DESIGN CONDITIONS

For the range of wave conditions which occur, maximum runup heights and forces on shoreline structures in the center of the bay occur during high swell waves from WNW (309°). Significant wave heights of 15 to 20 feet and periods of 12 to 20 seconds are selected here to develop design parameters. However, a range of wave heights actually occur for any given wave condition. Based on approximating the spectrum of these heights with a Rayleigh distribution, the range of expected heights for 15- and 20-foot significant waves would be:

<table>
<thead>
<tr>
<th>Statistic</th>
<th>For Hs = 15 Feet</th>
<th>For Hs = 20 Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Height</td>
<td>23'</td>
<td>36'</td>
</tr>
<tr>
<td>Highest 1%</td>
<td>25'</td>
<td>33'</td>
</tr>
<tr>
<td>Highest 10%</td>
<td>21'</td>
<td>25'</td>
</tr>
<tr>
<td>Average Height</td>
<td>19'</td>
<td>22'</td>
</tr>
</tbody>
</table>

During this selected design condition, the highest waves would break in deeper water outside the bay (refer to the tabulation below and Table 4). Smaller waves, including those reformed after an outside break, would move into the bay to break in shallower water directly on the beach.

<table>
<thead>
<tr>
<th>Period (Seconds)</th>
<th>Hs = 15 Feet</th>
<th>Hs = 20 Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Breaking (Feet)</td>
<td>Breaking (Feet)</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
<td>22</td>
</tr>
</tbody>
</table>

The offshore break and translation of water shoreward causes a rise in water level referred to as wave setup. This condition enables smaller waves to penetrate further into the bay prior to breaking. It is these smaller waves which produce the highest runup and greatest forces at the shoreline. Calculated wave setup and resulting water levels are tabulated below. These are based on the occurrence of wave setup during a mean higher high water tide level, a prudent choice for design purposes.

### Summary of Wave Setup and Resulting Superelvated Water Level

<table>
<thead>
<tr>
<th>Wave Period (Seconds)</th>
<th>Hs = 15 Feet</th>
<th>Hs = 20 Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HMMW Tide Level (Feet msl)</td>
<td>Wave Setup (Feet)</td>
</tr>
<tr>
<td>12</td>
<td>2.26</td>
<td>2.25</td>
</tr>
<tr>
<td>20</td>
<td>1.36</td>
<td>2.74</td>
</tr>
</tbody>
</table>

**Notes:**
1. The mean higher high water (MHHW) tide level is the average of the highest of two daily high tides.
2. Wave setup is computed using the technique in Coastal Engineering Research Center (1984) to 3-104.

Wave runup on the beach above the superelvelated water level increases with breaker height but decreases with breaking distance offshore. The spectrum of possible breaking heights and distances offshore must be evaluated to identify the particular waves which produce maximum runups. For the 1.4 percent average bottom slope in the bay itself and the 1.7 slope of the present beach, estimated maximum runups above the superelvelated water level are 4.2 to 5.5 feet. This is the result of 8 to 12 second waves breaking 200 feet and less from the foot of the beach slope. Longer and shorter period waves produce lesser runup heights. When added to the design superelvelated water level, wave runup between 8 and 10 feet above mean sea level datum is the result. Notably, this corresponds to the maximum elevations of the natural shoreline born in the center of the bay. Some overlapping there and substantial overlapping in either side are the predicted results.

It is also appropriate to consider potential shoreline inundation by tsunami. Expected inundation by a 100-year tsunami was established for the National Flood Insurance Program (Housten, Carter, & Hoek, 1977) and is now incorporated in Hawaii County's subdivision regulations. At Paua Bay, this inundation level is eight feet at the shoreline and declines slightly with distance inland. Although this height was established using state-of-the-art techniques, it is based on a limited number of tsunami observations in the...
region and none of these in the near vicinity of Puama Bay. Further, this calculated height is very sensitive to the use of historic data. In view of this a more conservative tsunami height of 12 feet is recommended. This was the maximum height in Kauai (Bay during the 1946 tsunami). It is also the highest recorded in the region.

DESIGN RECOMMENDATIONS

This section of the report lists recommendations for nearshore elevations, the existing anchialine pond, expansion of the shoreline beach at the southeast corner of the Ritz-Carlton site, and design of the proposed swimming lagoon.

1. Shoreline Access. Access from anywhere along the shoreline to the water in the bay is difficult in calm conditions; surging currents during high waves make it dangerous. Access to deep water should be limited strictly to the proposed improvements along the southern third of the bay's shoreline.

2. Minimum Shoreline Elevation. Adopt 10 feet (m) as the minimum elevation for landscaping and recreational features along the shoreline which cannot tolerate periodic immersion by storm wave runup.

3. Minimum Floor Elevation. Adopt elevation 12 feet (m) as the lowest floor elevation of habitable structures. Although higher than required by County ordinance, this is a prudent choice in view of potential tsunami inundation.

4. Structures Seaward of the Shoreline. Construction of piers or groins which extend seaward of the shoreline is not recommended. Forces of the breaking waves and surges which can occur during high tide and wave setup would require relatively massive structures which would not be in keeping with the natural appearance of the bay.

5. Existing Anchialine Pond. The anchialine pond in the southwest corner of the Ritz-Carlton site is described as being in its "final stages of senescence" due to the accumulation of organics and silts (Dollner, 1982:138). Apparently this condition has existed for years. Detailed 1974 aerial photographs show a dense growth of surrounding trees. Nakoleh and Broek (1974:24) document the sediment bottom and vegetation. However, it would be relatively easy to reclaim this potentially attractive feature. The accumulated sediment can be removed by pumping. Surrounding vegetation should also be removed.

6. Shoreline Beach. Expansion of the shoreline beach at the southern end of the bay would provide a safe, natural-appearing swimming area as well as access for snorkeling in deeper water in the bay. Its location and the presence of the shallow area directly offshore would ensure stability of the beach. Also, the natural lava outcrops at each end of the beach will limit lateral movement of sand. Figure 12 illustrates the recommended development concept. It includes the following features:

a. The existing seawall and outcrop on which it is built would be removed.

b. The beach would have 300 feet of frontage at its mean sea level shoreline and a minimum 1.0 acres of sand area above this shoreline.

c. The swimming area would be excavated to -6.0 feet (m). This would provide a depth of about 5 feet during the mean lower low tide level (MLLW). At present, typical depths are one to two feet. Total excavation is estimated to be 6,000 cubic yards. Based on visual examination and experience with similar pahoehoe lava at the Puama Lea Bay Hotel shoreline, it is assumed that most or all excavation can be accomplished with a bulldozer and ripper.

d. The total amount of sand required, including the bottom of the swimming area, is approximately 4,700 cubic yards. Existing sand would be removed, stockpiled, and replaced after the excavation is completed. The balance of the sand requirement, estimated to be 2,100 cubic yards, would have to be imported from Uhihi or Kaluakoi.
e. Both lagoon options would require a rock wall to retain sand around the perimeter of the anchialine pond. Recommended elevation of the wall is 9.0 feet (asl).

f. The option to retain the pond entirely would have a 350-foot long shoreline at mean sea level, 1.1 acres of sand beach above this shoreline, and 0.8 acres of swimming area below it (Figure 14). Excavation is estimated to be 18,000 cubic yards. Approximately 5,050 cubic yards of imported sand would be required. A budget of $170,000 should be allocated for this project.

g. The option which would entail filling half of the anchialine pond would provide a slightly larger swimming lagoon and beach area (Figure 14). Its mean sea level shoreline would be 490 feet long. There would be 1.3 acres of sand beach above this shoreline and 0.6 acre of swimming area below it. Required excavation is 24,500 cubic yards. Imported sand would amount to 6,100 cubic yards. A budget of $800,000 should be established for this project.

Our recommendation is the option which would retain the anchialine pond entirely. The pond is worth rehabilitating and preserving and this can be done without sacrificing aesthetic and recreational values of the swimming lagoon.

REFERENCES


BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT AT PAUOA BAY, SOUTH KOHALA, HAWAII

PREPARED FOR
BELT, COLLINS & ASSOC.
HONOLULU, HAWAII
OCTOBER 29, 1986

STEVEN DOLLAR
Marine Research Consultant
INTRODUCTION

Coral reefs and other marine environments are often some of the most valuable aesthetic and recreational features of coastal tropical and sub-tropical resort developments. Because of the value of these aquatic environments, careful evaluation of the potential for degradation that might arise during construction and the ensuing operation of coastal resorts is an important preliminary step in development.

