May 19, 1987

Honorable John C. Lewin, Director
Department of Health
c/o Office of Environmental Quality Control
State of Hawaii
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Lewin:

Final Environmental Impact Statement
Mokuleia Development Proposal by Mokuleia Land
Company From Preservation and Agriculture to Resort,
Residential, Park-Golf Course, and Commercial Use
TMK 6-8-02: 1, 6, 10 & 14; 6-8-03: 5, 6, 11, 15-17,
19, 20, 30, 31, 33-35, 38-40; 6-8-08: 22

We have determined that the above is an acceptable Final
Environmental Impact Statement for the proposed project. This
determination in no way implies a favorable recommendation on
the applicant's request for any approvals or permits required
by the Department of General Planning for this project.

There are a number of concerns that must be addressed by
the General Plan, subsequent zoning, subdivision, and other
permit processes. These concerns are included in the
acceptance report which is attached.

If there are any questions, please contact Randy Hara of my
staff at 523-4483.

Sincerely,

DONALD A. CLEGG
Chief Planning Officer

Attach.
DEPARTMENT OF GENERAL PLANNING (DGP)
REFERENCE NO.: 87/NS-1
MAY 19, 1987

ACCEPTANCE REPORT: CHAPTER 343, HRS
FINAL ENVIRONMENTAL IMPACT STATEMENT
MOKULEIA DEVELOPMENT PROPOSAL BY
MOKULEIA LAND COMPANY
MOKULEIA, NORTH SHORE, OAHU, HAWAII
TAX MAP KEY: 6-8-02: 1, 6, 10 & 14;
6-8-03: 5, 6, 11, 15-17, 19, 20, 30, 31, 33-35, 38-40;
6-8-08: 22

A. BACKGROUND

In a letter dated March 5, 1987, the Chief Planning Officer was informed that the new landowner and applicant for the above project was Mokuleia Land Company and no longer Northwestern Mutual Life Insurance Company. Details of the project have not changed.

Mokuleia Land Company is proposing to develop a project consisting of 2,100 hotel rooms, 1,200 condominium units, 700 residential units, 100,000 sq. ft. of commercial space, and two 18-hole golf courses on approximately 1,019 acres of ranch land in Mokuleia. This Final EIS has been prepared in conjunction with an application for an amendment to change the designation on the North Shore Development Plan Land Use Map from Agriculture and Preservation to Resort (313 acres), Residential (331 acres), Park-Golf course (342 acres), and Commercial use (33 acres).

The project's demand for potable water is estimated at 2.0 million gallons per day (mgd). In addition, the project will require approximately 1.5 to 2.0 mgd of irrigation water. The developer's water system will include the improvement of 3 existing wells, the installation of one new well, two new reservoirs, water pumping stations, and transmission lines to be dedicated to the Board of Water Supply. In addition, the developer will develop a new private water system to irrigate the two golf courses. Water will be supplied by sources from the Mokuleia Sub-area, which has a sustainable yield of 20 mgd, of the Waialua Ground Water Control area. Less than 40% of that yield is currently being used.
Two alternatives are being considered by the developer to dispose of wastewater generated by this project. One alternative is a developer-provided system to serve only the development. The other is to construct joint treatment and disposal facilities with the City and County. The costs of the second alternative would be shared by the City and developers based on a formula which will be developed later.

Vehicular access to the project site will be via Farrington Highway. The existing highway has sufficient capacity to serve the predicted peak hour volumes. Signalization at Thompson Corner will be provided when traffic volumes and operating conditions warrant. The developer will construct all internal roadways and improvements to the highway within the project limits.

Preliminary drainage plans call for the enlargement of or improvement of Makaleha Stream. Runoff will be directed to a retention basin to be provided mauka of Farrington Highway. From the retention basin, runoff will flow under Farrington Highway to the ocean.

B. PROCEDURES

1. On June 2, 1986, the applicant submitted an Environmental Assessment for the proposed development in order to comply with Section 343-5(a)(b) of the Hawaii Revised Statutes. The applicant was notified by letter dated June 2, 1986 that an EIS would be required.

2. Pursuant to this determination, an Environmental Impact Statement Preparation Notice (EISPN) was published in the "OEQC Bulletin" on June 8, 1986. The EISPN was mailed to 54 interested agencies and organizations and 27 responses were received in the ensuing 30-day comment period.

3. A Draft EIS (DEIS) was filed on February 20, 1987 and notice published in the "OEQC Bulletin." Fifty-six agencies or organizations received copies of the DEIS and 35 responses were received.

4. A request for an extension of the Acceptance period was received on April 6, 1987 and granted in a letter to the environmental consultant dated April 8, 1987.

5. Comments and concerns which were raised were addressed in the DEIS and in the Final EIS (FEIS) which was submitted on May 7, 1987.
C. CONTENT

The Final EIS for the Mokuleia Development Proposal by Mokuleia Land Company adequately addresses the content requirements specified in Sections 11-200-17 and 11-200-18 of the EIS Rules.

D. RESPONSE

The applicant made adequate responses to all comments, which were included in the Final EIS.

E. UNRESOLVED ISSUES

Several issues, while discussed by the applicant, remain unresolved at the present time.

The following issue shall be resolved prior to approval of the applicant's DP amendment request:

1. The applicant's request requires a General Plan amendment, which is currently being processed to designate Mokuleia as a secondary resort area.

The following unresolved issues need to be addressed in the rezoning process:

2. A State Land Use District Boundary Amendment to redesignate the project site from the existing Agricultural and Conservation district to an Urban district.

3. The project will require new water source system approval from the State Department of Health, as well as increased water allocations within the Waialua Ground Water Control Area from the Board of Land and Natural Resources and approval of a water master plan by the Board of Water Supply.

4. A sewer master plan for on- and off-site sewer system improvements approved by the Department of Public Works.

5. Highway Improvement Plans and Programs, as required by the State Department of Transportation, and construction of internal streets to City and County standards as required by the Department of Transportation Services.

6. A noise mitigation plan to be reviewed and approved by the Department of Land Utilization in consultation with the State Department of Transportation, to handle noise from the nearby Dillingham Airfield.
7. An archaeological survey, in consultation with the State Historic Preservation Office and to be approved by the Department of Land Utilization, to identify, assess, and protect the archaeological resources related to this project.

8. A wetlands management program to be developed with the U.S. Fish and Wildlife Service.

9. A Wildfire Contingency Plan and Forest Reserve Access Plan to be worked out with the Department of Land and Natural Resources.

G. DETERMINATION

The Final EIS is determined to be acceptable under the procedures and requirements established in Chapter 343, HRS, and the State "EIS Rules." This determination does not imply a favorable recommendation on the applicant's request for any approvals or permits required by the Department of General Planning.

Approved: DONALD A. CLEGG
Chief Planning Officer
Department of General Planning
FINAL
ENVIRONMENTAL IMPACT STATEMENT

MOKULEIA DEVELOPMENT PROPOSAL
MOKULEIA, OAHU

Tax Map Key: 1st Division
6-8-02: Parcels 1, 6, 10 and 14
6-8-03: Parcels 5, 6, 11, 15, 16, 17,
        19, 20, 30, 31, 33, 34, 35,
        38, 39 and 40
6-8-08: Parcel 22

MAY 8, 1987

William E. Wanket, Inc.
John Zapotocky, Consultant
FINAL
ENVIRONMENTAL IMPACT STATEMENT
MOKULEIA DEVELOPMENT PROPOSAL
MOKULEIA, OAHU

MAY 8, 1987

submitted pursuant to chapter 343,
hawaii revised statues
environmental impact statement
regulations

WILLIAM E. WANKET
Pacific Tower 1010
1001 Bishop Street
Honolulu, Hawaii 96813
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PART I
SUMMARY

Action: Applicant

Project Name: Mokuleia Development Proposal

Project Description: A General Plan Amendment and a Land Use and Public Facilities amendment to the North Shore Development Plan. Approximately 1,000 acres are proposed for development. The project includes 2,100 hotel rooms, 1,200 condominium units, 700 residential units, 100,000 sq. ft. of commercial space, two golf courses and other recreational amenities. The applicant is requesting a resort designation on the General Plan and resort, residential, and commercial designation on the development plan.

Project Location: The site is located on Oahu's North Shore on lands north and south of Farrington Highway in Mokuleia. The site is currently vacant with the exception of fencing improvements, and ten houses and the former Dillingham Family Vacation Home.

Tax Map Key: 6-8-02: Parcels 1, 6, 10, and 14
6-8-03: Parcels 5, 6, 11, 15, 16, 17, 19, 20, 30, 31, 33, 34, 35, 38, 39, and 40
6-8-08: Parcel 22

Development Plan Designation: Agriculture/Preservation

State Land Use: Agriculture/Conservation

Zoning: Agriculture/Preservation

Applicant/Owner: Mokuleia Land Company

Environmental Consultant: William E. Wanket, Inc.

Accepting Authority: Department of General Planning
Summary:

The project site is currently vacant with the exception of fencing improvements and eleven dwelling units. The land is used for grazing of cattle. Portions of the property are used for polo and for other equestrian activities. The property also contains a lake of approximately 20 acres which is the remnant of a sand mining operation which ceased in 1979.

The applicant is proposing to develop a recreational/resort/residential complex on approximately 1,000 acres of land. The land to be developed includes all of the coastal properties owned by the applicant as well as the flatlands and a portion of the foothills. The applicant's remaining holdings in the area (1,900 acres) are not proposed for development; however, increased recreation use of these lands may occur.

At full development in 2005, the visitors to the project are expected to spend an estimated $106,000,000 (in 1986$). Indirect and induced expenditures are expected to add an additional $99,000,000 for a total annual expenditure of over $200,000,000. Residents of the development are expected to generate approximately $13,000,000 in direct expenditures at full development. Total employment in 2005 generated in the State is expected to be approximately 5,000 jobs. These economic impacts compare with negligible operating revenues and less than 10 jobs under current conditions. The development is expected to contribute to the economic health of Oahu and Hawaii's major export industry, tourism. The project will also contribute directly to State and local finances by maintaining a 2:1 to 3:1 revenue to expense ratio both short and long term.

Additional beneficial impacts include providing housing and recreational opportunities to Oahu residents.

When completed in 2005 the proposed development is expected to have a population of 4,680 persons including an estimated 3,480 visitors and 1,200 residents. (Additional residential population estimated at approximately 800 to 900 persons will be generated between the years 2005 and 2015 as single family lots are developed by their individual owners.)

Adverse or unavoidable environmental effects include population generated impacts and other impacts. The adverse impacts and mitigating measures are summarized below.

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<td>None necessary as the Ag Impact Study shows there are an abundance of other lands now and to become available in the future to supply potential agricultural needs.</td>
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Aircraft noise  
Short-term impacts from military operations may be unavoidable. Impacts from civilian aviation can be mitigated by proper designs.

Construction impacts including noise, dust and traffic  
Compliance with State Department of Health rules and regulations governing noise and compliance with City and County of Honolulu Ordinances governing grading and other construction activities.

Increased traffic  
The traffic study for the development by Parsons, Brinckerhoff, Quade & Douglas indicates that increased traffic can be accommodated. The applicant will work with the Department of Transportation and City Dept. of Transportation Services to implement the consultant's recommendations.

Increased water consumption  
Water consumption will increase; however, the Mokuleia aquifer has sufficient water to supply the project and provide for additional future development. Based on DLNR estimates, the sustainable yield of the Mokuleia Aquifer is 20 million gallons per day, of which less than 8 million gallons per day are being used.

Increased demand for utility services  
The utility companies will be kept apprised of the progress of the development so that services will be available without delay.

Increased need for public services, police, fire, schools, parks, etc.  
The government fiscal impact analysis for the development indicates that the project will generate $2 to $3 in taxes for every $1 spent to provide services. In addition, the applicant will work with the various governmental agencies to meet the need for increased services.

Lifestyle changes  
The impact of the development on lifestyle is subjective and would vary depending on the person's current lifestyle. For example, for an unemployed worker or one facing an uncertain future in the sugar industry, the jobs created at the development may improve the lifestyle. On the other hand, for a retired person desiring a rural lifestyle the new development may not be as welcome. The developer has commissioned a social impact study and has been meeting with community groups and individuals so that the flow of
communications will continue between the community. The applicant intends to continue community communications during the operational phase of the development.

Generation of sewage and solid waste
The applicant will provide a sewerage system either by development of sewerage facilities or by participation in the City's proposed Waiaulu system. The cost of operating sewage and solid waste disposal sites is generally offset by user fees and/or public subsidy.

Wetlands Human Impact
Applicant to develop a program for management to mitigate impacts as well as design elements such as setbacks, landscapes and fencing to protect wetland habitats.

The applicant has considered a number of alternatives to the proposed action including (1) No Action, (2) Agricultural Development, (3) Recreational Development, (4) Residential Development, and (5) More or Less Development than is being proposed or a different combination of development mix.

Unresolved Issues:
The development as proposed is compatible with the State Plan, Tourism Functional Plan, Housing Functional Plan, the City General Plan (with amendment), the North Shore Development Plan (with amendment), and the Hawaii Coastal Zone Management Program. The development is not compatible with the State Agricultural Functional Plan but meets the conditions for conflict resolution prescribed in the Agricultural Functional Plan.

PART VII of the EIS describes the major processes and its scope of review that will be required for development at Mokuleia. It also identifies certain issues that will require continuing assessment during these processes in order to arrive at the most appropriate method for mitigation, including areas dealing with wetlands, low/moderate income housing, parks and accessways, Dillingham Airfield, and sewage disposal.

The applicant intends to comply with all applicable laws, rules and regulations by obtaining all required approvals including the following:

<table>
<thead>
<tr>
<th>Approval</th>
<th>Approving Authority</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Plan Amendment</td>
<td>City Council</td>
<td>Application filed</td>
</tr>
<tr>
<td>North Shore Development Plan Land Use Amendment/Public Facilities Amendment</td>
<td>City Council</td>
<td>Application filed</td>
</tr>
<tr>
<td>Resoing</td>
<td>City Council</td>
<td>Application to be filed</td>
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<tr>
<td>Special Management Area Permit</td>
<td>City Council</td>
<td>Application to be filed</td>
</tr>
<tr>
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<td>Status</td>
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<tr>
<td>Shoreline Certification</td>
<td>State Surveyor</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Subdivision Approval</td>
<td>Department of Land Utilisation</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>State Land Use Boundary Amendment</td>
<td>State Land Use Commission</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Department of Army Permit</td>
<td>U.S. Army Corps of Engineers</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Section 7 Consultation (Endangered Species)</td>
<td>U.S. Fish and Wildlife Service</td>
<td>Request for consultation to be filed</td>
</tr>
<tr>
<td>Federal Consistency (with Coastal Zone Management Act)</td>
<td>State Department of Planning and Economic Development (HEED)</td>
<td>Application to be filed</td>
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<tr>
<td>Conservation District Use Permit</td>
<td>State Department of Land and Natural Resources</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Stream Permit</td>
<td>State Department of Land and Natural Resources</td>
<td>Application to be filed</td>
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<tr>
<td>Approval of Drainage System</td>
<td>State Department of Transportation/County Department of Public Works (DPW)</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Approval of Wastewater Disposal System</td>
<td>State Department of Health/County Department of Public Works/County Department of Land Utilization</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Approval of Potable Water System</td>
<td>State Department of Land and Natural Resources/State Department of Health/County Board of Water Supply</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Historic Sites Review</td>
<td>State Department of Land and Natural Resources</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Permit for Construction within State Highway Rights-of-Way</td>
<td>Department of Transportation/County Department of Transportation Services</td>
<td>Application to be filed</td>
</tr>
<tr>
<td>Permit for Installation of utility lines within State Highway Rights-of-Way</td>
<td>Department of Transportation</td>
<td>Application to be filed</td>
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<td>Electric Connection Approval</td>
<td>Hawaiian Electric (HEI)</td>
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<tr>
<td>Telephone Connection Approval</td>
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<td>Grading Permits</td>
<td>Department of Public Works</td>
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</tr>
<tr>
<td>Building Permits</td>
<td>Building Department</td>
<td>Application to be filed</td>
</tr>
</tbody>
</table>
PART II
INTRODUCTION

A. GENERAL DESCRIPTION OF THE SITE

The proposed resort development is located on property owned by Mokuleia Land Company in Mokuleia, Waialua, Oahu, Hawaii. The entire property consists of approximately 2,887 acres, of which only 1,019 acres are proposed for the resort project (Exhibits 1 and 1A).

The entire property can be grouped for convenience into five (5) parcels, A through E, as follows:

PARCEL A

LAND SITUATED ON THE SOUTHERLY SIDE OF PARRINGTON HIGHWAY AT MOKULEIA, WAIALUA, OAHU, HAWAII, BEING PORTIONS OF LAND COURT APPLICATIONS 824, 1107 AND 1810. BEING ALSO IDENTIFIED AS PARCEL 6 OF TAX MAP KEY 6-8-02 AND PARCELS 5, 6, 11, 15, 19, 20, 30, 31, 33, 34, 35 AND 40, CONTAINING AN AREA OF 2,763.242 ACRES MORE OR LESS.

PARCEL B

LAND SITUATED ON THE NORTHERLY SIDE OF PARRINGTON HIGHWAY AT MOKULEIA, WAIALUA, OAHU, HAWAII, BEING LOT 1-D OF LAND COURT APPLICATION 824, LOT 8 OF LAND COURT APPLICATION 1107, AND LOTS 4-A, 4-B, 5 AND 59-A OF LAND COURT APPLICATION 1810, BEING ALSO IDENTIFIED AS PARCELS 16, 17, 38 AND 39 OF TAX MAP KEY 6-8-03, CONTAINING AN AREA OF 83.316 ACRES MORE OR LESS.

PARCEL C

LAND SITUATED ON THE NORTHERLY SIDE OF PARRINGTON HIGHWAY AT MOKULEIA, WAIALUA, OAHU, HAWAII, BEING LOT 38 OF LAND COURT APPLICATION 1810, BEING ALSO IDENTIFIED AS PARCEL 1 OF TAX MAP KEY 6-8-02, CONTAINING AN AREA OF 26.717 ACRES MORE OR LESS.

PARCEL D

LAND SITUATED ON THE NORTHERLY SIDE OF PARRINGTON HIGHWAY AT MOKULEIA, WAIALUA, OAHU, HAWAII, BEING LOT 39 OF LAND COURT APPLICATION 1810 AND PORTION OF GRANT 338 TO HIXIAU AND KANA, BEING ALSO IDENTIFIED AS PARCELS 10 AND 14 OF TAX MAP KEY 6-8-02, CONTAINING AN AREA OF 13.089 ACRES MORE OR LESS.
PARCEL E

LAND SITUATED ON THE NORTHERLY SIDE OF FARRINGTON HIGHWAY AT MO'OKUAIA, WAI'ALUA, OAHU, HAWAII, BEING A PORTION OF GRANT 333 TO MANANA AND HULU, BEING ALSO IDENTIFIED AS PARCEL 22 OF TAX MAP KEY 6-8-08, CONTAINING AN AREA OF 0.856 ACRES MORE OR LESS.

The property has diverse physical characteristics. The property fronts Farrington Highway. The makai (oceanside) portion of the property consists of four non-contiguous parcels totaling about 120 acres. These parcels have about 1.5 miles of ocean frontage along white sand beaches.

The mauka (mountainside) portion of the property includes about 2,767 acres. The site slopes gently from sea level to about 300 feet over a distance of about a mile to the base of the Waianae mountain range. From this point to the top of the mountain range, the topography is steep and rugged and the vegetation shifts from typical ranch scrub to more lush foliage (Exhibit 2). The steep portion of the property, approximately 1,868 acres, will remain in an undeveloped condition, or will be used for recreational purposes.

The hillsides form tributaries to intermittent water courses which flow usually during the stormy periods. The water courses are well defined and flow to the ocean.

Climate in the area is excellent year round with an average temperature of 73.5°. Rainfall averages 30 inches per year. Rainfall is higher in the upper elevations of the Waianae Range, providing a consistent source of ground water recharge. Prevailing breezes are the northeast trade-winds.

Makai of Farrington Highway, Parcel B is primarily used for grazing, with the westernmost 18 acres leased to the Hawaii Polo Club for polo games during part of the year. The remaining three beachfront parcels are all primarily in open space, with the easternmost six acres of Parcel C currently being leased to the Episcopal Church's recreational "Camp Mo'okulea" complex.

B. HISTORY OF THE USE OF THE LAND

Mo'okulea Land Company purchased the land from Northwestern Mutual in 1987. Prior to Northwestern Mutual's purchase of the land in 1979, these lands were owned by the Dillingham family, who used them for a vacation retreat and ranching purposes. The old Dillingham estate home is still on the site. Throughout the years various parts of the land were in agricultural pursuits, including sugar production, macadamia nut planting, and truck crops. However, since the early 1970's, the land was primarily used for cattle grazing.
C. CURRENT LAND USE CLASSIFICATIONS AND ZONING

State Land Use Classification is shown on Exhibit 3.

Development Plan Land Use designations are shown on Exhibit 4.

Development Plan Public Facilities designation are shown on Exhibit 5.

Zoning Districts for the property are shown on Exhibit 6.

Special Management Area boundaries affecting the property are shown on Exhibit 7.

Flood Hazard Classifications on the property are shown on Exhibit 7.

Agricultural Lands of Importance on the property are illustrated on Exhibit 8.

Soil Classifications on the property are shown on Exhibit 9.

Land Study Bureau Classifications (A & B) on the property are shown on Exhibit 10.

IESA Proposed LE Classifications on the property are shown on Exhibit 11.

D. OBJECTIVES

1. Market Assessment

Mokuleia could be developed as a community serving both residents of and visitors to Oahu. To be consistent with the current image and attractiveness of the North Shore region, development should be low density, with an emphasis on recreational activities and facilities. The major land uses could include hotels, multifamily condominium and residential units, golf courses, commercial areas and other complementary facilities and amenities.

Assessment of the market for the various types of facilities under consideration indicates that Mokuleia could support development of the proposed 2,100 hotel units with a range of guest services, 1,200 condominium units, 700 residential units, a commercial complex, 36 holes of golf course, and possibly polo fields, hiking trails, camping areas and sports center (Exhibit 12).

This development would result in a community with a variety of facilities with appeal to the island resident and repeat visitor. Through careful planning, it could offer a unique residential or vacation experience in a relaxed, rural atmosphere which has previously been found only on the neighbor islands. However, its location on Oahu could give it a competitive edge over neighbor island locations.
EXHIBIT 5
NORTH SHORE DEVELOPMENT PLAN
PUBLIC FACILITIES MAP

LEGEND
On the next page
LEGEND

FOR
EXHIBIT 5,
NORTH SHORE DEVELOPMENT PLAN
PUBLIC FACILITIES MAP

PROPOSED FUNDING PARK (2-6 YEARS)
PLANNED FOR FUTURE PARK (7 YEARS-BEYOND)

PUBLIC FACILITY

SITE DETERMINED (BY PROPERTY LINE)

SITE UNDETERMINED (IN GENERAL AREA)
**LEGEND**

FOR
EXHIBIT 7, SMA/FLOOD DESIGNATIONS

**LEGEND**

*EXPLANATION OF ZONE DESIGNATIONS*

**ZONE**

**EXPLANATION**

A  Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

A1-A20  Areas of 100-year flood; base flood elevations and flood hazard factors determined.

C  Areas of minimal flooding. (No shading)

D  Areas of undetermined, but possible, flood hazards.