In the South Kohala District of the Big Island of Hawaii, the Ritz-Carlton Corporation is proposing to build a first class resort hotel at Pauoa Bay, located north of the Mauna Lani Bay Hotel (see Figure 1). In addition to the hotel and associated shoreline facilities, an 18 hole golf course is planned for the property surrounding the hotel. The shoreline and nearshore marine environment at Pauoa Bay is a pristine coastline that is presently unimpacted by any activities of man. In addition, a single anchialine pond is located near the shoreline at the southern end of the property. Plans for the hotel complex call for the possible construction of a salt-water lagoon, and beach modification for the purpose of improved access to the ocean for swimmers. Before such shoreline modification can be undertaken, however, it is necessary to evaluate the potential for permanent and degradational environmental alteration.
OBJECTIVES

Any potential environmental degradational processes may be minimized if the proper information is assembled early on in the development scheme. Environmental data can serve to identify areas that may be particularly susceptible to man-induced stresses, or conversely, particularly resistant to such stresses. Comparison of the magnitude of natural environmental impacts to anticipated anthropogenic (man-induced) stresses can serve to put into perspective the ultimate effects of the activities of man.

With these considerations in mind, the overall purpose of this report to present a descriptive and quantitative picture of the marine environment and associated biotic communities, and to evaluate the effects that the planned Ritz-Carlton Resort will have on this environment.

A specific objective of the baseline assessment is to gather information that describes the natural physico-chemical structure of the aquatic systems. Because shoreline modification and practices such as golf course irrigation and fertilization present a potential for alteration of natural chemical parameters, establishment of such a baseline is important. Chemical data corresponding to the specific criteria set forth in the State of Hawaii, Department of Health, Water Quality Standards (Chapter 54 of Title 11) have been used, in part, to establish the physico-chemical baseline.
Another objective of the environmental assessment is to establish quantitative baseline information to accurately depict the community structure of the indigenous populations inhabiting Fauoa Bay and nearby regions. Marine community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, other attached benthic fauna and flora such as algae and sponges, motile benthos such as echinoderms, molluscs, and crustaceans, and pelagic species such as reef fish and sea turtles. This information will serve to identify any living marine resources that may be of significant commercial or recreational value, or that represent rare or unique ecological features that may be especially susceptible to human-induced stress.

The emphasis of this report is not, however, directed at an extensive compilation of either lists of organisms inhabiting the area, or extensive tabulation of chemical measurements, as is often the case with environmental assessments. Rather, emphasis is placed on characterizing the aquatic environments as integrated communities under the influence of specific physico-chemical processes. Describing the cause and effect relationship of these processes in shaping biotic community structure is the major intent of the survey.

With these ideas in mind, permanent baseline stations or "benchmarks" were established in order to allow monitoring of the same stations in the future. This provision is in accordance with the State of Hawaii, Department of Health (Chapter 54 of Title 11, Administrative Rules entitled "Water Quality Standards"), which specify that permanent benchmark stations be established for monitoring of marine biological communities. Water quality standards shall be deemed met if time-series surveys of benchmark stations indicate no relative changes in the relevant biological communities, as noted by biological community indicator organisms which may be applicable to the specific site.

In the context of time-series surveys, the most useful biological assemblages for direct evaluation of environmental impacts to the offshore marine environment are benthic (bottom dwelling) communities. Because benthos are generally long-lived, immobile, and intimately affected by exogenous input of sediments and other potential pollutants, these organisms must either tolerate the surrounding conditions within the limits of adaptability or die. As members of the benthos, stony corals are of particular importance in nearshore Hawaiian environments. They contribute a large portion of the reef biomass and their skeletal structures are vital in providing a complex of habitat space, shelter, and food for other species. Since corals serve in such a keystone function, coral community structure is considered the most "relevant" group in the use of reef community structure as a means of evaluating past and potential impacts associated with land
development. For this reason, and because alterations in
coral communities are easy to identify, observable change
in coral population parameters is a practical and direct
method for obtaining the information that is required to
meet existing environmental regulations.

In addition, because they comprise a very visible
component of the nearshore environment, detailed
investigations of reef fish assemblages are presented.

METHODS

WATER QUALITY

Water quality was evaluated at 8 stations within Pauoa
Bay as well as at a control station approximately 1 mile
offshore (see Figure 2). Water quality parameters
evaluated were the nine specific criteria designated for
open coastal waters in S11-54-06 of the Water Quality
Standards. These criteria include: total kjeldahl
nitrogen, ammonia nitrogen, nitrate + nitrite,
orthophosphate phosphorus, total phosphorus, light
extinction coefficient, chlorophyll a, nephelometric
turbidity, and nonfilterable residue.

Water samples for nutrient analysis were taken in 125
ml acid-washed polyethylene bottles. These samples were
filtered through glass fiber filters in the field and
immediately placed on ice. Analysis for ammonium, nitrate
plus nitrite, orthophosphate, conducted using standard
techniques on a Technicon Autoanalyzer. Total nitrogen and
phosphorus were analyzed in a similar fashion following
persulfate digestion. Water for other analyses was
collected in 1 liter polyethylene bottles and kept chilled
until analysis. Chlorophyll a was assessed by fluorometric
methods, turbidity was measured with a Turner nephelometer,
and nonfilterable residue was assessed gravimetrically.
All laboratory analyses were conducted by AEOS
Environmental Laboratory in Honolulu.

Light extinction was measured in situ using a Licor
integrating photometer.

COASTAL REEF ENVIRONMENT

All field work was carried out on October 9-12, 1986,
and was conducted from a 19 foot boat, as well as from
shore. Several methods were employed in the collection of
qualitative and quantitative data. Qualitative
reconnaissance surveys covering the entire area fronting
the development parcel were conducted by slowly towing a
diver behind a small boat, and by swimming throughout inner
Pauoa Bay. These surveys were useful in making relative
comparisons between areas, identifying any unique or
unusual biotic resources, and providing a general picture
of the physiographic structure and benthic assemblages
occurring throughout the region of study.

Following the preliminary survey, three quantitative
transect sites were selected offshore of the development
area (see Figure 3). These sites were designated as Pauoa
North (PN), Pauoa Central (PC), and Pauoa South (PS). Two of the sites (PN and PS) corresponded with study sites that were evaluated in 1983 as part of a baseline assessment of the marine environment at Pauoa Lani Resort (Roller and Winn 1983). Re-surveying these sites for the present study allowed for time-series comparisons of the effects of natural processes on community structure.

All site locations were accurately determined and recorded using a hand-bearing compass and triangulation sightings of distinguishable landmarks. At each site, line transects were conducted at depths of approximately 15, 30, and 60 feet. These depths correspond to the three generalized major West Hawaii reef zones. In addition, 3 shallow transects in inner central Pauoa Bay were surveyed. Each transect is designated by the location and the depth. For example PC-7 is the most shoreward transect in central Pauoa Bay located in 7 ft. of water.

Transects were 200 feet long and were oriented parallel to the shoreline in areas deemed to be representative of community structure. When possible, the ends of each transect were permanently marked for possible future monitoring studies by pounding steel stakes into the substrate. A surveying tape was laid out over the reef surface parallel to depth contours between two marker stakes. An aluminum quadrant frame with dimensions of one meter by two-thirds meter was sequentially placed over ten random marks on the transect tape so that the tape bisected

Figure 2. Detailed map of Pauoa Bay showing depth contours and location of water chemistry sampling stations. Location of control station is not to scale and is located approximately 1 mile offshore.
the long axis of the frame. At each quadrat location a color photograph recorded the segment of reef area enclosed by the quadrat frame. In addition, a diver with knowledge of the taxonomy of resident species visually estimated the percent cover and occurrence of organisms and substrate types within the quadrat frame. Only macrofaunal species greater in size than approximately 2 cm were noted; no attempt was made to identify or enumerate cryptic species dwelling within the reef framework, or nocturnal species that inhabit the reef surface only at night.

Following the period of field work, quadrat photographs were projected onto a grid and units of bottom cover for each species and bottom type were calculated. This information was combined with the in-situ cover estimates and the combined assessment provided the data base for the benthic community structure analysis. Species diversity was calculated using the Shannon-Wiener index, and can be equated with the equitability, or dominance, of distribution of the species occurring on each transect.

The practical advantages of photo-transects are numerous: most species can be easily and accurately identified from transparencies, and the transparencies provide a permanent record for subsequent time-series comparisons. Also, photo-quadrat sampling is rapid and efficient with respect to time and data collected - an important consideration under conditions where underwater time is restricted by cost, depth and exposure.
Quantitative assessment of reef fish community structure was conducted in conjunction with the benthic surveys. As the transect tape was being laid along the bottom, all fishes observed within a band approximately six feet wide along the transect path were identified to species and enumerated. Care was taken to conduct the fish surveys so that the minimum disturbance by divers was created, ensuring the least possible dispersal of fish. Only readily visible individuals were included in the census, no attempt was made to seek out cryptic species or individuals sheltered within coral.

RESULTS AND DISCUSSION

PHYSICAL STRUCTURE OF SHORELINE AND PAUOA BAY

Pauoa Bay is a semi-circular indentation in the coastline approximately 1000 feet wide at the mouth bounded on the south by Keawakapu, and on the north by Lee o Paniolo. Pauoa Bay, however, cannot be classified as a true "bay" according to the Department of Health criteria because the ratio of volume to cross-sectional area is approximately 200. In order to be classified as a bay the ratio must equal or exceed 700.

Structural composition of the approximate one-half mile of shoreline of the Pauoa property is a basaltic ledge interspersed with pocket beaches composed of rounded basaltic rocks, white coral rocks, and grey sand (see Plate 3). The coral rocks have been thrown up on the shoreline after being broken loose by storm action.

Composition of the bottom within the bay is predominantly a basalt and limestone surface covered with a thin veneer of sandy sediment (see Plates 2 and 3). Interpersed in the rock surface are depressions that are often filled with rubble fragments created by impact from storm waves to living coral colonies (see Plate 3).

Hydrographically, the entire inner bay is less than 12 ft deep. A small sill approximately 8 ft. deep occurs across the mouth of the bay. This sill appears to be the area that receives the brunt of impact from long-period swells that cause breaking waves within the bay. The present survey was conducted during a period of moderate wave activity, and the force of breaking waves on the sill was observed.

Seaward of the two points that define the inner bay, bottom topography is typical of much of the offshore region of west Hawaii. A relatively flat reef terrace extends out to a water depth of approximately 50 ft., a distance of approximately 1000 to 1500 ft. offshore. Composition of the reef terrace is predominantly basaltic, and represents the seaward extension of the island mass. Much of the basaltic substrate is covered with a veneer of limestone resulting from the activity of reef organisms.

Beyond the reef terrace, bottom slope increases to 20-40° and extends to abyssal depths. Bottom cover on the
island slope is predominantly white sand.

WATER QUALITY

The location of 8 water quality stations in Paqua Bay, and the control station are shown in Figure 2. As mentioned previously, according to the criteria defined by the Department of Health, Paqua Bay is considered open coastal waters that are classed AA. Groundwater extrusion in the region is estimated at about 3 million gallons per mile per day (T. Nance, Belt Collins & Assoc., personal communication). This discharge rate equals the boundary between “wet” and “dry” criteria as defined by the DOH; as a result both wet and dry criteria will be considered applicable to Paqua Bay water quality.

Table 1 shows the limiting values of the nine specific parameters specified by DOH for wet and dry conditions of open coastal waters. Table 2 shows the values of the water quality parameters from the eight Paqua Bay stations, the mean and standard deviation for the combined Paqua Bay stations, and a control station 1 mile offshore. It was not possible to measure light extinction inside Paqua Bay because that measurement requires access with a boat.

It can be seen by comparing Tables 1 and 2 that the geometric means for all chemical parameters in Paqua Bay except PO₄ exceed the dry criteria specified by DOH. In addition, four criteria (Total N, NO₃+NO₂, Chl. a, and

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Geometric mean not to exceed the given value</th>
<th>Not to exceed the given value more than 10% of the time</th>
<th>Not to exceed the given value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Kjeldahl N</td>
<td>150.00*</td>
<td>250.00*</td>
<td>350.00*</td>
</tr>
<tr>
<td>Nitrogen (ug N/l)</td>
<td>110.00**</td>
<td>180.00**</td>
<td>250.00**</td>
</tr>
<tr>
<td>Ammonia Nitrogen (ug NH₃-N/l)</td>
<td>5.00*</td>
<td>8.00*</td>
<td>15.00*</td>
</tr>
<tr>
<td>Nitrate + Nitrite Nitrogen (ug NO₃+ NO₂-N/l)</td>
<td>5.00*</td>
<td>14.00*</td>
<td>25.00*</td>
</tr>
<tr>
<td>Orthophosphate Phosphorus (ug PO₄-P/l)</td>
<td>7.00*</td>
<td>12.00*</td>
<td>17.00*</td>
</tr>
<tr>
<td>Total Phosphorus (ug P/l)</td>
<td>20.00*</td>
<td>40.00*</td>
<td>60.00*</td>
</tr>
<tr>
<td>Light Extinction Coefficient (k units)</td>
<td>0.25*</td>
<td>0.50*</td>
<td>0.85*</td>
</tr>
<tr>
<td>Chlorophyll a (ug/l)</td>
<td>0.50*</td>
<td>0.90*</td>
<td>1.75*</td>
</tr>
<tr>
<td>Turbidity ( nephelometric turbidity units)</td>
<td>0.50*</td>
<td>1.25*</td>
<td>2.00*</td>
</tr>
<tr>
<td>Nonfilterable Residue (ug/l)</td>
<td>20.00*</td>
<td>30.00*</td>
<td>40.00*</td>
</tr>
</tbody>
</table>

*"Wet" criteria apply when the open coastal waters receive more than three million gallons per day of fresh water discharge per shoreline mile.

**"Dry" criteria apply when the open coastal waters receive less than three million gallons per day of fresh water discharge per shoreline mile.
Table 2. Water quality data for Puno Bay and control stations shown in Figure 2. Geometric means do not include control station. Subscripts for light extinction coefficients indicate depth.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>MEAN ± 1 S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Kjeldahl Nitrogen (ug N/l)</td>
<td>180.0</td>
<td>161.0</td>
<td>123.0</td>
<td>155.0</td>
<td>184.0</td>
<td>277.0</td>
<td>276.0</td>
<td>146.0</td>
<td>150.0</td>
</tr>
<tr>
<td>Ammonia N (ug NH₃-N/l)</td>
<td>7.0</td>
<td>3.0</td>
<td>2.0</td>
<td>2.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Nitrate + Nitrite (ug NO₂⁻-NO₃⁻-N/l)</td>
<td>23.0</td>
<td>25.0</td>
<td>6.0</td>
<td>25.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>7.0</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Orthophosphate (ug P₂O₅-P/l)</td>
<td>6.0</td>
<td>8.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>6.0</td>
<td>6.0</td>
<td>4.0</td>
<td>6.75 ± 0.90</td>
</tr>
<tr>
<td>Total Phosphorus (ug P/l)</td>
<td>8.0</td>
<td>8.0</td>
<td>7.0</td>
<td>9.0</td>
<td>1.1</td>
<td>9.0</td>
<td>1.1</td>
<td>7.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Light Extinction Coefficient (Kₐ)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
<td>0.15</td>
<td>0.06 ± 0.03</td>
</tr>
<tr>
<td>Chlorophyll a (ug/l)</td>
<td>0.33</td>
<td>0.47</td>
<td>0.38</td>
<td>1.10</td>
<td>0.90</td>
<td>0.94</td>
<td>0.23</td>
<td>0.28</td>
<td>0.19 ± 0.24</td>
</tr>
<tr>
<td>Turbidity (NPSU)</td>
<td>0.83</td>
<td>0.88</td>
<td>0.91</td>
<td>1.32</td>
<td>1.32</td>
<td>1.32</td>
<td>1.86</td>
<td>0.62</td>
<td>0.32 ± 0.54</td>
</tr>
<tr>
<td>Nonfilterable Residue (ug/l)</td>
<td>3.2</td>
<td>5.4</td>
<td>8.3</td>
<td>9.4</td>
<td>21.1</td>
<td>24.1</td>
<td>7.2</td>
<td>5.0</td>
<td>10.46 ± 7.76</td>
</tr>
</tbody>
</table>

As mentioned above, the forces of wave activity and, to a lesser extent, upwelling, are significant factors affecting the water quality in Puno Bay. Turbidity and total suspended solids are the most important factors in determining the water quality in the bay. Turbidity is caused by the sediment particles and organic matter in the water, whereas total suspended solids are primarily composed of inorganic particles. The water samples were collected during the period when the moon was full, which typically results in higher wave activity. Water quality conditions were assessed using standard methods, including measurements of nutrients, chlorophyll, and turbidity. The data indicate that water quality in Puno Bay is generally good, with some exceptions during certain periods.
quality, nearshore wave action causes fine sediments to become suspended. The result of sediment suspension is increased turbidity and light extinction. It can be seen that all of the Fauoa Bay turbidity values and the mean bay value exceed the mean limits for both wet and dry conditions, and three of the inner bay stations (4, 5, and 6) exceed the absolute limits for dry criteria, while station 6 exceeds the absolute limit for wet criteria.