V1-V30  Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

SMA Boundary Line

**NOTE:**
The Department of the Army Corp of Engineers provided more detailed information broken down by Tax Map Key parcels. A complete copy of their March 9, 1987 letter and exhibits are found in PART XIII.
LEGEND:

FOR

EXHIBIT 9, SOIL CLASSIFICATIONS:

BS    Beaches
EaC   Ewa Silty Clay Loam, 6 to 12 percent slopes
EwC   Ewa Stony Silty Clay, 6 to 12 percent slopes
EJE   Halawa Silt Loam, 20 to 35 percent slopes
ELMG  Helemano Silty Clay, 30 to 90 percent slopes
JaC   Jaucas Sand, 0 to 15 percent slopes
KaB   Kaena Clay, 2 to 6 percent slopes
KaeB  Kaena Stony Clay, 2 to 6 percent slopes
KaeC  Kaena Stony Clay, 6 to 12 percent slopes
KanE  Kaena Very Stony Clay, 10 to 35 percent slopes
K1A   Kawaihapa Clay Loam, 0 to 2 percent slopes
K1aA  Kawaihapa Stony Clay Loam, 0 to 2 percent slopes
K1aB  Kawaihapa Stony Clay Loam, 2 to 6 percent slopes
KpD   Kemo Silty Clay, 12 to 20 percent slopes
KpF   Kemo Silty Clay, 35 to 70 percent slopes
MBL   Mahana-Badland Complex
Mt    Mokuleia Clay Loam
Ph    Pearl Harbor Clay
Pna   Pulehu Clay Loam, 0 to 3 percent slopes
TP    Tropaquepts
rRk   Rock Land
rSY   Stony Steep Land
rTP   Tropohumults-Dystrandepts Association
LEGEND
on the next page
**LEGEND:**
FOR
EXHIBIT 11, LESA PROPOSED L. E. CLASSIFICATIONS:

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<th>MAP SYMBOL</th>
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<td>BS</td>
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<tr>
<td>EaC</td>
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<tr>
<td>EwC</td>
<td>77</td>
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<tr>
<td>EJe</td>
<td>45</td>
</tr>
<tr>
<td>HLMG</td>
<td>No Rating</td>
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<tr>
<td>JaC</td>
<td>41</td>
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<td>KaB</td>
<td>79</td>
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<tr>
<td>KaeB</td>
<td>71</td>
</tr>
<tr>
<td>KaeC</td>
<td>62</td>
</tr>
<tr>
<td>KanE</td>
<td>41</td>
</tr>
<tr>
<td>Kla</td>
<td>94</td>
</tr>
<tr>
<td>KlaA</td>
<td>83</td>
</tr>
<tr>
<td>KlaB</td>
<td>83</td>
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<tr>
<td>KpD</td>
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<td>PaA</td>
<td>86</td>
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<td>TP</td>
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</tr>
<tr>
<td>rRK</td>
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<tr>
<td>rSY</td>
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<tr>
<td>rTP</td>
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</tbody>
</table>
Discussion throughout this market assessment makes use of historical market data both from Oahu and the neighbor islands. The Mokuleia proposal calls for the creation of a recreational community. There are no examples of the proposed development on Oahu or on the neighbor islands. There are a number of proposed developments on Oahu such as Kailua, West Beach and Makaha which exhibit certain of the characteristics of the proposed Mokuleia development. None of the Oahu projects have achieved a mature stage. There are a number of neighbor island developments such as Wailea, Kaanapali, Princeville, etc., which also exhibit some of the characteristics of the proposed Mokuleia Recreational Community, and have achieved varying degrees of maturity. The Mokuleia Recreational Community has been targeted to attract the resident population as well as the Oahu visitor. Alternate accommodations and second home product are needed on Oahu to prevent a continuation of the erosion of Oahu's market share of Hawaii's visitor market. The Mokuleia project is expected to compete for business on Oahu and as part of the Hawaii visitor market. Therefore, it is appropriate to view market data available on Oahu transactions as well as information available about competing products on the neighbor islands.

The applicant believes that absorption rates discussed in the market assessment have a significant upside potential. Inflation rates and mortgage interest rates without precedent in the United States caused disruption in real estate markets during the 1980's. This upheaval caused trouble at financial institutions which responded by reassessing their loan approval criteria. Buyers faced with high interest rates and financial institutions with changing policies tended to defer discretionary purchasers of recreational real estate. For these reasons the applicant feels that a return to more traditional inflation and interest rate levels, as well as increased stability in the financial markets, will increase absorption rates for the product being proposed at Mokuleia.

The market assessment, prepared by John Child & Company, Inc. is included as Appendix A. Specific market assessments for the various land uses are summarized under the following subheadings:

a. Hotel Market Assessment

Based on the preliminary development plan, the proposed hotels at Mokuleia are expected to attract both local residents and off-island visitors. Factors which would attract hotel guests to Mokuleia include:

- Unique location on Oahu:
  - Accessible to and from Waikiki, the Honolulu central business district and all areas of Oahu
  - Oceanfront, rural environment
- Range of recreational opportunities:
  - Onsite golf course, possibly polo field, hiking trails, riding trails, camping grounds, tennis ranch and sports center
  - Beach activities including swimming, surfing, windsailing, and boating

- Range of entertainment and commercial services:
  - Entertainment at hotel facilities
  - Variety of food and beverage services at hotel and commercial facilities.

Market Share

The supportable hotel rooms were estimated based on Mokuleia's projected market position in relationship to overall Oahu room demand.

Initially, Waikiki hotels and condominium units are estimated to capture about 93% of the Oahu hotel room demand. Waikiki is expected to continue to dominate the Oahu visitor accommodations industry. However, as master planned resort developments in areas outside Waikiki emerge, Waikiki's share could be expected to decline from its current level of about 93% to about 75% by 2005. This decline in market share would result from:

- Limited amount and availability of suitable development sites in Waikiki.
- Development and maturation of resort destination areas outside Waikiki.
- Increasing preference of repeat visitors to stay outside of Waikiki.
- Increasing number and length of stay of local resident hotel guests.

The North Shore/Koolaupoa area currently captures about 2% of the room demand on Oahu. Based on the plans for expansion at the Turtle Bay Resort and the proposed development plan for Mokuleia, the North Shore is projected to capture a 12.5% market share of room demand on Oahu by 2005, as shown in the following table.
<table>
<thead>
<tr>
<th>Area</th>
<th>1984</th>
<th>1995</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waikiki/Kahala</td>
<td>93.0%</td>
<td>87.5%</td>
<td>75.0%</td>
</tr>
<tr>
<td>West Beach/Leeward</td>
<td>3.0</td>
<td>4.5</td>
<td>10.0</td>
</tr>
<tr>
<td>North Shore/Koolauloa</td>
<td>2.0</td>
<td>6.0</td>
<td>12.5</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>2.0</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
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**Supportable Hotel Rooms on Oahu**

Based on the anticipated supply and demand relationships for visitor units on Oahu, the visitor industry could be expected to require about 18,900 to 22,700 additional rooms by 2005. This represents a requirement of 9,500 to 13,300 rooms in addition to the inventory which is currently being planned for Oahu.

Hotel rooms are expected to continue to account for about 70% of total demand for visitor rooms on Oahu. As a result, the number of supportable hotel rooms on Oahu is projected to range between 40,300 to 42,900 rooms by 2005.

**Supportable Hotel Rooms at Mokuleia**

Based on the proposed development concept, Mokuleia could achieve a market capture rate of about 1.5% in 1990, increasing to 5% by 2005. At these estimated market capture rates, the number of supportable hotel rooms at Mokuleia is projected to increase from about 500 units in 1990 to between about 2,000 and 2,200 in 2005, shown as follows.

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated market share</th>
<th>Supportable hotel rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1.5%</td>
<td>480-510</td>
</tr>
<tr>
<td>1995</td>
<td>3.0</td>
<td>1,080-1,160</td>
</tr>
<tr>
<td>2000</td>
<td>4.0</td>
<td>1,560-1,660</td>
</tr>
<tr>
<td>2005</td>
<td>5.0</td>
<td>2,020-2,150</td>
</tr>
</tbody>
</table>
b. Condominium Apartment

Market Assessment

The preliminary condominium development concept for Mokuleia takes into account recent trends in the condominium market, characteristics and history of comparable projects on all islands and the projected market support at Mokuleia.

Market Review

The developments envisioned for Mokuleia could be expected to appeal to residents and visitors seeking an active recreational environment. For purposes of comparison, 30 similar condominium projects were studied. Selection was based on the following criteria:

- Projects in rural locations on Oahu.
- Projects in or near master-planned resort areas on the neighbor islands.

These projects were found to share the following characteristics:

- Location - Condominium developments are typically located to offer attractive views and surroundings. In order of desirability, condominium orientations are usually:
  1. Oceanfront
  2. Ocean view
  3. Golf-front, and
  4. Interior.

View orientations of the sampled units were as follows:

<table>
<thead>
<tr>
<th>Orientation</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Oceanfront</td>
<td>24%</td>
</tr>
<tr>
<td>Ocean view</td>
<td>22</td>
</tr>
<tr>
<td>Golf-front</td>
<td>27</td>
</tr>
<tr>
<td>Interior</td>
<td>27</td>
</tr>
</tbody>
</table>

100%

- Project Density - This is a general indicator of the relative open space and privacy available to individual units. The average project density for similar projects is 12 units per acre. Project densities ranged from 8 units per acre at Wailea and Princeville to 23 units per acre at Hakaha, Mokuleia, Punalu'u and Kaawa condominiums.
Project Amenities - The projects generally offer a recreation center and at least one swimming pool. Many also front along a beach suitable for swimming. Other amenities provided include whirlpools, saunas, tennis courts, barbecue areas and landscaping.

Sales Absorption

Rural Oahu includes nearly 3,500 units in 31 condominium projects, including 9 projects considered comparable to concepts for Mokuleia. Since 1979, these 31 projects have averaged 300 sales per year. The 9 selected projects accounted for 29% of sales in all 31 projects and averaged 86 sales or resales per year during this period. Kuliima Estates East and West accounted for nearly 40% of these sales.

The shortest marketing periods and the greatest numbers of units sold occurred in 1975 and 1979, when the selected projects achieved annual sales of 100 to 200 units. Since 1980, sales rates have declined, and currently average between 20 and 35 units per year. There is a direct correlation between the rates of sales and the level of interest rates.

Initial sales rates of new units in rural Oahu and the selected neighbor island resort areas range from 30 to 93 units per year, and average 50 units per year.

Buyer Characteristics

Condominium buyers are generally motivated by a desire to acquire a retirement or vacation home or by perceived investment opportunities. Nearly 50% of those purchasing condominiums in rural Oahu are from Hawaii.

Market Assessment

Initially, the condominium buyers at Mokuleia could be expected to be Oahu residents and visitors who return frequently. Buyers are expected to be:

- Primarily from Hawaii as well as the western United States.
- Predominantly married couples, aged 35 to 60 years.
- Physically active and seeking access to golf courses, tennis courts, beaches and restaurants.
The market support for condominium units at Mokuleia is dependent on its reputation and image as a major recreational development, which is expected to attract a large base of local residents from which condominium buyers may emerge. Based on the sales history of similar projects, average sales absorption for oceanfront condominiums could increase from about 70 to 80 units per year over the first decade of development. Similarly, the average sales absorption rates for condominiums on the mauka portion of Mokuleia could be projected to increase from about 45 to 55 units per year. Total projected sales absorption support about 1,725 units; however, the current development concepts include only about 1,200 units.

c. Residential Market Assessment

The location, preliminary development concepts and recreation orientation in Mokuleia are unique. Because the project is unlike any existing area in Hawaii, comparisons with existing residential projects include residential lots of less than one acre available in planned resort communities (community lots) and lots of one acre or more available in rural Oahu (acreage lots).

Market Review

The characteristics and market performance of community and acreage lots are discussed as follows.

Community Lots

To date, planned resort community on Oahu have not included single-family lots (community lots). On the neighbor islands, about 2,149 community lots were developed in five resort communities. The majority of these are at Waikoloa Village and Princeville resorts. However, over the next two decades, about 6,900 community lots are planned for development on the neighbor islands.

The existing and planned community lots are described as follows:

Location - The majority are either hillside with ocean and/or valley views or interior lots. Lot developments that abut golf course fairways are the next most common type, while oceanfront lots represent only about 3% of the total.

Size - A variety of lot sizes are expected, ranging from 9,500 square feet and up. Golf course lots are generally larger and have higher prices.
Amenities - Most community lot subdivisions do not include extensive amenities, because buyers are reluctant to pay for the maintenance of such facilities. Instead, most projects offer short-term, complimentary or voluntary memberships at the resort golf or tennis facilities.

Absorption - Community lot subdivisions averaged about 63 sales per year since 1971. Sales rates have fluctuated with general real estate cycles, with fewer sales between 1982 and 1983. Until recently, lots that have sold since 1982 have typically been lower-priced or offered at discounted prices. Again, the cycle is directly related to the level of interest rates.

Buyer Characteristics - Buyers of community lots tend to be 40 to 55 years of age, and either from the U.S. west coast or the island where the project is located. While view lots are preferred, buyers who:

- visit the area frequently,
- are Hawaii residents, or
- intend to retire in the area

are often willing to forego a view for lower-priced lots. Historically, the majority of purchasers have bought community lots for future improvement as a retirement home or for investment or speculative building.

Acreage Lots

Development of acreage lots has occurred primarily in rural areas in the State. On Oahu, such developments are typically in Kahaluu, Pupukea, Mokuleia and Makaha. Most acreage lot subdivisions include less than 23 lots. Six acreage lot developments on Oahu, Maui and Molokai were selected for study and are described as follows.

Location - Lots are generally considered to be view lots if they have ocean views of varying quality and/or views of mountain ranges. Lot locations in the selected subdivisions are described as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>View lots</td>
<td>54%</td>
</tr>
<tr>
<td>Interior lots</td>
<td>42%</td>
</tr>
<tr>
<td>Oceanfront lots</td>
<td>4%</td>
</tr>
</tbody>
</table>

100%

Size - Typical lot sizes range between 1/2 to 7 acres. Lot sizes generally do not vary substantially within subdivisions.
Amenities - None of the projects studied provide any common community facilities or security.

Absorption - The subdivisions have averaged about eight lot sales per year since 1978. Sales are generally the highest in the initial years when the developer markets the lots.

Buyer Profile - The acreage lot buyer is similar to the buyer for community lots, except that the former prefers a higher degree of privacy. In addition, between 75% and 100% of the buyers are from within the State.

Market Assessment

The primary buyers for residential lots could be expected to be those seeking:

- Primary residence in a recreation-oriented community, or
- Vacation or retirement home.

A secondary market could include the speculative builder and investor markets.

The rate of residential lot sales at Mokuleia may be expected to be related to visitor facility development and the maturity of the resort as a visitor destination. Sales are projected to increase with the opening of hotels and condominiums. In addition, these lots would provide a unique opportunity for residential units in a quality recreation-oriented community on Oahu.

Annual community lot sales are projected to increase from 30 to 50 lots per year over a 15-year period; annual acreage lot sales could increase from 10 to 20 lots per year. Total absorption at Mokuleia could amount to 825 lots by 2005; however, the current development concepts include only 700 lots.

d. Commercial and Recreational Facilities Assessment

Commercial and recreational facilities would complement the development envisioned at Mokuleia. The market support for a retail shopping center, golf course and other recreational facilities and amenities were assessed.
Retail Facilities

Market support for retail space at Hōkūle‘a would result from shopping needs of onsite visitors and residents, off-resort visitors and neighboring North Shore residents. The average daily population of these four groups is projected to be over 20,000 by 2005.

The total annual retail sales in Hōkūle‘a by these four markets are estimated to amount to about $4.9 million in 1990 and to increase to about $27.6 million by 2005. Visitor dollars are expected to account for the majority of total expenditures (93%); Hōkūle‘a resident expenditures are estimated to account for about 3%. Offsite visitors and North Shore resident expenditures are expected to represent 4% of total expenditures.

The sales level appropriate for retail facilities at Hōkūle‘a has been estimated at $275 per square foot, based on sales levels at comparable centers. The net demand for freestanding retail space could be expected to support about 10,500² by 1990 and 68,000² by 2005. "Net demand" is defined as total retail space demanded in Hōkūle‘a less that which could be expected to be built in its hotels.

The retail center could include widely recognized restaurant and other food service establishments. The facility could be designed to take advantage of adjoining inland waterways by including wide, landscaped promenades and park areas. To accommodate such malls, walkways and public areas, a development site of 6 to 7 acres would be appropriate.

Alternate Commercial Facilities

Given the unique recreational orientation of Hōkūle‘a, alternate commercial facilities could be supported on 22 to 23 acres. Potential uses being considered include:

Multi-Media Complex – This complex could provide facilities for theatrical, cinematic and musical performances. It could also be used for public meetings and forums. The complex could provide a diverse range of entertainment opportunities to benefit the North Shore community.

Interactive Sports Museum – This facility could showcase the diversity of recreational activities in Hawaii, as well as offer visitors opportunities to participate in these activities. Sports which could be featured include surfing, paniolo rodeo, hang gliding, polo, canoe racing and ancient Hawaiian games.
Recreational Facilities

The image of the Mokuleia area is widely associated with recreational activities. A wide range of recreational amenities would enhance the attractiveness of the development to both residents and visitors.

Golf Courses

As well as being a desirable recreational facility, a golf course enhances the image of the development. It offers the intangible benefits of open space, tranquility and aesthetic value. The presence of a course also lowers the overall density of units in the area and gives a feeling of spaciousness to the resort. Golf courses also enhance the land values of areas surrounding the resort.

A well designed course is able to draw visitors to an area based on its reputation. Thus, resort golf courses are generally "championship" courses, featuring extensive landscaping and challenging, but forgiving, play.

The demand for golf has been projected based on estimated on- and off-resort population and golf utilization rates. The number of rounds of golf are projected to increase from about 166 rounds per day by 1995 to about 320 rounds per day by 2005.

Resort golf courses are often developed prior to the completion of other visitor and community facilities to enable the course to mature and to attract potential visitors to the area. Thus, while the golf course may not be fully supported in terms of desired rounds of play, the first golf course should be developed for completion concurrently with the first major hotel facility. A second golf course could be developed later as the resort matures, to prevent overcrowding and deterioration of the first course.

Other Recreational Facilities

Mokuleia's diverse physical features and other recreational facilities are not typically found on Oahu. As a result, Mokuleia has the opportunity to establish itself as a recreation-oriented destination on Oahu. Other recreational facilities could include:

Polo Club and Stables - Mokuleia is already well known for its polo matches. The development could include a club and stables surrounded by condominiums and golf fairways. This would enhance the rural, ranchlike atmosphere of the community. During off season, the facilities could be used for rodeos and other equestrian events.
Hiking Trails - Several trails now lead from the lowlands to a plateau of the Waianae Mountains known as Peacock Flats. These and other similar trails could be developed to offer visitors and residents the opportunity to experience and enjoy the rugged, natural beauty of the region.

Camping Areas - Camp grounds, developed in conjunction with the hiking trails, could augment the recreational facilities and appeal of the community.

Sports Center - A sports center could include a pavilion and outdoor track and field. The pavilion could include basketball and volleyball courts which could be adapted for boxing, wrestling, gymnastics and other indoor sports, as well as locker rooms and showers. Outdoor activities could include track and field events, soccer, rugby and football.

Tennis Ranch - A tennis ranch could include courts suitable for tournament play and provide ancillary facilities such as locker rooms, showers, pro shop and a restaurant. With the proper design and approach, a tennis ranch could accommodate several tennis tournaments each year.

2. Statement of Objectives

The Mokuleia site is on the North Shore of Oahu, about six miles west of Haleiwa. The North Shore region is rural; the primary land uses and economic activities derive from agriculture and the visitor industries.

The North Shore is known for its scenic coastlines, beaches, and world-class surfing areas. It has long been an area for family beach houses, which are frequented primarily on the weekends and in summers.

In addition, local residents associate Mokuleia with hiking trails, camp grounds, polo fields, and air activities including gliding and aerobatics.

The 2,900-acre site has diverse physical characteristics. The property fronts Farrington Highway. The makai (oceanside) portion of the site consists of four noncontiguous parcels totaling about 120 acres. These sites have about 1.5 miles of ocean frontage along white sand beaches.

The mauka (mountainside) portion of the site includes about 2,780 acres. The site slopes gently from sea level to about 300 feet over a distance of about a mile to the base of the Waianae mountain range. From this point to the top of the mountain range,
the topography is steep and rugged; the vegetation shifts from typical ranch scrub to more lush foliage. Development is to be confined to about 1,000 acres of the total site.

Preliminary development concepts are being studied. The applicant is evaluating these concepts in terms of community needs, market support, physical and financial feasibility. Important goals of the development concept are to create jobs and business opportunities in the community.

The preliminary development concept envisioned for Mokuleia focuses on land uses and recreational facilities which would be enjoyed by Hawaii families as well as visitors. Land uses are planned to complement the existing image and character of the area. As a result, the development is proposed as a low density, recreation-oriented master planned community.

A tentative land use plan has been proposed. This plan is meant to consider the existing image and character of Mokuleia and the North Shore community, address any specific development needs for Oahu and Hawaii residents and the realities of financial limitations for the developer.

Based on the preliminary land use plan, Mokuleia is envisioned to be a recreational community in a relatively rural, low density environment. The applicant proposes to orient land uses and facilities to serve residents in the adjoining communities as well as others on Oahu.
PART III
PROJECT DESCRIPTION

A. GENERAL DESCRIPTION OF THE ACTION'S TECHNICAL, ECONOMIC, SOCIAL AND ENVIRONMENTAL CHARACTERISTICS

1. Technical Characteristics

The preliminary development concept envisioned for Nokuleia focuses on land uses and recreational facilities which would be enjoyed by Hawaii families, as well as visitors. Land uses are planned to complement the existing image and character of the area, and the physical characteristics of the site. As a result, the development is proposed to be a low density project, with structures not exceeding 6 to 7 stories in height, centered around a recreational theme that would offer residents and visitors a wide range of leisure time activities, including water-oriented uses, hiking, camping, golf, tennis, horseback riding, as well as spectator type activities.

The land use elements of the plan are illustrated on Exhibit 13, and can be briefly described as follows:

- **Resort.** The proposed resort project consists of 3,300 units; approximately 2,100 are hotel units and 1,200 are condominium units. The units are to be distributed both mako and mauka of Farrington Highway. The hotel development would include oceanfront resort type hotels and possibly a village hotel and conference center hotel on the mauka side of Farrington Highway.

The oceanfront resort type hotels would be designed to maximize the scenic ocean views and minimize any adverse influences on the two neighboring developments. The hotels would be activity oriented and offer a broad range of on-site recreational and entertainment opportunities.

A hotel mauka of Farrington Highway with a thoughtful design concept could result in a low-density village atmosphere. Extensive interior landscaping and waterways would compensate for the lack of ocean frontage and limited ocean views. The hotel would provide a relaxed environment for guests who seek a slower-paced vacation experience than experienced in Waikiki.

The conference center hotel could cater to small to medium sized conventions and meetings and corporate incentive groups. The hotel could include meeting and conference rooms, audio/visual and telecommunications facilities, pavilions, and
banquet halls. On-site recreational facilities including swimming pools and whirlpools, racquet sports, and a health center would provide active recreational complements to the more businesslike meeting rooms.

The 1,200 resort condominium units could be on oceanfront sites and on sites fronting the golf course. These units are expected to appeal to residents and visitors seeking an active recreational environment. Project amenities could include a recreation center, swimming pools, saunas, tennis and other game court activities, barbecue areas, and extensive landscaping.

- **Residential.** Seven hundred (700) residential units are proposed to be developed, including lots with golf course frontages and lots arranged around open space and recreational amenities. The average density proposed per acre is 2.5.

The residential development would offer a range of choices in terms of living style and investment in Mokuleia. Residential units will provide families privacy as well as flexibility in design and orientation. For growing families, the units may be desirable as primary residences; for other families, a secondary or weekend home could be built. In addition, residential development may represent an opportunity to invest in a property which could be enjoyed in retirement.

- **Recreational Development.** A wide range of recreational facilities and amenities are possible to enhance the attractiveness of the development to both residents and visitors.

**36 Holes of Golf Course** are planned to meet the demand for such activity, as well as to provide open space amenities for onsite developments.

**Polo Club and Stables -** Mokuleia is already well known for its polo matches. The development could include a club and stables surrounded by condominiums and golf fairways. This would enhance the rural, ranchlike atmosphere of the community. During off season, the facilities could be used for rodeos and other equestrian events.

**Hiking Trails -** Several trails now lead from the lowlands to a plateau of the Wai'anae Mountains known as Peacock Flats. These and other similar trails could be developed to offer visitors and residents the opportunity to experience and enjoy the rugged, natural beauty of the region.
Camping Areas - Camp grounds, developed in conjunction with the hiking trails, could augment the recreational facilities and appeal of the community.

Sports Center - A sports center could include a pavilion and outdoor track and field. The pavilion could include basketball and volleyball courts which could be adapted for boxing, wrestling, gymnastics and other indoor sports, as well as locker rooms and showers. Outdoor activities could include track and field events, soccer, rugby and football.

Tennis Ranch - A tennis ranch could include courts suitable for tournament play and provide ancillary facilities such as locker rooms, showers, pro shop and restaurant. With the proper design and approach, a tennis ranch could accommodate several tennis tournaments each year.

- Commercial - Approximately 69,200 square feet of commercial space (excluding an estimated 31,500 square feet of space in hotels) are projected to be needed when the development of the project is completed.

The commercial development could provide convenient facilities for goods and services for guests and residents of Mokuleia and for the North Shore community. The commercial development would include retail shopping, dining and entertainment facilities in addition to those that may be provided in the hotel and condominium facilities.

Other potential commercial uses could include a Multi-Media Complex for theatrical, cinematic and musical performances. Such a complex could provide a diverse range of entertainment opportunities to benefit the North Shore community. Another potential use is an Interactive Sports Museum that could showcase the diversity of recreational activities in Hawaii, as well as offer visitors opportunities to participate in these activities. Sports which could be featured include surfing, paniolo rodeo, hang gliding, polo, canoe racing and ancient Hawaiian games.

Following is a brief description of infrastructure improvements related to the proposed resort community. A fuller discussion of the proposed infrastructure improvements can be found in Part IV, Section F, Infrastructure and Public Services.

- Farrington Highway (abutting project) - Provide miscellaneous pavement widening and shoulder improvements and left turn lane. Reconstruct and lengthen one bridge, raise the roadway grade to provide adequate flood clearance and install highway lighting.
Primary Access Road - Construct 56 feet to 76 feet wide primary access roadway from Farrington Highway through the development to service adjacent sections of land within the project.

Trunk Sewer Lines - Construct new 12" to 15" sewer lines in Farrington Highway and new privately constructed roadways.

Sewage Lift Stations - Construct sewage lift stations which are needed to move the wastewater to the treatment plant.