While light extinction coefficients were not measured at the inner bay sampling stations owing to the shallow depth, it can be seen that the mean outer bay value is approximately twice the open ocean control, indicating that the effects of wave induced sediment stirring are detectable up to 800 ft. offshore.

The mean bay chlorophyll a value also exceeds both the mean wet and dry criteria, while mean nonfilterable residue exceeds the mean dry criteria.

Values of water quality parameters at the open ocean control station are below the mean wet criteria, while total N and chl. a exceed the dry limits.

BIOLGICAL COMMUNITY STRUCTURE

The Benthos - Corals and Invertebrates

In general, the geologically young age of the island of Hawai’i limits the development of true "coral reefs". Rather, the majority of the offshore benthic (i.e., bottom) environment is a "coral community". The distinction is that, for the most part, corals are growing on substrate composed of basement rock, rather than on calcareous rock of organic (reef) origin.

The typical coral community structure of the west coast of Hawai’i has been described in detail by Dool (1975). Three zones, each characterized by a distinctive substratum type, depth range, range of physical conditions, and single dominant coral species make up the coral community. Figure 4 shows a diagrammatic representation of the west Hawai’i coral community structure, while Figure 5 and Table 3 summarize quantitatively the results of the benthic community transects in, and near Fauoa Bay. Community structure in Fauoa Bay corresponds somewhat with the typical pattern presented in Figure 4, although there are some differences.

As described above, the entire region within Fauoa Bay is a shallow pavement of basalt and limestone. Because of the regular frequency of high intensity storm wave activity that is destructive to many corals and other bottom-dwelling organisms, coral cover in the inner bay is low. It can be seen in Table 3 that coral cover is only 1.5% at transect FC-7, closest to shore and increases to 4.3 and 5.3% at transects FC-11 and FC-8, respectively. Much of the substrates in the inner bay is covered with a fine algal turf (Plate 2). The majority of living coral in the inner bay is composed of encrustations of Porites lobata and
small heads of *Focilopora meandrina* growing on solid limestone veneer. At the outermost station inside of Faunia Bay (PC-8) several large colonies of *P. lobata* were encountered (see Plate 5). Only a very small fraction of the surface of these structures contained living coral tissue; the rest being covered with fine sediment.

The most abundant invertebrate other than corals within Faunia Bay are the sea urchins *Tripneustes gratilla* (see Plate 4). This species occurs commonly in areas of high scour and water movement.

Beyond the boundaries of inner Faunia Bay, the marine environment and community structure assumes the characteristic pattern of west Hawaii. The transects at Faunia north (PN), Faunia south (PS), and the three outermost of Faunia central (PC) represent this pattern. Typically, the most shoreward zone is a narrow region comprised of the seaward continuation of the basaltic shoreline terrace, scattered with boulders, and covered in part by a veneer of limestone secreted by a variety of marine organisms. In some areas the reef bench is relatively flat, while in other areas it is characterized by high relief in the form of pits, ledges, and pinnacles.

*Focilopora meandrina*, a sturdy hemispherical branching species, and *Favites lobata*, a flat, solid encrusting species are the dominant coral colonizers of the near-shore terrace. *P. meandrina* rapidly colonizes newly cleared surface, has a small adult colony size of
short densely packed branches, and is able to flourish in areas that are physically too harsh, particularly in terms of wave action, for other species. The 15 ft. transects traversed such *Porites meandrina*-boulder zones (see Plates 6 and 7).

It can be seen in Table 3 and Figure 5 that total coral cover at PM-15 and FS-15 is about 17 and 8%, respectively, while at FC-15 cover is 36%. The substantially larger coral cover in the central sector is apparently due to the hydrography of the bay; wave energy appears to be dissipated in shallower water relative to the regions off the projecting points to the north and south.

Number of coral species on the shallow zone transects ranged from 3 to 9 (see Table 3). Most of the species that occur in the transects are those with large growth forms. Other corals that were observed on the reef bench but did not occur in the transect quadrats were *Cyanthastrea ocellata*, *Porites damicornis*, *Pocillopora *mihanovici*, and *Montipora frambellia*.

Comparison of coral cover between the 1983 and present survey at the north and south 15 foot transects reveals that coral cover has remained relatively constant over the last three years (see Table 3 and Figure 5). Because community structure in this zone is dictated by the normal range of wave stress, it is expected that there would be little temporal variability.

Besides corals, the dominant benthic organisms in the

near-shore surge zone are encrusting coralline algae (Porolithon spp.), and the sea urchins Echinometra mathaei and Echinostephus articulatus. These urchins bore into the reef surface and dead coral colonies and give the substrata an irregular pitted appearance. In some areas of the limestone terrace densities of the urchins is on the order of 50 individuals per square meter. Very few other benthic invertebrates occur in the near shore zone owing to the frequent impact of breaking waves and high surge.

Seaward of the edge of the shallow surge zones, the bottom is predominantly a flat basaltic terrace, interspersed with lava extrusions and sand channels (see Plate 8). The reef terrace normally varies from about 200 to 400 feet wide, with a depth range of 15 to 50 feet. Poretta lobata is the dominant coral in this area, occurring in a variety of growth forms. The species predominantly takes the shape of massive, thick lobed colonies (see Plates 9 and 10). Because of increased water depth and distance offshore, reduced wave action results in greater proportions of coral cover on the reef bench. It is in this zone that the most number of corals occur, and where early stages of "reef formation" are beginning. The 30 ft. Pauoa Bay transects represent typical Poretta lobata-reef bench environments.

Comparing coral cover at the 30 ft. transects between the 1983 and present surveys gives a quantitative indication of the changes in community structure induced by
wave action (see Figure 5 and Table 3). At the north bay 30 ft. transect, cover decreased approximately 25% between 1983 and 1986 (from 49 to 26%). At the south bay 30 ft. transect coral cover increased by 4% in 1986 compared to 1983 (44 to 48%). It appears that the reef terrace on the north side of Pauoa Bay was impacted by a very severe winter storm that struck the Kohala and Kona coast in February of 1986. Severe storms with wave heights of 15-20 ft. occur on an infrequent basis, and are of sufficient intensity to cause destruction of areas of the reef that are normally below the depth of destructive force. The effect of these events is to cause large losses in percent coral cover and increase the percentage of rubble and bared surfaces on the reef (see Plate 11). The effects of such storm events has been investigated in detail by Dohler (1982).

The major taxa of benthic organisms, other than corals, occurring on the Pauoa Bay reef terrace are sea urchins (Echinoida) and sea cucumbers (Holothuroidea). By far the most abundant urchins are the two species that bore into limestone surfaces, *Echinometra mathaei* and *Echinostephus asiaticus*. In the reef bench zones, densities of these urchins are often of the order of 30 individuals per square meter. Less abundant, but ubiquitous across the entire reef, are the larger species of urchins, *Tripneustes gratilla*, *Echinohirax diadema*, and *Heterocentrotus mammillatus*.

Most common of the sea cucumbers are the species *Holothuria atra* and *H. mauritiana*, which occur mainly in the *P. lobata*-reef terrace zone. Encrusting calcareous algae is abundant on bared limestone surfaces, and on the non-living parts of coral colonies.