Sewage Treatment Plant - Construct a new sewage treatment plant (STP), injection wells, and appurtenances to treat and dispose of the wastewater. Alternatively, the applicant will participate with the City and County of Honolulu in its development of a new STP for theWaialua area.

Water Wells - Complete the installation of pumps and appurtenances on three wells that have been drilled but not yet completed. Drill a fourth well and install the required pumps and appurtenances.

Water Reservoir - Construct two (2) reservoirs, one for the lower service areas, and the other for the higher service lands, together with the required water lift stations and appurtenances.

Water Transmission Mains - Construct water transmission mains of various sizes to be built in the private and public roadways.

Drainage - Two streams flow through the site, Hakalana and Kapalua Streams, with the latter providing discharge into Kai'ahulu Bay. Proposed plans call for rerouting the discharge outlet to Hakalana Stream.

Electricity and Telephone - Additional overhead transmission lines will be necessary to supply needed power for the development. Electrical and telephone service onsite will be provided by an underground duct system.

2. Economic Characteristics

The completed resort development is estimated to generate nearly 4,900 direct, indirect and induced jobs on Oahu, of which about 3,250 jobs are estimated to be located within the region. Much of the supply for this onsite labor demand could be met from within the region from various sources, including the unemployed and underemployed, military dependents, females, high school graduates, employed persons now commuting outside the area, and
3. **Social Characteristics**

Three types of characteristics merit discussion: (1) continuation and possible expansion of some existing social characteristics; (2) provision of new amenities; and (3) the present community involvement program, which is intended to result in agreements about future benefits to the community.

Existing social characteristics which may be continued and even expanded include equestrian-oriented recreation (particularly polo) and hiking or hunting in the mauka portions of the property. At present, the Hawaii Polo Club leases approximately 18 acres of beachfront Mokuleia property. This site is now the center of polo activities in Hawaii. According to the club president, there are about 30 players and 100 associate members, and matches draw between 500 and 2,000 spectators. Many players keep their horses at the Crowbar Ranch (a division of Mokuleia Ranch), which provides horse stable facilities, daily grooming and feeding service, and limited additional equestrian activities for both polo club members and other paying members of the general public.

Current project plans call for resort development on the existing polo field site. However, there have been preliminary discussions between the landowner and the polo club on relocating the polo fields to a more mauka location. No commitments have been made on either side as of this time. However, if the plans do come to fruition, it is likely that expanded stable operations and related equestrian activities (possibly dressage or rodeo) would also constitute a characteristic of the project.

Mauka portions of the project site include several trails suitable for hiking and a jeep access trail (recently washed out in one place) to Peacock Flats, which is an excellent potential nature/recreational site. Due to liability concerns, the landowner recently has been hesitant to grant permission to outside parties to use the trails. However, there are reports of trespassing by some persons, including hunters. If the project is approved, the access road to Peacock Flat would be improved and the developer would try to provide access to the general public, depending on other requirements for developer expenditures. The current intent is to contract with an outside operator, which could finance needed improvements and operating costs through small user fees. The mauka hiking, picnic, and/or camping facilities could then be open to the general public. It is possible that a portion of the mauka lands could also be set aside for hunting on a fee basis.
Several other commercial aspects of the project will also provide new amenities for North Shore residents—the golf course, restaurants, and contemplated theatre facilities. The additional visitor and resort residential population will provide a base for expanding public services on the North Shore, such as fire protection, emergency medical services, and additional police personnel. A new water system designed to meet the project's needs will upgrade the water service in the area, and to meet wastewater requirements a sewerage system including a sewage treatment plant will be built (possibly in connection with the City's proposed Waialua STP).

To explore the possibility of additional social benefits for the nearby community, the developer has been meeting with community leaders, groups and organizations, and individuals. These efforts will continue throughout the planning process to ensure community issues and concerns (employment, job training, beach and mountain access, shoreline protection, housing, etc.) are appropriately addressed.

4. Environmental Characteristics

The major physical onsite features include the Waianae Mountain Range, Makalena and Kapalua Streams, pond areas (former sand mining borrow pits), and Kai'ahulu Bay.

The Waianae Mountain Range forms a spectacular, scenic background for the proposed resort community. Approximately 1,800 acres of the applicant's mauka land is not proposed for development, but will remain in open space or be used for recreational purposes, such as hiking and/or camping activities.

The pond areas on the mauka side of Farrington Highway were formed as a result of previous sand mining activity on the site. These pond areas are now used as habitats for waterbirds. Any development, improvement and/or modification to these areas will be done in coordination with the U.S. Fish and Wildlife.

Makalena and Kapalua'au Streams flow through the property. Both streams have discharge outlets that empty into Kai'ahulu. However, under the current drainage configuration, only Kapalua'au Stream is able to discharge runoff from the adjacent watershed area. Makalena Stream, however, is considered a superior discharge outlet, and improvements to this stream are proposed that will reroute the discharge from Kapalua'au Stream. This rerouting is not expected to adversely affect the water quality within Kai'ahulu Bay. More detailed description of the nearshore marine environment is provided in Part IV, Section 2 of this EIS.
B. PROPOSAL AND PURPOSE OF THIS EIS

Proposal: Amend the North Shore Development Plan to designate approximately 1,019 acres for resort, residential, commercial and recreational uses.

Need: Market studies commissioned by the applicant indicate that there will be a need for 9,500 to 13,300 hotel rooms in addition to the inventory which is being planned for Oahu.

Implementation of Planning Policies: Implementation of State and County planning policies as described in Section IX of this EIS.

Purpose for EIS Preparation: To satisfy the requirements of Chapter 343, Hawaii Revised Statutes ("H.R.S.").

C. USE OF PUBLIC FUNDS OR LANDS FOR THE ACTION

No public funds or lands are being considered for the action if granted.

D. PHASING AND TIMING OF THE ACTION

The following table shows the phasing and timing of the proposed development as estimated by the applicant's market assessment.

| MOKULEIA Proposed Development Phasing Guidelines 1990 to 2005 |
|-------------------|-------|------|------|
|                   | 1990  | 1995 | 2000 |
|                   |       | 2005 |
| Hotel units       | 500   | 1,300| 1,600| 2,100|
| Condominium units | 0     | 575  | 1,150| 1,200|
| Single-family lots| 0     | 200  | 475  | 700  |
| Total units       | 500   | 1,875| 3,225| 4,000|

The phasing schedule indicates a 20-year development time frame including the time required to obtain government approvals. Timing is affected by several factors beyond the control of the applicant such as government approvals, market conditions for resort and residential development, financing of projects, etc. Accordingly, the schedule should be viewed as an anticipated development framework rather than an exact timetable.
PART IV

DESCRIPTION OF THE ENVIRONMENTAL SETTING AND
THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

A. TOPOGRAPHY

Existing Conditions

The area proposed for development consists of four parcels of land between the Farrington Highway and the Pacific Ocean and one parcel of land between Farrington Highway and the Waianae Mountain Range. The shoreline properties are all relatively flat with minor variations caused by drainageways through the parcels and areas of buildup due to windblown sand. The parcel mauka of Farrington Highway is relatively flat for about 1/2 mile mauka of the highway and then slopes up increasingly until it reaches the base of the Waianae mountains.

Impact

The proposed development will have some impact on the overall topography of the site. Localized changes in topography will be necessary to accomplish development. These changes may include the following: (1) building up coastal areas where development is proposed in order to mitigate storm wave and tsunami hazards, (2) grading and construction of drainageways to mitigate flood hazards, (3) cutting and filling in order that roads to be developed are in compliance with good engineering practice and County standards, (4) for areas proposed for recreational use, e.g., golf courses, altering grades in order to improve their value as recreational amenities, (5) within the areas proposed for development of residential lots, grading in order to enhance views or comply with provisions of the subdivision ordinance. The impact of manmade structures or alterations of the landscaping is covered in the visual section of this EIS (Part IV, Section B).

Mitigating Measures

The lack of prominent natural features on the sites being proposed for development and the avoidance of major topographic changes limit the topographical impact of the development. Other mitigating measures will include compliance with City & County of Honolulu grading and subdivision ordinances which contain provisions for erosion control during construction.
B. SOILS

The site is located on the northern coastline of Oahu at the foot of the Wai'anae range. The Wai'anae mountain range is believed to have developed in Tertiary time from three rift zones. The lavas that built the mountain generally consist of aa and pahoehoe basalts.

After the volcano became dormant, soil developed from the weathering of the rock surface. Streams carved valleys into the mountain range, and changes in sea level resulted in alluviation of the valley floors and development of fringing coral reefs.

The project is generally overlain by alluvium and colluvium derived from soil materials of the uplands being transported to the lower slopes by water and gravity. Along the shoreline, beach sand can be found. The sand is derived from wind and water deposited material from coral and seashells.

The USDA Soil Conservation Service, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", classifies the near surface soils on the Island of Oahu. Soils within the project site are shown on Exhibit 9 and described as follows:

Ewa Series

Ewa silty clay loam, 5 to 12 percent slopes (EwC)
Ewa stony silty clay, 6 to 12 percent slopes (EwC)

The Ewa soils are classified as low-plasticity silt and clay (MH or CL using the Unified Soil Classification System) and have moderate shrink-swell potential. The soils are generally suitable for use as fill and can support low-rise structures.

Haleiwa Series

Haleiwa silty clay, 0 to 2 percent slopes (HeA)

The Haleiwa soils are classified as high-plasticity silt and clay (MH and CH), have moderate shrink-swell potential, are suitable for use as fill, and can support low-rise structures.
Jaucas Series

Jaucas sand, 0 to 15 percent slopes (JaC)

The Jaucas sands are classified as poorly-graded sand (SP). The sand has low shrink-swell potential, is erodible, and can support low-rise structures.

Kaena Series

Kaena clay, 2 to 6 percent slopes (KaB)
Kaena stony clay, 2 to 6 percent slopes (KaeB)
Kaena stony clay, 6 to 12 percent slopes (KaeC)
Kaena very stony clay, 10 to 35 percent slopes (KanE)

The Kaena soils are classified as high-plasticity clays with high shrink-swell potential. The soil is very sticky and plastic when wet and is generally unsuitable for use as fill. Structures placed on this type of soil will require special design consideration to minimize distress due to shrinking and swelling of the soils. This usually includes removal of 18 to 36 inches of unsuitable soil and replacement with non-expansive, compacted granular fill.

Kawihapaia Series

Kawihapaia clay loam, 0 to 2 percent slopes (KlaA)
Kawihapaia stony clay loam, 0 to 2 percent slopes (KlaA)
Kawihapaia stony clay loam, 2 to 6 percent slopes (KlaB)

The Kawihapaia soils are classified as low-plasticity clays underlain by silty sand and gravel. The clay soil has moderate shrink-swell potential, is suitable for use as fill (except that there are stones in the soil profile), and is suitable to support low-rise structures.

Mokuleia Series

Mokuleia clay loam (Mt)

The Mokuleia soil is classified as a low-plasticity clay and silty sand that is underlain by clean sand. The soil has moderate to low shrink-swell potential, is suitable for use as fill and capable of supporting low-rise structures.
Pearl Harbor Series

Pearl Harbor clay (Ph)

The Pearl Harbor soils are classified as high-plasticity clays underlain by peat and organic soils. The soil has high shrink–swell potential, is poor for use as fill, and has low supporting capacity for structures. Special design considerations are required for development over these soils due to the soft consistency of the material.

Pulehu Series

Pulehu clay loam, 0 to 3 percent slopes (PaA)
Pulehu stony clay loam, 2 to 6 percent slopes (PaB)

The Pulehu soils are classified as low-plasticity clay and silt, and as silty sand. The soil has low to moderate shrink–swell potential, and is suitable for use as fill, and capable of supporting low-rise structures.

Impacts

Location of improvements on the site must take into consideration soil conditions. Building on unsuitable soils may jeopardize the safety and value of the improvement.

Mitigating Measures

In most areas the use of conventional foundations will be adequate to support the development being proposed. In areas having soils with high shrink–swell potential, removal of unsuitable soil to depths varying from 18 to 36 inches and replacement with non-expansive soil will be required. In soft soil areas, surcharging, "floating" foundation, or removal of soft soil will provide the necessary support for structures.

Siting of proposed improvements will take into consideration soil conditions. Soil testing prior to construction and the adherence to good engineering practices and City & County Building Codes should mitigate any problems associated with soil stability.
C. WATER RESOURCES AND WATER USAGE

Existing Conditions

The proposed development is within the Mokuleia sub-area of the Waialua Water Control Area. The Board of Land and Natural Resources (BLNR) controls water allocations within a water control area under authority of Chapter 177, H.R.S., and Chapter 166 of Title 13, Administrative Rules. According to documentation provided by BLNR, the Mokuleia sub-area has a sustainable yield of 20 million gallons per day. Existing wells on the property have a combined capacity of almost seven (7) million gallons per day (see Exhibit 14).