Frothose benthic algae are conspicuously rare on the reefs of West Hawaii. Several plants were observed, however, off Pauoa. These included the brown algae *Turbinarea grata* and *Pedina spp.*

Typically, at the seaward edge of the reef bench, the slope of the bottom increases, and substratum consists primarily of unconsolidated rubble and sand. *Porites compressa*, commonly called "finger coral" covers the reef slope in the form of dense interconnected thickets that extend to a depth of approximately 90 ft. (see Plates 12, 13, and 14). Below the lower limit of coral growth, bottom cover consists of white sand.

At Pauoa Bay, the slope of the deep reef is somewhat less than other parts of the Kona or Kohala coast. Submerged lava flows encountered along much of the deep reef zone caused the bottom to be relatively flat compared to the normal reef slope angle of about 40°. As a result, coral cover on the 60 ft. transects was dominated less by finger coral than in areas with steeper slopes. Rather, coral cover at the 60 ft. transects is a combination of finger coral and massive *P. lobata* colonies (see Plate 12).

As on the reef terrace, it is possible to
quantitatively assess the effects of the severe winter storm to the deep slope zone. As described above, it appears that the brunt of the destructive force of storm waves was focused on the northern end of Puunua Bay. It can be seen in Table 3 and Figure 5 that coral cover decreased 14% on the 60 ft. north bay transects (72 to 51%), and increased 13% (72 to 85%) in 1986 compared to 1983. Because of the delicate nature of finger coral, it is especially susceptible to mechanical stress from shear forces caused by breaking waves. Following storms vast mats of finger coral on the reef slope are reduced to small rubble fragments (see Plate 15). Regrowth of storm-damaged finger coral is generally rapid, as living portions of rubble can regenerate quickly into mature thickets of *P. compressa* (see Plate 16).

The boring sea urchins found in the reef terrace zones are essentially absent from the slope zone owing to the lack of solid substrate. The sea urchins *Echinometra diadema*, *Heterocentrotus mamillatus*, and *Tripneustes gratilla* are found on the reef slope, although in reduced abundances compared to the shallow zones. Encrusting red coralline algae, predominantly *Porolithon spp.* and *Peroniella rubra*, were commonly observed on the deeper reef slope on the *Porites compressa* reef framework.

Species diversity is usually another parameter that reflects the degree of stress on coral community structure. With little or no stress, such as wave action, each of the three reef zones is dominated by a single species; the greater the degree of dominance, the lower the diversity. Moderate storm damage may preferentially reduce the cover of the dominant species, resulting in a more equitable distribution, and hence higher diversity. Storm events of moderate intensity seem to prevent dominance and resource monopolisation by differentially affecting the most abundant species or the species highest in competitive ability. Infrequent storms of very high intensity wipe out all corals and return coral communities to a bare pioneering stage. There does not, however, appear to be a pattern to diversity on the Puunua Bay transects.

The design of the reef survey was such that no cryptic organisms or species living within interstitial spaces of the reef surface were enumerated. Since this is the habitat of the majority of mollusks and crustaceans, detailed species counts were not included in the transecting scheme. No dominant communities of these classes of biota were observed during the reef surveys at any of the study stations.

Reef Fish Community Structure

Reef fish community structure was largely determined by the topography and composition of the benthos. Transect results are presented in Table 4 and Figures 6 and 7.

The reef fish community at Puunua Bay is typical of that
found along most of the Kona Coast (Robson 1974, Walsh 1984), and can be grouped into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fishes, swimming tetradonts, and surge-zone fishes.

Juvenile fishes belonged mostly to the family Acanthuridae (surgeon fishes), with representatives from the families Labridae (wrasses), Mullidae (goat fishes) and Chaetodontidae (butterfly fishes). Juveniles were most abundant on the deepest transects of the reef slope zone (60 ft.) in areas dominated by finger coral (*Porites compressa*). The complex habitats created by the growth form of *P. compressa* provide shelter for small fish.

Planktivorous damselfishes, principally of the genus Chromis were abundant in several of the areas surveyed. *Chromis sulphureus* and *C. veratrum* predominated at the outer edge of the shelf and in deeper water, whereas *C. vanderbilti* was the primary shallow water species. Schools of sergeant-major damselfish, * Abudefduf abdominalis*, were conspicuous at several of the central Pauoa transects.

Herbivores, primarily the acanthurids *Zebrasoma flavescens* and *Ctenochaetus striatus* were also abundant.

On the shallower reef terrace, adult *Acanthurus lineatus*, *A. nigricans* and *acantheridae (parrot fishes) were also common. In areas where coral rubble was abundant, common fishes included the angelfish *Centropyge pottieri*, and several species of wrasses, notably *Pseudochromis*
Table 11. Phlab Community Structure at 2000 ft.

<table>
<thead>
<tr>
<th>Community Structure</th>
<th>Phlab Sample</th>
<th>Phlab Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community 1</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Community 2</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Community 3</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>Community 4</td>
<td>40%</td>
<td>45%</td>
</tr>
<tr>
<td>Community 5</td>
<td>50%</td>
<td>55%</td>
</tr>
</tbody>
</table>

Legend: Red = Phlab Sample 1, Green = Phlab Sample 2.
tetracentra and P. occidentalis.

Surge zone fishes were not quantitatively assessed because of the difficulty in working on the wave-swept basalt terraces that these fish inhabit. Visual observations, however, revealed that this biotope supported a large number of fishes, principally herbivores of the genera Kyphosus, Acanthurus, and Ham.- The wrasse Thalassoma prorigerum and T. furciferum were also abundant in the surge zone. Few juvenile fishes were seen inhabiting the boulder zone environment. Triggerfish of the species Melanichthys niger and H. vidua were also observed congregating in the water column over the reef platform.

The fish community at the three transects within Fauoa Bay (RC-6, 11, 7) was markedly impoverished in relation to other areas of the reef (see Figures 6 and 7). The primary species in the bay were the drab surgeonfish, Acanthurus nigricrans, the ubiquitous wrasse, Thalassoma duperreyi, and the goatfish, Mullolichthys multifasciatus. Individuals of the latter species were mostly small juveniles (some) that are seasonally abundant in inshore waters. In addition to the quantitative transects, several reconnaissance swams traverced the inner bay. Observations from these swams were in accord with the results of the transects. Overall, the inner bay biotope was characterized by having both a low number of species and a low number of individuals. The decreased populations are
almost certainly a result of the extreme physical rigor of the inner bay resulting from breaking waves.

Several species of "food fishes" (taken by subsistence, recreational and/or commercial fishermen) were observed during the survey. Schools of several hundred individuals of goatfish (weke) (*Hypoplectrus flavolineatus*), opele (*Hypoplectrus macrorhinos*), and blue-lined snapper (keele) (*Lutjanus kasmira*) were observed while diving. Rocky ledges and large coral heads sheltered fair numbers of squirrelfish (u'ū) (*Holocentrus brachypterus*). Over a dozen jacks (papio) (*Caranx melampygus*) were seen during the survey, although most were quite small. Other food fishes included parrotfishes (hua) (*Scarus spp.*), goatfishes (moana kea) (*Parupeneus cyclostomus*), grand-eyed porgys (mu) (*Menidia grandoculis*), and groupers (*Cephalopholis straus*). None of these species were particularly abundant. Orange-eyed surgeonfish (kole) (*Ctenochaetus striatus*), while abundant, were generally not large enough to be considered suitable for "food fish".

Overall, fish community structure at Pauoa Bay is fairly typical of the assemblages found in relatively undisturbed Hawaiian reef environments. The presence of large schools, and large individuals, of some food fishes indicates that the area has been subjected to only light to moderate amount of fishing pressure. Abundant small butterfly fishes also indicated that the area is not heavily exploited by aquarium fish collectors. The apparent low

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**Figure 7. Number of fish on Pauoa Bay transects.**
levels of fishing are probably a function of the remote location of the site with respect to shore access and the distance from the nearest harbor or boat launching facility.

Threatened or Endangered Species

Three species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (Chelonia mydas) occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. During the course of the present survey a single green sea turtle was observed swimming in Pauoa Bay. The endangered hawksbill turtle (Eretmochelys imbricata) is known infrequently from waters off the Kona Coast. No hawksbill turtles were observed in the vicinity of Pauoa Bay during the course of the present survey. George Sales, Zoologist with the National Marine Fisheries Service, who specializes in the study of Hawaiian sea turtles, has said that the Pauoa area is not identified as a hawksbill turtle nesting, breeding, or aggregating site.

Populations of endangered humpback whale (Megaptera noveangliae) are known to winter in the Hawaiian Islands, from December to April. In general, however, it is not common for whales to occupy the shallow reef areas that are the focus of this survey.

Anchialine Pond

Food Morphology and Biotas

Anchialine ponds are shoreline pools without surface connection to the sea that contain water of measurable salinity, which oscillates with tidal rhythm owing to inland expansion of the oceanic water table. Such ponds are known to occur around the world in laves and elevated fossil reefs. In the Hawaiian Archipelago, anchialine ponds exist almost exclusively along the shorelines of Hawaii and southwest Maui. The term "anchialine" (from the Greek "anchialos" meaning near the sea) was coined by Holthuis (1973).

Until the relatively recent increase in coastal resort development, little work had been done on the biological and chemical structure of Hawaiian anchialine ponds. The first comprehensive survey was carried out by Maciolek and Brock (1974), in which 305 closed (no surface connection with the ocean) ponds on the west coast of Hawaii were inventoried with regard to location, environmental characteristics, biota, and historical relationships. More recently, ponds in the vicinity of several resort developments, especially in the Waikoloa area have been surveyed (Ol Consultants, 1984).

The seasonal cycle of anchialine ponds appears to progress from new ponds that are devoid of any bottom...
sediment to ponds with thick accumulations of soft sediment resulting from the growth of benthic algal mats. Deposition of sediment appears to slow the flushing rate, thereby increasing the capacity for sediment retention. At some point, when the level of sediment accumulates to the level of the surface water of the pond, clear standing water will no longer occur, and the pond will become a marshy wet area. In addition, fresh water near the soil or rocky surface surrounding ponds often provides a suitable habitat for land plants. Detrital litter of land plant origin falling into the ponds adds to the organic deposition that eventually causes pond senescence.

A single anchialine pond occurs on the Ritz-Carlton property onshore of the southern portion of Pauoa Bay. The pond appears to have been formed from the collapse of a lava tube. Presently, the pond is surrounded by dense growth of beach plants and palm trees. Pond water had a salinity of 4%o, relatively low for anchialine ponds which average about 10 %o. Standing water in the pond is limited to a very small area of approximately 30 square feet. The pond can be described as being in the final stages of senescence owing to deposition of plant material that fills the pond. Decaying plant material has formed a thick sediment layer that eventually will accumulate to the surface level of standing water. Oxidative processes are apparent in the pond sediment as evidenced by the strong smell of reduced sulfides.

Presently, the depth of water above the sediment surface is approximately 6-8 inches.

Typically, the most abundant fauna of anchialine ponds are snails and shrimp. Haeckel and Brock (1974) classify four shrimp, three snails, and two native fish as being "representative" pond organisms. Two of the shrimp species, *Halocaris rubra* (opsule) and *Heterocaris lobosa* are considered rare, found only in anchialine areas, but are normally the most common shrimp found in ponds. The other two shrimp species, *Palaemon debilis* and *Macrobrachium grandimanus*, are found in estuaries and streams as well as anchialine ponds.

The three representative snails, *Assiminus sp.* *Helana sp.* and *Theodoxus cariosus*, are typically found in tide pools and anchialine ponds, especially on the undersides of rocks. Representative pond fish are *Elopichthys sandvicensis* and *Obolithus sandvicensis*.

While the survey of the Pauoa Bay pond was not exhaustive in that it did not include night surveys, it was apparent that the pond was degenerate in pond biology. None of the representative fish or shrimp were observed, while only two of the mollusks *Assiminus* and *Helana* were observed on the rocky walls of the pond. No species of algae or vascular plants were observed growing in the pond. The absence of many of the representative species is likely a result of the advanced stages of succession of the pond. High levels of reduced sulfides resulting from detrital
oxidation probably make the aquatic environment toxic to most biota.

CONCLUSIONS

The ultimate purpose of the data collected during the baseline survey is to provide information on the degree of environmental impact to the marine environment that might occur as a result of construction and operation of the Ritz-Carlton Hotel at Paqua Bay.

Implementation of the proposed action would involve grading, vegetation removal, new construction and other changes to the existing environment on several hundred acres of land. There are also tentative plans for direct modification of the shoreline for construction of a marine swimming lagoon, and/or modifying both an existing rubble masonry groin and beach at the southern end of the bay in order to make the area more suitable for swimming. Therefore, potential impacts to the marine environment must be considered as direct modification of the shoreline, and indirect processes that come about as results of activities on land.

DIRECT IMPACTS - SHORELINE MODIFICATION

With regard to direct alteration of the shoreline for the purpose of constructing a swimming lagoon, excavation will require the removal of a portion of the shoreline basaltic shelf with heavy equipment. Planning of such work should require that dredging of the opening of the lagoon entrance should be the last step in construction. Leaving a dike at the lagoon entrance until the inner lagoon is completed will minimize the time that turbid water resulting from excavation will be flushed into Paqua Bay. The major potential impact from lagoon construction will be in the form of increased turbidity caused by shoreline excavation. Such increased turbidity should be of a temporary nature, lasting only through the actual construction period and a short time after.

As was evidenced in the present survey, Paqua Bay is subjected to rapid flushing by wave forces, as well as tides and currents. One of the major results of this survey is that inner Paqua Bay is routinely subjected to natural forces which cause turbidity to range above the level specified by the Department of Health water quality standards. In addition, the wave forces occurring when water samples were collected for the present survey represent moderate conditions, and not the extremes that generally occur several times each winter. Because such events are the norm, rather than the exception, over the annual cycle, the marine communities that exist in Paqua Bay are limited to species that can tolerate frequent episodes of large amounts of suspended sediment and physical force from breaking waves. The result is an environment within Paqua Bay that is often severely stressed and is distinctly suboptimal with respect to
serving as a habitat for marine biota.

With this scenario of natural stress, it is possible to predict the effects of additional sediment loading from lagoon excavation. As mentioned above, construction planning will minimize the time additional suspended material will be added to the environment. It is not possible to predict the quantity of material that will become suspended as a result of construction, but owing to the size of the lagoon entrance (less than 110 feet), it is probable that the amount of material will be relatively small in proportion to the amount that is stirred from storm events. Fine sediment from dredging that will become suspended is not qualitatively different than material that is routinely suspended by natural forces. Because the marine communities, and water quality, presently reflect the effects of high turbidity and wave stress, the incremental additions resulting from construction will very likely not have any additional effect to the environment. Most water quality standards are presently exceeded under conditions of moderate wave activity and groundwater extrusion. Biotic communities are severely limited compared to areas with less wave exposure. An additional temporary increase in sediment loading is not likely to cause any significant changes to these characteristics of Paunua Bay.

While it has been shown that inner Paunua Bay is severely and routinely stressed, it is also apparent from the survey that the reef communities outside the bay are not subjected to the same forces. Suspended sediment is retained and recirculated within the bay, and diluted and flushed into the offshore coastal region. Measured turbidity at stations 7 and 8, located approximately 500 ft. from the shoreline points marking the boundaries of Paunua Bay, exceeded the mean limits but were well below the absolute limits allowed by DOH standards. This level of water column turbidity is not sufficient to affect marine communities, as the survey results indicate that benthic and fish assemblages outside the bay mouth were considered "normal". It is anticipated that any incremental increase in turbidity owing to shoreline construction would likewise not affect the offshore communities.

Other shoreline activities that could impact the nearshore marine environment are modification of an existing rock groin, and a beach at the southern end of Paunua Bay. Both of these activities might entail creating an increase a temporary increase in suspended sediment if excavation is required. However, the extent of such excavation is likely to be much smaller than that required for construction of the swimming lagoon, and the same arguments would apply. Specifically, when compared to the extent of natural sediment suspension, and the nature of the environment that has resulted from natural stress, incremental additions brought about by shoreline activity are likely to be insignificant.
INDIRECT IMPACTS

The major potential indirect impact to the marine environment associated with shoreline development appears to be increased sedimentation from wind or runoff as a consequence of grading. Changes in groundwater discharge and surface runoff, especially with respect to nutrients from sewage effluent used for irrigation and golf course fertilization, are also considered as factors. Herbicides and pesticides that might be used on the golf course also present the potential for impacts.