Impact and Mitigating Measures

The proposed development would require the use of approximately 2.0 million gallons of potable water for domestic consumption and an additional 1.5 to 2.0 million gallons of water per day for irrigation purposes. Little or no impact on water recharge is expected due to the development as proposed. The bulk of the development proposed is in areas described by the Board of Water Supply as "pass" areas indicating no connection between surface and groundwater resources.

As the proposed water usage for the development is lower than the existing developed well capacity on the site, it is doubtful that any mitigating measures need be taken. However, the proposed development is located in the Waialua Water Control Area and requires the installation of a public water system. Such a system would require the approval of the Board of Land and Natural Resources, the Board of Water Supply, and the Department of Health. The approval process of these agencies will assure that adequacy of the water source and the purity of the water meets standards of the City & County of Honolulu and the State of Hawaii.

D. TSUNAMI/FLOOD HAZARDS

Existing Conditions

The standard used in the United States of America for determining the flood hazard potential of various properties is the Department of Housing and Urban Development's "Flood Insurance Rate Map" (FIRM). These maps were developed by the U.S. Army Corps of Engineers. These maps designate and rate the flood hazards from both rain and wave action. A portion of the property being proposed for development is located within flood hazard areas designated under the FIRM program. The affected areas are shown on Exhibit 7. The following is a description of the various zones that are applicable to the proposed project.
EXHIBIT 14

Wells Existing on Property

Wells existing on the subject property are as follows:

<table>
<thead>
<tr>
<th>State Well Number</th>
<th>Well Capacity in MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3410-01</td>
<td>.83</td>
</tr>
<tr>
<td>3410-03</td>
<td>1.5</td>
</tr>
<tr>
<td>3410-05</td>
<td>-</td>
</tr>
<tr>
<td>3310-01</td>
<td>1.5</td>
</tr>
<tr>
<td>3310-02</td>
<td>1.5</td>
</tr>
<tr>
<td>3310-03</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>6.83</td>
</tr>
</tbody>
</table>
Flood Zone A: Areas of 100-year flood; base flood elevation and flood hazard not determined.

Flood Zone A6: Areas of 100-year flood; base flood elevation and flood hazard determined.

Flood Zone C: Areas of minimal flooding.

Flood Zone V22: Areas within which in addition to base elevations there are structural requirements.

NOTE: The Department of the Army Corps of Engineers provided more detailed information broken down by tax map key parcels. A complete copy of their March 9, 1987 letter and exhibits are included in Part XIII of this EIS.

**Impact**

Development within flood zone areas may pose a risk to both human safety and the safety of improvements.

**Mitigating Measures**

The applicant will mitigate the potential for flood impacts by the following:

**Additional studies**

Prior to developing plans for specific improvements, the applicant will study the areas in Flood Zone A in accordance with "Storm Drain Standards" of the City & County of Honolulu to determine the base flood elevations and hazard potential.

A study identifying the potential hazard from Tsunami and Hurricanes has been done by Dr. Charles Bretschneider and is included as Appendix E. This information is being incorporated into the engineering study which will make specific recommendations for mitigating against flood-tsunami hazards.

**Specific Actions**

A number of specific mitigating measures may be recommended, including:

- Providing setbacks from coastal areas subject to wave action.
— Raising the grade of the site above base flood elevation.
— Increasing structural capabilities of foundations or building to withstand projected hazard.
— Development of various designs to dissipate potential wave action.

Compliance with Ordinances and Laws

The FIRM program developed by HUD has been incorporated into the City & County of Honolulu’s Land Use Ordinance (Article 7.10). The applicant will comply with the requirements of all laws relating to flood mitigation.

E. MARINE ENVIRONMENT

The marine environment of concern can be divided into two regions that can be described as the nearshore marine environment and the near/offshore marine environment. The nearshore marine environment begins at the waterline and extends offshore to depths of approximately 60 feet. The near/offshore marine environment includes depths from 60 feet to 600 feet, occurring 2 to 3 miles offshore. A different environmental impact discussion is offered for each of these regions.

E.1. NEARSHORE MARINE ENVIRONMENT

Existing Conditions

Conditions in the nearshore marine environment adjacent to the proposed Mokuleia development are typical of a class "A" nearshore coastal body of water. Kai'ahulu Bay, which is located adjacent to Parcel B, the largest oceanfront parcel proposed for development, was found to be acceptable for recreation purposes. Observations by the consultant (e.g., nearshore submarine channel, see Appendix F, Oceanit Laboratories, Inc.) led them to conclude that the existing drainage pattern had been altered in the past from Makalena to Kapalama Stream.

Impacts

The major impact on the nearshore waters would be the rerouting of drainage from Kapalama to Makalena Stream, approximately 300 meters apart along the coast. Both discharge into the same nearshore embayment area, i.e., Kai'ahulu Bay. An additional impact could result from runoff containing pesticides and herbicides after being applied to the landscaping and golf course. No other significant impacts on nearshore ocean waters are expected from the proposed recreational resort community.
Mitigating Measures

Based on a consulting report from Oceanit Laboratories, Inc. rerouting of the drainage to Makalena Stream would have a beneficial impact. This is due to the fact that there is an existing channel in front of the Makalena Stream outlet which serves as a conduit for discharging runoff into the ocean. Runoff into the ocean is expected to be the same or less than without the development due to drainage improvements as part of the development. Impacts from the use of pesticides and herbicides can be mitigated through the selective use of "safe" materials. Additionally, water quality monitoring and marine life observations will help to identify any adverse effects. This selection and monitoring process is regulated by the Department of Health through their Water Quality Certification, Section 401 application. No other mitigating measures appear necessary as there are no other impacts identified.

E.2. NEAR/OFFSHORE MARINE ENVIRONMENT

Existing Conditions

The near/offshore marine environment includes a shelf that skirts around Kaena Point and includes the area offshore of the proposed Mokuleia Development. This shelf is considered to be an area of high productivity (i.e., good area for fishing).

In general, nearshore currents can be characterized as geostrophic currents that flow in the westerly direction; wind-driven currents that tend to flow in the westerly and easterly direction during tradewind and kona wind conditions, respectively; and tidal currents that tend to flow in the westerly and easterly direction during flood and ebb conditions, respectively (Bathen, Circulation Atlas for Oahu, Hawaii, 1978).

Discussions with the National Marine Fisheries Services (NMFS) indicated that at present there is no known significant Green Sea Turtle (Chelonia mydas) activity along the 1.5 mile strip of beach and marine waters adjacent to the proposed project. Tiger sharks (Galeocerdo cuvier), the only known natural predator of juvenile, subadult and adult Green Sea Turtles (Balaz, Synopsis of Biological Data on the Green Turtle in the Hawaiian Islands, NMFS, 1980) have been caught in the offshore waters, generally at night. The diversion of stream discharge from Kapalama to Makalena Stream is considered to be an environmentally good move because it will help to preserve the existing structure of the reef, i.e., the channel in front of the Makalena Stream.
Discussions with the University of Hawaii Kewalo Basin Marine Mammal Laboratory (KHML) indicated that there are several species of marine mammals that utilize, either directly or indirectly, the waters off the proposed Mokuleia Development, including: Bottlenose dolphin (Tursiops gilli), Spinner dolphin (Stenella longirostris), Spotted dolphin (Stenella attenuata), Rough-toothed dolphin (Steno bredanensis), False Killer whale (Pseudorca crassidens), Pilot whale (Globicephala macrocephalus), Pigmy Sperm whale (Kogia breviceps), and Melon Headed whale (Peponocephala electra). The Humpback whale (Megaptera novaeangliae) is known to use the area in the winter time, generally between the end of December to mid May. In general, Humpback whales have been seen in the area from Mokuleia to Kaena Point out to the 600-foot isobath.

Discussions with the US Fish and Wildlife Service (USFWS) and the State Division of Aquatic Resources (AR), part of the Department of Land and Natural Resources (DLNR), did not add to the list of near/offshore marine life previously identified by KHML.

A few Hawaiian Monk Seals (Monachus schauinslandi) have recently been reported in the area (Ramon-Saunders, Haleiwa). However, although periodic sightings occur around populated islands such as Oahu, Hawaiian Monk Seals are typically found on isolated outer atoll islands of the Hawaiian islands (Sylvia, "Notes on the Hawaiian Monk Seal," Journal of Mammalogy, Vol. 40, No. 2, 1959.

**Impacts**

Impacts on the near/offshore marine environment could result from increased recreational use including increased vessel traffic, jet skiing, wind surfing, etc. The potential increase in marine use and noise, resulting from easier access and increased public awareness, could cause certain types of marine life to avoid the area. Additional impacts could result from night-time lighting particularly for nocturnally feeding marine life.

Significant impacts from the project are not anticipated at this stage in the project development plan, i.e., rerouting the stream discharge in Kaahulu Bay. Any additional project plan modifications would require further study.
Mitigating Measures

Based on discussions with the NMFS, USFWS, KEMML, and AR certain conditions could be imposed to limit the impact on near/offshore marine life, such as restricted vessel usage during peak use periods of marine life. However, these concerns are generally addressed by the federal government, e.g., restrictions for whale watching. Therefore, no additional restrictions on near/offshore marine environmental use is seen as necessary at this time.

Other forms of mitigation could include the controlled use of nighttime lighting so that shaded lights, rather than flood lights are used to light the coastline in certain areas.

Additionally, impacts could be mitigated through a public awareness and appreciation program that would inform the public about marine life habitats and uses, e.g., watching the Humpback whale. This type of public awareness program could be coordinated with the different regulating agencies and KEMML.

F. COASTAL EROSION AND POTENTIAL SEA LEVEL CHANGES

Coastal Erosion:

Existing Conditions

According to Beach Changes on Oahu as Revealed by Aerial Photographs by Dennis Hwang, July 1981.

The areas proposed for development have shown varying susceptibility to coastal erosion as shown below.

- Site B, Transect 12: Lost 8' with accretion and reclictions
- Site C, Transect 9-10: Varied from 5' gain to 11' loss at transection
- Site D and E: Transects 6 and 7 varied from a 0' gain at Transect 6 to a loss of 37' at Transect 7

It should also be noted that the report showed significant accretion at various points along the north shore from time to time.

Impact

Locating new improvements in areas where shoreline instability has been recognized in the recent past may subject the improvements to long-term ocean hazards due to coastal erosion.
As indicated by the above table the parcels proposed for development have had gains and losses in the past 30 years.

Coastal Erosion

Mitigating Measures

There are a number of mitigation measures which can be undertaken to minimize the impact of erosion.

1. Provision of Adequate Setbacks - Providing adequate setbacks is the method of minimizing erosion preferred by both the applicant and the various government agencies charged with administration of coastal approvals. This alternative has the advantage of minimizing impacts to proposed development while at the same time providing maximum protection to the environment by not interfering with natural processes. Setbacks may have the undesirable effect of limiting development or encouraging concentration of development (higher structures).

2. Replenishment of Eroded Material - This alternative has been used successfully in other beachfront locations. In the case of the Mokuulea property large quantities of sand have been mined from the property in the past and there is reason to believe that large deposits of sand remain unmined in certain areas particularly beneath the existing polo field. During the development process it would be possible to stockpile sand for future use replacing it with other material. Negative impacts of this methodology would be the interference with the natural coastal changes which might have impacts at other coastal locations.

3. Artificial Stabilization with Barriers or Seawalls - While this is a potential option it is undesirable from the viewpoint of public policy cost and developer liability. The applicant has no plans to propose the use of barriers or seawalls in order to prevent coastal erosion. Should such a request be made it would be subject to a number of permit requirements including Corps of Engineers, Shoreline Management, Conservation district Use Permit and other.

POTENTIAL SEA LEVEL CHANGES:

Existing Conditions

In response to Senate Resolution 137, 1984, the Department of Planning and Economic Development prepared a report titled "Effects on Hawaii of a Worldwide Rise in Sea Level Induced by the 'Greenhouse Effect'"
January 1985. This report indicated that increases in sea level would have a significant impact on the state's shoreline as well as the economic activities if that rise were 4.8 feet or greater. However, no conclusion could be reached as to what the actual level 100 years from now would be.

**Impact**

The location of economic investment in areas impacted by sea level changes is of interest to State and County planners.

Due to tsunami considerations, the Mokuleia Development will most likely be raised to levels (elevations) which would probably keep it above any potential rise in sea level over the next 100 years.

Of greater concern to the development is the usability of public facilities such as the Honolulu Airport and Honolulu Harbor in the event of sea level changes. The economic viability of the development is dependent on the existence of a tourist industry on Oahu.

**Mitigating Measures**

At the present time actual changes in sea level cannot be known. Therefore only general caution can be exercised.

In selecting designs and building locations consideration should be given to potential increases in sea level.

G. **DILLINGHAM AIRFIELD**

**Existing Conditions**

Dillingham Field is located approximately one mile West of the bulk of the development proposed mauka of Farrington Highway and immediately south of the non-contiguous oceanfront parcels proposed for development. Dillingham is a military field under long term lease to the Department of Transportation DOT (State of Hawaii) for civilian operations. At the present time the bulk of the aircraft using the field are small general aviation aircraft. Other uses include gliders, skydiving and occasional military use. In recent years the primary military use has been for helicopter training. Information provided in a 6 April 87 communication from Directorate of Facilities Engineering U. S. Army Support Command, Hawaii, indicates that no military safety zones have been developed for the field and that no ICUS Installation Compatible Use Noise Zone has formally been adopted for the field.
According to State DOT information, Dillingham Field reported approximately 100,000 operations in 1986 from all sources during normal hours of operations. Note: Military training operations conducted outside normal operating hours (daylight) would not have been counted. DOT provided the following statistics on total operations: 1979 145,000; 1980 131,000; 1981 120,000; 1982 92,000; 1983 85,000; 1984 89,200; 1985 95,000; 1986 99,966.

Impact

Noise impacts of the field on the proposed development are extensively discussed under the Noise section of this EIS.

Safety impacts of the airfield on the proposed development: Discussions with Department of Transportation and FAA personnel indicated no special hazards relating to the land uses proposed. Written communication from both the FAA and the DOT made no mention of safety hazards associated with the airport. Communication dated 6 April 87 from the military indicated that there are criteria for establishing accident potential zones. Depending on how that criteria were applied at Dillingham Field the potential for incompatibility of land uses existed. However, the same letter states that civilian authorities should be the ones contacted for safety information.

Mitigation Measures

See noise section of EIS for mitigation measures relating to noise.

Mitigation measures appropriate to mitigate safety considerations include restricting development to areas outside of designated hazard zones, if any. Compliance with recommended land use restrictions within designated hazard areas will be followed.

H. TERRESTRIAL VERTEBRATES AND VEGETATION

Existing Conditions - Terrestrial Vertebrates

A terrestrial vertebrate survey of the site was conducted by Char and Associates (June 1986). The results of this study can be found in Appendix I. The study results are summarized below.

Faunal habitats: Six general faunal habitats—pasture lands, koa-haole scrub, kiawe forest, pond areas, beach area, and mixed maritime scrub/grassland—are recognized on the project area. A more detailed classification system of vegetation types is presented in the botanical report.
The predominant faunal habitat on the project area is pasture land, which consists of open to semi-open grassy areas. In the semi-open areas, scattered trees and shrubs of kiawe (Prosopis pallida), Java plum (Syzygium cumini), koa-haole (Leucaena leucocephala), and klu (Albizia julibrissin) are frequently observed. The dominant grasses are two species of Paniceae and California grass (Brachiaria mutica). The pasture area provides grazing for both beef and dairy cattle (Bos taurus) as well as horses (Equus caballus). Cattle egret (Bubulcus ibis) was often seen associated with horses and cattle in the lower pastures. Bird densities and variety are high in this habitat, with a number of granivorous (seed-eating) species present. Bird and several smaller mammal species, such as the mongoose (Herpestes auropunctatus) and the house mouse (Mus musculus), are frequently encountered around the livestock watering troughs scattered throughout the paddocks.

The koa-haole scrub and kiawe forest are the second and third faunal habitats. These habitats occupy the inland portions of the project area. Species density and diversity are not as great as in the pasture areas. The red-crested cardinal (Paroaria coronata) is common in this habitat. Mongoose, the metallic skink (Liolepisinae metallicum), and the mourning gecko (Lepidodactylus lugubris) prefer these wooded areas.

The pond areas around the Crowbar Ranch were surveyed intensively, as endangered waterbirds are known to frequent the area. Seventeen (17) Hawaiian coot or 'ala'ae ke'oke'o were observed on the largest of the ponds, which has been modified for waterbirds; two (2) coot were observed in the reservoir pond behind the corrals; and one (1) coot was observed on the pond located on the Waiau-lua side (easternmost) of the ranch facilities. This pond area consists of one irregularly-shaped pond which has been incompletely separated by an earth and coral rubble berm. Four (4) Hawaiian duck or kolea (Anas wyvilliana) were found on this pond. The birds are probably captive-bred birds released in this or a nearby area. We were not able to get close enough to see if the birds were banded.

The endangered Hawaiian Stilt (Himantopus mexicanus knudseni) and the Hawaiian Gallinule (Gallinula chloropus sandvicensis) have been reported from the wetlands on the study area by the State Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service. Another source reported that a colony of Laysan Albatross (Diomedea immutabilis) a protected Hawaiian bird had frequented the project area at least during the past two winters.
The beach or coastline area is the fifth habitat and is used by a number of migratory species which winter over in the islands. The survey was conducted after most of these species had already left for their summer breeding grounds in North America or the Arctic. Migratory species which probably be seen here during the late fall, winter, and early spring months include the Pacific golden-plover or kola (Pluvialis fulva), wandering tattler or 'uili (Heteroscelus incanus), ruddy turnstone or 'akekeke (Arenaria interpres), and sand-derling or huna-kai (Calidris alba). These species would also utilize the pond areas and some of the pasture areas, especially those low-lying spots periodically flooded during heavy rains.

The maritime mixed scrub/grassland habitat located behind the beach has a faunal community similar to those of the koa-haole scrub and pasture areas. The house sparrow (Passer domesticus), however, is more numerous in these areas. The red-vented bulbul (Pyconotus cafer) was common in this habitat and was often observed searching among the grassy areas for ripe wild tomato fruit (Lycopersicon pimpinellifolium). The tomato plants are abundant here, and the birds are attracted to the area by the fruit; the birds would probably be less common in this area when the tomato plants are not fruiting.

The consultant has recommended that buffer zones be established around the pond area. Existing trees and shrubs should remain intact; additional planting should be made in those areas without shrub cover.

**Anticipated Impacts and Mitigative Measures - Terrestrial Vertebrates**

The vertebrate fauna present on the site is composed largely of introduced species. Development of the pastureland areas, kiawe forest, koa-haole scrub, and maritime scrub/grassland will probably reduce the habitat size of a number of introduced bird species, especially finch and game bird species. Opportunities for range expansion of species commensal with man, such as the house sparrow and the common mynah, will increase. The vertebrate fauna affected by the development in these areas is of minor environmental concern. None is considered endangered by federal or state governments. Some, such as the mongoose and cat, prey on the native waterbirds found in the pond areas.

The pond areas and the coastline, to a lesser extent, support a number of native bird species. The pond areas provide habitat for and are utilized by two endangered waterbird species, the koloa and the Hawaiian coot. The consultant's recommendation that alterations or modifications of the pond areas should be done in close consultation with the U.S. Fish and Wildlife Service will be followed.
Existing Conditions - Vegetation

Based on a terrestrial botanical survey of the site (Chase and Associates, 1985), eight (8) vegetation types or plant communities can be found: strand assemblage, Maritime wooded assemblage, wetland areas, pasture areas, leucaena scrub, prosopis woodland, stream bottoms, and rocky hillside.

- **Strand assemblage.** In the unconsolidated sand of the beach, the dominant plant is naupaka-kahakai, which forms extensive, low, wind-swept strands, especially on the top of dunes. Three native plants share the top of the dune with naupaka-kahakai. They are the 'akoko, pohililili, and pohinahina. In addition, New Zealand spinach is common throughout.

  Where there are not trees immediately behind the beach, the dune-type vegetation extends for some length. In these areas, the back dune vegetation is much richer in both native and exotic species. Most of these are annuals or small, non-woody perennials. The ground is covered for the most part by Bermuda grass, New Zealand spinach, 'ilima, Australian saltbush, aleina, and pau-o-Hi'iaka.

- **Maritime wooded assemblage.** Farther back from the beach, or where trees come down to the beach, strand vegetation gives way to plants more common in the dry lowlands. Within the study area, the only tree that tolerates exposure to the elements, especially salt spray, and thrives at the beach is ironwood. It is widely planted and also comes up spontaneously from seed.

  Away from the trees other plants increase. The vegetation may take three forms—thicket, scrub, or grassland. Only koa-haole forms extensive scrub and thickets. Where koa-haole is more open, it produces a scrub which grades into grassland with a further decrease in woody cover. In places where the woody species do not predominate, Guinean grass and sour grass form grassland. In drainage areas with running water, California grass grows in a narrow band adjacent to the water's edge.

- **Wetland areas.** These are areas adjacent to standing fresh or slightly brackish water—ponds and drainage ways. Ordinarily they would be expected to have unique flora of their own, but this is not the case in the study area, as these wet areas have been greatly modified by man. The pond areas are former borrow pits
from sand mining operations. For the most part, the vegetation in these wetland areas consists of those plants already growing in the adjacent communities, though usually much more lushly than nearby.

- **Pasture areas.** The vegetation of these areas has been modified by the introduction of range grasses and some legumes for forage and by the grazing of horses and cattle. In addition, a number of weedy plants have also found their way into these areas. In the upper areas the primary forage grass is Guinea grass. In the lower areas it is California grass. Other grass species were found to be more restricted.

Besides the grasses, which are the most salient feature of the pasture areas, a number of other plants are significant members of the community. Among the woody plants are kiawe and Java plum. Klu and koa-haole form a very open scrub throughout. In the upper sections of the study guava, Chinaberry and silk oak are occasional. In the area just to the west of the Dillingham house is the remnant of an old macadamia nut orchard. A large number of herbaceous plants are to be found in the pastures. Several degrade the quality of the pasture and, as they are avoided by the animals, they tend to take over when the more desirable plants are overgrazed.

- **Leucaena scrub.** These are areas in which the koa-haole are taller, up to five or six meters tall, and whose crowns meet to form a more or less closed canopy. An infestation of a recently introduced psyllid species has severely damaged koa-haole plants in the islands. While large areas of koa-haole scrub on the study site are damaged, it was observed that koa-haole was thriving in several places. Closer examination found high numbers of ladybird beetles, which were apparently reducing the psyllid infestations.

- **Prosopis woodland.** Kiawe is scattered throughout the study area, but in only two areas does it become a major component. One area is a mixed scrub/forest near the western extreme of the upland portion, the other is an almost pure stand just to the west of the Nike road. In the lower reaches it is clearly an artificial strand with the trees planted in a row. Kiawe wood is harvested in this area. In the upper areas of the project site, the canopy opens up considerably, and the orderly planting of trees is not apparent. At the very top of the study site, the woodland is quite scruffy with koa-haole. In the scrubby areas, it is little different from the preceding Leucaena plant community type.
Stream bottoms. This vegetation type is of very limited occurrence in the study area. It is also a woodland, extending down the length of every stream with significant seasonal flow, though seldom greater than thirty meters in width. The predominant tree is Java plum, which forms an almost completely closed canopy. What gaps there are in the canopy are filled with kukui. Wiliwili, a native tree, is occasional; seedlings and saplings of wiliwili are found in a number of even the smallest dry streambeds in pasture areas.

Two ferns characteristic of stream bottoms are also found here, though the streams are almost too dry to support them during the summer months. They are Blechnum occidentale and downy woodfern.

Rocky hillsides. For the most part, the hillsides are rockier than the pastures, on steeper slopes, and less heavily grazed. Scrubs are common. Among the species restricted to this community are two dryland ferns which prefer arid banks, Pteris cretica and the gold or silver fern. Among the flowering plants, there are two native species characteristic of rocky areas. Nehe is locally fairly common along the foothills all the way to Ka'ena Point. 'Ala'alawai-nui is virtually restricted to this pockets of soil on rocky ledges of the steep hillsides. Wiliwili, while seen occasionally in the pastures and stream bottom below, is quite common on the hillsides, mostly just outside the study area, although they do extend down into the study area for a short distance. The only other native tree unique to this area is alahe'e.

For a complete description of the eight vegetation types and the relative abundance of each species, please refer to Appendix I, Biological Survey Study by Char and Associates (1986).