Increased Sedimentation and Runoff

A potential cause of impact to the marine environment resulting from nearshore development is increased sediment loading. Land-derived fine sediment could be transported as wind-borne dust or runoff during the period when ground cover is removed during grading. Increased sedimentation does not appear, however, to be a likely source of environmental alteration for the development scenario at Pu`uoloa Bay. Ground cover to be graded is either barren lava that has not been weathered to any appreciable extent, or scrub brushland with a slightly weathered lava surface layer. When these materials are moved and crushed by bulldozers a smooth surface of cobbles 1 to 4 inches in size generally results. In addition, only a fraction of any wind-blown material generated would be carried in a westerly direction toward the ocean and pond. As the size distribution of the wind-blown fraction would probably be in the silt-clay range, it would be expected that this material would remain in suspension for some time if it entered the water column, and therefore it is unlikely that any measurable settlement would occur anywhere in the nearshore marine environment.

Most importantly, as discussed above regarding direct impacts, Pu`uoloa Bay is subjected to relatively great sediment stress under normal conditions. Slight increases, should they occur at all, in sediment loading from wind-blown transport are likely to be insignificant in comparison to natural sediment content of nearshore waters.

It is also not expected that runoff during construction would increase oceanic sediment loads. The climate of the south Kohala region is one of the driest in the Hawaiian Islands; therefore substantial rainfall during construction is rather unlikely. However, in the event of heavy rainfall, the porous nature of the lava and soil ground cover is such that sheet flow carrying suspended sediment toward the ocean is highly unlikely. Rather, most rainwater that enters the ocean as runoff appears to do so following percolation through the surface rock layers to the water table and subsequent groundwater extrusion at the shoreline. Such groundwater flow would not have the effect of transporting sediment to the ocean since the basal rock acts as a filter. Normal volumes of groundwater extrusion is in the neighborhood of 3 mgd per mile; the increase to
this volume owing to direct rainfall and percolation is likely to be insignificant. For a similar development on the Kohala coast at Waikoloa, it was estimated that the annual discharge of stormwater runoff is roughly equivalent to the amount of groundwater which enters the ocean each day (U.S. Army Corps of Engineers 1985). Therefore, a major effect of rain during the period of grading might be to significantly decrease the amount and distribution of airborne dust—a circumstance that would have to be considered a beneficial side effect.

At this time no estimates exist of how drainage patterns might be changed as a result of the development plans. There appear to be no areas offshore of the Ritz-Carlton boundaries where marine systems have been adversely affected by runoff to date. It is expected that this would remain the case. However, if analyses indicate that the proposed changes in land use and drainage patterns might result in substantial changes in water quality, additional field surveys will be conducted to determine the best location for the discharge of drainage and to assess the significance of expected water quality with respect to marine community structure.

**Increased Nutrient Loading From Irrigation and Fertilization**

Because operation of the Ritz-Carlton calls for construction of a golf course that will be irrigated and fertilized with treated sewage effluent, the potential for impacts to the aquatic ecosystems owing to high rates of nutrient loading must be considered. When subjected to substantial increases in nutrients, the response of marine and freshwater systems is termed "eutrophication," and consists of increased growth of a portion of the plant (phytoplankton) community that is able to directly utilize the nutrients, generally at the expense of normal community integrity. The overall result of this process is usually a degradation of environmental quality. In the past, coral reefs in some areas of Hawaii, primarily Kaneohe Bay and off Sand Island on Oahu, have been severely damaged in this manner by sewage impacts.

At Fauoa Bay, it is not anticipated that such impacts will occur for several reasons. Most importantly, any increased nutrient loads would be rapidly dispersed before effects to the marine communities could be realized. The unrestricted circulation of the offshore zone by tides, current, meso-scale eddies, wind, and wave action promotes rapid dilution and water exchange. Residence time of a parcel of water fronting the development is probably on the order of hours, so buildup of any nutrient material is unlikely. It was similarly concluded that resort development at Waikoloa would cause no changes in nutrient concentrations in the marine environment owing to rapid mixing and dilution (Corps of Engineers 1985).

Another reason that the marine environment will
probably show no effects as a result of golf course irrigation is that much of the nutrient load is taken up by the vegetation on the golf courses. Chang and Young (1977) report that on a golf course on Oahu irrigated with treated sewage effluent 98% of the total nitrogen and 100% of the total phosphorus was taken up by the soil-plant surface layer. Chemical processes that account for the uptake include incorporation into plant biomass, cation exchange, fixation and adsorption on the soil, biological oxidation and denitrification. The important aspect of the study conducted on the Oahu golf course is that essentially none of the nutrient load reaches the marine environment through groundwater runoff.

Another factor that accounts for the lack of potential for impact is the secondary level of sewage treatment planned for the development effluent. Studies done at several of the ocean discharges on Oahu that intentionally discharge much greater volumes of secondary sewage into marine environments indicate there is no detrimental effect whatsoever owing to the discharge. In fact, the impacts that have been reported all can be considered beneficial since they result in increased fish populations. Fish populations benefit from the increased particulate food, as well as from shelter afforded by the outfall structure. Based on these observations, it is probable that even if malfunctions in sewage plants cause discharge directly into the ocean, there will be little or no effect to water quality or biotic communities.

A most convincing argument for the lack of potential alteration to marine communities by golf course-related factors, is the present condition of reefs offshore of golf courses that use treated sewage effluent. On the Island of Hawaii, golf courses at Kona, Waikoloa, Mauna Lani, and Mauna Kea presently use such methods of irrigation. Surveys of the reef environments at all of these locations indicate no adverse effects in any form.

Finally, results of the water quality analyses indicate that Paaua Bay waters presently have nutrient concentrations that exceed the DQ1 standards. It is likely that any increases in nutrient concentrations, even if they are detectable, will not change the level of compliance with DQ1 standards.

**Pesticides and Herbicides**

Potential for negative alteration to marine ecosystems owing to pesticides and herbicides also seems to be nil. It has not been found necessary to utilize substantial quantities of pesticides on golf courses in Hawaii, and only very small applications of herbicides are periodically made to the greens (H. Bustamente, Mauna Lani Resort, personal communication). Such small quantities do not appear to be of a magnitude great enough to leach through the soil and lava, be carried to the ocean via groundwater extrusions, and then bioaccumulate to the point of
producing a noticeable effect.

**Potential Effects to Protected Species**

As mentioned in the Results, there are several protected and threatened marine species that may inhabit the offshore environment. Possible plans for modification of the shoreline, are limited to activity very close to, or shoreward of the high tide mark. Potential impacts to marine mammals and turtles from such activity appears to be negligible. Heavy equipment used in construction might produce noise that could be heard by whales. A literature review conducted by Darby-Edsau & Associates (1984) for the Waikoloa Beach Resort EIS indicated that this kind of low-level noise would have no apparent adverse effects on major marine animals, and would not cause avoidance of the area.

Short term changes in water quality resulting from construction would also not be of a magnitude to affect the behavior of sea turtles that may venture into Pauoa Bay. Increased access to the shoreline, once the hotel is constructed, might affect resident turtles because these animals often do not remain in areas frequented by humans. This potential impact must be considered very slight, however, owing to the infrequent observation of turtles in the area, and the abundant habitat space along the Kohala and Kona coast.

**Anchialine Pond**

As described in the results section, the single anchialine pond on the Ritz-Carlton site is in the final stages of the "pond life cycle", and will probably cease to exist in the not too distant future. In addition, pond biota is limited by the reducing conditions brought about by oxidizing organic material. Hotel plans currently do not call for filling, or otherwise altering, the pond. Indirect effects, such as increased nutrients from groundwater intrusion by golf course irrigation appear to present little potential for alteration of the pond. Even ponds that appear to be in early successional stages, and are inhabited by the full suite of pond biota, do not appear to be affected by nearby development. Brock (1984) has surveyed the ponds in the vicinity of the Nauna Lani Resort Hotel. Even though these ponds are virtually surrounded by the hotel and condominium units, they remain unaffected in terms of water chemistry and biotic composition. At Waikoloa, time series surveys of water quality parameters of anchialine ponds indicate that a nearby golf course may cause nutrient concentrations to rise, but since the pond flora does not appear to be nutrient limited, there is no apparent effect to pond biotic composition (OI Consultants 1984, 1986).

It appears safe to assume that similar development would also have little effect on the pond on the Ritz-Carlton site.
SUMMARY

The marine environments at Pa'aua Bay appear to be representative of the Kona and Kohala coast of Hawaii. Within the confines of the bay, macrobenthic and fish communities are limited owing to the rigorous conditions brought about by wave and sediment stress. Beyond the inner bay, offshore coral community development corresponds generally to a three-zone pattern influenced primarily by the degree of destructive force of wave impact. Reef fish communities appear to be relatively unimpaired by fishing pressure. The region does not represent an unusual commercial or recreational resource, and does not appear to be a significant habitat of rare, endangered or protected species.

During a period of moderate wave stress and normal groundwater extrusion, most of the water quality parameters within the bay exceeded the standards specified by the Department of Health for open coastal waters. It is certain that water quality standards would be exceeded even further during episodes of severe wave stress. Shoreline modification, as well as indirect sources of sedimentation and nutrient augmentation appear to present lesser potential for changes in water quality than the full range of natural environmental influences. Because state guideline criteria are exceeded in the natural state, it is irrelevant to consider the potential for exceeding the criteria by shoreline development.

The potential for direct impact as a result of development of the Ritz-Carlton to the aquatic communities appears to be very small. None of the developmental activities appear to have the potential to induce changes in physio-chemical water quality parameters of a magnitude sufficient to cause changes in community structure. Marine environments are routinely subjected to stresses of massive proportions that are much more influential (or destructive) than the incremental changes that could result from any development activity.

The single anehaline pond on the development site appears to be a suboptimal pond habitat at present owing to infilling by plant detritus. Pond communities are not nutrient limited, so increased nutrient levels resulting from resort activities would probably have no adverse affect. None of the activities of the hotel, other than removal, would affect the present status of the pond.

If some unexpected event related to development activities does occur, the resulting alterations to marine community structure would probably be reversible, and recovery rapid once the stress factor is mitigated. Tolerance to such changes appears to already be part of the physiological range of the community.

It can be concluded that as long as the normal reasonable steps are taken in construction practices, and operational procedures for the golf course and sewage
treatment systems are carefully maintained, there should be no adverse impacts to the marine environments. However, the baseline marine biological studies were implemented in such a way that replicate surveys conducted in subsequent years can show actual changes in marine and pond community structure. Regardless of how unlikely, there is always the potential for an unexpected event. If any development practices cause changes in physical-chemical parameters which lead to changes in environmental integrity, these effects could be quantified through time-series surveys. Therefore, it is recommended that the Ritz-Carlton planners utilize the bench-mark stations to the fullest by incorporating into their long-range plans subsequent marine surveys. If, and when, development construction near the shoreline commences, it would appear to be a prudent action to initiate a monitoring program at that site during the activity. With such an ongoing program, it would be possible to quickly pinpoint any detrimental processes as they happen and remedy the situation before significant or irreversible environmental damage occurs.

Plate 1. View of Papao Bay looking north toward Loe o Panipuu. Shoreline is composed of black lava outcrops and grey beach sand. Breaking waves inside the bay can be seen at the upper left.
Plate 2. Typical quadrat at inner Peuoa Bay (PC-7). Bottom is composed of basaltic beach covered with sediment-bound algal turf, and is devoid of corals or other macroinvertebrates.

Plate 4. Typical quadrat at inner Peuoa Bay (PC-8). Living coral colonies of Porites lobata appear as light green structures within the frame. Dark round objects in lower center are sea urchins, Tripneustes gratilla.

Plate 3. Typical quadrat at inner Peuoa Bay (PC-11). Depressions in the reef bench collect coral rubble broken loose by wave action.

Plate 5. Large colony of P. lobata inside Peuoa Bay. Only a small percentage of the structure remains covered with living coral tissue; the remainder is mostly covered with a coating of fine sediment.
Plate 6. Typical quadrat on basaltic reef terrace at transect PB-15.

Plate 7. Typical quadrat on basaltic terrace at transect PB-15 showing limestone structures that originated from coral growth.

Plate 8. Sand and boulder channel at transect TC-30.

Plate 10. Large mound-shaped colony of P. lobata on the reef terrace near transect PS-30. Such coral growth is possible because the water depth is great enough so that destructive force of waves is minimized.

Plate 11. Large colony of P. lobata near transect PS-30 that is almost completely devoid of living coral tissue as a result storm wave stress.

Plate 12. View of undisturbed Porites compressa finger coral mat on the reef slope near transect PC-60.

Plate 13. Diver laying out transect tape and conducting fish count survey on the P. compressa reef slope (PC-60).
Plate 14. Typical quadrat showing undisturbed finger coral, *F. compressa* at transect PS-60.

Plate 15. Typical quadrat showing storm impacted finger coral community at transect PT-60. Note difference from similar, but undisturbed community in Plate 16.

Plate 16. Closeup of storm-damaged finger coral mat. Fragments of living coral can be seen that are beginning to re-establish. Complete recovery of the mat community is approximately 5-10 years.
REFERENCES CITED

Brock, R. E. 1983. Aquatic survey of the anchialine pond system at Lahupua, South Kohala, Hawaii. Submitted to Hauna Lani Resort, Inc.


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### Intersection Level of Service Analysis
**Unsignalized Intersection**
**Mai 14, 1987**

**Keahole Airport & Queen Kaahumanu Hwy**

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INTERSECTION LEVEL OF SERVICE ANALYSIS
UNSIGNALIZED INTERSECTION
MAY 14, 1987

WAIKOLOA BEACH RESORT
QUEEN KA'AHUMANU HWY

EXISTING
INTERSECTION LEVEL OF SERVICE ANALYSIS
UNSIGNALIZED INTERSECTION
MAY 14, 1987

MAUNA LANI RESORT &
QUEEN KA'AHUMANU HWY

EXISTING

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NB LEFT A

SCENARIO 2

EB LEFT F
RIGHT A
NB LEFT A

SCENARIO 3

EB LEFT F
RIGHT A
NB LEFT B

SCENARIO 4

EB LEFT F
RIGHT A
NB LEFT A

SCENARIO 5

EB LEFT F
RIGHT A
NB LEFT A

SCENARIO 6

EB LEFT F
RIGHT A
NB LEFT A

C-10
INTERSECTION LEVEL OF SERVICE ANALYSIS
UN SIGNALIZED INTERSECTION
MAY 14, 1987

WAIMEA-KAWAIHAE RD & QUEEN KAAMUNU HWY

EXISTING

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SCENARIO 2
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RIGHT A
WB LEFT A

SCENARIO 3
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SCENARIO 4
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SCENARIO 5
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WB LEFT E

SCENARIO 6
NB LEFT F
RIGHT F
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Figure C-1
INTERSECTION 16
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-2
INTERSECTION 37
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-3
INTERSECTION 43
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-4
INTERSECTION 51
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-5
INTERSECTION 60
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-6
INTERSECTION 16
PM PEAK HOUR VEHICLE
TURNING MOVEMENTS

RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-7
INTERSECTION 37
PM PEAK HOUR VEHICLE
TURNING MOVEMENTS

Ritz-Carlton Mauna Lani
Mauna Lani Resort
South Kohala, Hawaii

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PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-9
INTERSECTION 51
PM PEAK HOUR VEHICLE
TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-10
INTERSECTION 60
PM PEAK HOUR VEHICLE
TURNING MOVEMENTS

RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-11
INTERSECTION 16
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-12
INTERSECTION 37
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna-Lani Resort
South Kohala, Hawaii
Figure C-13
INTERSECTION 43
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-14
INTERSECTION 51
PM PEAK HOUR VEHICLE
TURNING MOVEMENTS
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C–15
INTERSECTION 60
PM PEAK HOUR VEHICLE TURNING MOVEMENTS
RITZ–CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-18
REGRESSION EQUATIONS AND PROJECTED TRAFFIC: INTERSECTIONS OF LINDSEY ROAD AND MAMALAOA HIGHWAY AND WAIMEA-KAWAIHAE ROAD AND QUEEN KAHAUMANU HIGHWAY
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii
Figure C-17
REGRESSION EQUATIONS AND PROJECTED TRAFFIC: INTERSECTIONS OF QUEEN KAHAHUMANU HIGHWAY AND PALANI ROAD AND QUEEN KAHAHUMANU HIGHWAY AND AIRPORT ROAD
RITZ-CARLTON MAUNA LANI
Mauna Lani Resort
South Kohala, Hawaii