The U. S. Department of Interior Division of Fish and Wildlife expressed concern about potential secondary impacts to native dry land forest and candidate endangered plants found in the Mokule'ia, Makua Kea'au, and Kualoa Forest Reserves from increased camping and hiking activities in the upland area. Several candidate endangered plants including Cyanea superba, Schiedea kaalae, Neowaxaea phyllanthoides, Alsinodendron obovatum, Neraudia melastomifolia, Zanthoxylum skottsbergii, and Tetraplaxandra turbans are found within the Mokule'ia Forest Reserve. Of these, Cyanea superba is one of the rarest and is presently under review by the Washington office for listing as an endangered species. In 1981, this plant was restricted to two disjunct populations of 22 adults, 21 subadults, and 6 juveniles at Pahole Gulch and 3 adults and 15 juveniles at Kahalawai Valley.
Anticipated Impacts and Mitigative Measures - Vegetation

According to the survey by Char and Associates, there are no plant communities or individual species located in the study site in need of protection. There does not seem to be any botanical impediment to the development of the study area. It has a long history of use and alteration, and little of botanical value remains. All vegetation types on the project area, with the exception of the strand, are dominated by introduced (or exotic) plant species. The recommendation that landscaping be done, as far as practical, with native plants adapted to the environment will be followed.

Increased camping and hiking activities in the dry upland areas of the Mokule‘ia project may substantially increase the potential for accidental wildfires spreading into the forest reserves and destroying these candidate endangered plants. Fires spreading into these forest reserves may be difficult to control because of the topography, isolation, and abundance of inflammable grasses and other vegetation. In addition to fire threat, camping activity may increase the potential for introduction of exotic plant competitors into the forest reserves and improved access roads and trails may encourage off-road-vehicle activity causing erosion and habitat degradation.

The EIS states that additional trails and campgrounds may be developed in the upland areas which would be available to the general public. The U. S. Fish and Wildlife Service is concerned about the secondary impacts to the native dryland forest and candidate endangered plant species found on the adjacent Mokule‘ia Forest Reserve and the Pahole Natural Area Reserve by the increased human activity.

A number of mitigating measures are available, including:

1. Keep upland areas in present use. These upland areas have been used for grazing cattle. Grazing cattle and, perhaps, horses could be continued. Guided activities such as horseback riding and nature walks could be allowed.

2. Limited use. The upland areas could be opened for day hikes only, no camping. Picnic shelters with appropriate facilities for open fires for cooking would be established.

3. Camping and hiking allowed. Increased activity in the upland areas will require an active management and control system. The following suggestions are offered.
Upland Resource Management Program. This program (manager and staff) would be involved in issuing camping permits, monitoring and policing visitors and campsite, trail maintenance, etc.

This office would be responsible for making sure Mokule'ia hikers and campers do not go onto State forest reserve lands without appropriate permits from DOFAW. The office would also work closely with DOFAW and the Division of Conservation and Resources Enforcement (DOCARE) as well as the U. S. Fish and Wildlife Service.

Fire Control System. Camping allowed only on designated areas with facilities for open fires—fire pits, barbecue grills, etc. Or open fires could be banned; gas stoves, sterno, etc. used for cooking. Water tanks should be located near each campground. A system of firebreak roads and a fire fighting plan should be set up in coordination with DOFAW.

In the options presented above, all vehicular traffic would be restricted to paved or gravel-lined roads (for service vehicles). No off-road vehicle (ORV) activity, dirt-bikes, etc., would be allowed.

A Resource Management Program would be developed in consultation with the Fish and Wildlife Service, the Board of Land and Natural Resources Forestry Division, and other concerned and interested parties. The applicant believes that this would be the most appropriate forum for developing a mountain access program which addresses the many concerns.

I. WETLANDS

Existing Conditions

Exhibit 16A shows the existing wetlands areas as provided by the U.S. Department of Interior Fish and Wildlife Division. There is only limited information on the use of these wetlands by endangered waterbirds and migratory waterfowl. The Cowbar Ranch pond is listed as a primary habitat in the Hawaiian Waterbirds Recovery Plan. As indicated in the previous section, the applicant's consultant on Terrestrial Vertebrates focused attention on the wetlands area identified as having significance for endangered birds.
EXHIBIT 14A
LEGEND
WETLAND MAP

POWHx  palustrine, open water, permanent, excavated.
E2US2P  estuarine, intertidal, unconsolidated shore (sand),
         irregularly flooded.
PEMLCx  palustrine, persistent emergent vegetation, seasonal,
         excavated.
PFO3A   palustrine, broad-leaved evergreen vegetation, temporary.
PFO3C   palustrine, broad-leaved evergreen vegetation, seasonal.
R2OWHx  lower perennial riverine, open water, permanent, excavated.
Pond History:

The U.S. Department of Interior, Fish & Wildlife Division, has identified a number of Wetland Areas within the proposed development. A brief history of the creation of the major pond areas is appropriate at this point.

During the 1970's the Warren Corporation, a mining and construction company, was granted mining rights on the subject property in return for royalty payments to the property owner. Warren Corporation obtained a conditional use permit from the City and County of Honolulu in order to exercise its rights under the royalty agreement.

Terms of the conditional use permit required that the Warren Corporation return the land to its original grade following mining operations. In addition, the conditional use permit required that only limited amounts of land were to be opened for mining purposes at any given time.

In 1979, when the property was acquired by a new owner, mining operations had exceeded the scope allowed under the conditional use permit. The new owner went to court to prevent the Warren Corporation from continuing to violate the conditional use permit requirements and was granted a temporary restraining order and later a preliminary injunction. By the time injunctive relief was granted, over 20 acres of land were below grade, more than three times the acreage allowed in the conditional use permit.

Subsequently, the landowner filed for an agricultural subdivision at which time the Department of Land Utilization required that the landowner fill the largest pond as required by the conditional use permit. In order to release the conditional use permit to allow for processing of the agricultural subdivision, the landowner had to post a bond of approximately $500,000 to assure that the pond was filled.

Subsequently, the landowner was notified by Fish & Wildlife that endangered birds were using the mined areas as a habitat. The landowner wrote to the Corps of Engineers and received written confirmation that the manmade ponds were not "Wetlands" as defined by federal law because they were manmade. Fish & Wildlife was notified of the Corps' findings, yet has persisted in describing the mined areas as Wetlands.
The applicant in its recent resort development proposal has voluntarily proposed to work with the Department of Interior, Fish & Wildlife Division, and Department of Land and Natural Resources in order to preserve the recently developed ecosystem. The existing ponds are the result of haphazardly created mining pits in violation of City permits which were created in the last 10 years.

Proposed Action

The applicant proposes to retain the existing pond areas and incorporate them into the resort development as a design element. The primary purpose for this proposal is to retain the area as a primary habitat for the Hawaiian Waterbirds Recovery Plan.

The applicant believes that the sites can be improved and enhanced and, if need be, recreated in other locations with professional guidance from interested agencies into superior environments for the preservation of endangered species.

Impacts

Increased human occupation in the areas surrounding the ponds is expected to have some impact on the waterbirds which utilize the ponds. Human disturbance and activity near the ponds will increase. This may affect breeding activity and the recovery of the endangered waterbirds. There may be increased predation of waterbirds by pet and feral cats and dogs; rodent populations may increase. In addition, there may be changes in drainage and runoff patterns as well as water quality due to construction in nearby areas.

Mitigating Measures

The U.S. Fish and Wildlife Service has identified the ponds around the Crowbar Ranch as important habitat for the recovery of endangered Hawaiian waterbirds. The U.S. Fish and Wildlife Service has recommended that the design, planning, and modification of the wetlands (ponds and streams) on the project site be done in coordination with their office and the State Division of Forestry and Wildlife.

The consultant has recommended that buffer zones be established around the pond areas. Existing trees and shrubs should remain intact; additional plantings should be made in those areas without shrub cover.
The developer, the U.S. Fish and Wildlife Service, and the State Division of Forestry and Wildlife should develop a long-term maintenance program for the wetlands and a protection plan for the endangered waterbirds. Fencing of the pond areas would reduce disturbance from humans and the larger predators. In addition, an active trapping program for rodents and feral cats should be considered.

J. ARCHAEOLOGICAL

Existing Conditions

The applicant commissioned an archaeological investigation of the property proposed for development. The investigation was conducted by Archaeological Consultants of Hawaii, Inc. in June of 1986 (see Appendix H). The investigation undertaken consisted of two main elements. The first of these was a review of the literature and archaeological records available. This initial review indicated the presence of seven (7) sites of significance. The second element of the investigation was a field investigation of the site. The site investigation was undertaken in the company of ranch employees whose employment in the cattle operation for almost 30 years provided them with an extensive knowledge of the land and its characteristics.

Based on the survey described above, Archaeological Consultants of Hawaii, Inc. concluded that of the seven sites of potential significance, three have been destroyed and their function suggests that sub-surface investigation is unnecessary. The four remaining sites—Kawaiola Heiau, Hidden Waters, Heiau Site and Village Site—require additional study to determine exact locations, and in some cases, subsurface investigation.

Impact

The proposed development may jeopardize the sites identified in the archaeological report.

Mitigative Measures

The developer will work with the State Historic Preservation Officer and follow procedures for development which are compatible with State law. The Archaeological Consultants of Hawaii, Inc. report indicates an additional research program to be undertaken once a more detailed development plan is available. These recommendations include a more intensive survey, sub-surface investigation and further review of archival materials. The developer will follow the recommendations outlined in the report.
K. AGRICULTURE

Existing Conditions

The lands for the Mokuleia development can be divided into three general categories: beachfront, coastal-plain, and foothill lands. The beachfront lands consist of about 100 acres of Jamaican sand, which has very severe limitations for agriculture because soil is loose and lacks stability for heavy equipment, and is subject to wind erosion [U.S. DOA, Soil Conservation Service].

The coastal-plain lands of the Mokuleia development cover about 820 acres. Of this, about 440 acres are prime agricultural lands having few limitations for agriculture, or only moderate limitations because of some stoniness or vulnerability to erosion. These are level or gently sloping lands consisting of Puhehu clay loam, Kawaihapai clay loam, and Mokuleia clay loam. About 360 acres are other agricultural lands having severe limitations for agriculture. Problems include stoniness, vulnerability to erosion, and poor drainage. Slopes are as high as 12 percent, and the soils include Kaena clay, Kaena stony clay, Ewa silty clay loam, and Ewa stony silty clay. Finally, about 20 acres of the coastal-plain lands have poorly drained Pearl Harbor clay that has very severe limitations for agriculture.

The foothill lands of the development cover about 100 acres of the lower slopes and gulches of the Waianae Range. The soils include Kaena very stony clay, Halawa silty loam, Kamoo silty clay, Helemano silty clay, and rock land. These soils have very severe limitations which make them unsuited or generally unsuited for agriculture. Problems include stoniness, undesirable texture (too sticky and plastic), very steep slopes, and vulnerability to severe erosion.

Most of the coastal-plain lands are also categorized as prime and secondary lands for aquaculture (slopes of less than 5 percent and, for prime lands, clay, loam, or clay loam soils) [Hawaii Aquaculture Planning Program].

Annual rainfall in the area is about 30 to 35 inches per year, and somewhat higher for the mauka lands.

Currently, most of the higher quality agricultural lands are used for grazing.
Proposed Action

The proposed Mokuleia development will require converting about 1,000 acres of land to resort, housing, and recreation uses.

Anticipated Impacts

The Mokuleia project will not adversely affect plantation agriculture since no sugar or pineapple lands are involved. Also, based on a study by Decision Analysts Hawaii, Inc. (Appendix C), it is extremely doubtful that the Mokuleia development will affect adversely the statewide growth of diversified agriculture or aquaculture, either immediately or over the long term. This conclusion is derived from a comparison of the modest amount of prime agricultural land required for diversified agriculture versus the very large supply of prime agricultural land that is available for profitable crops.

To increase Hawaii’s self-sufficiency in produce crops to a realistic level, and to accommodate resident-plus-visitor population growth to the year 2000, a surprisingly small amount of land is required—less than 1,200 acres.

A large market exists for feed crops, but most of these crops are not commercially feasible for Hawaii. A possible exception is corn silage to feed cattle in feedlots. However, less than 2,600 acres would be needed statewide to feed all cattle in feedlots, even with an increase in cattle operations. Experiments with corn silage and other feed crops have been performed, but returns per acre have been low.

Regarding export crops, papaya is a possibility being explored for Oahu lands, although the acreage requirement for increased production is relatively small; total statewide plantings amount to a little over 2,000 acres, primarily on the Big Island. Macadamia nuts offer the potential of absorbing a significant amount of agricultural land, but increasing overseas competition indicates that this is a high-risk venture unable to compete in those areas where other economic activities offer higher land rents. Other existing export crops are not agriculturally suited for the Mokuleia area and/or require very little land. Finally, efforts in Hawaii for over a century indicate that it is extremely difficult to identify new export crops and develop them into new and profitable industries.
Livestock operations are another possibility, but the returns are low from cattle grazing; the trends are not favorable for increased dairy, egg, and swine and pork operations; and little land is required for poultry operations.

Problems with freshwater prawns include low profitability, a saturated local market, and an export market of doubtful potential. Other potential freshwater aquaculture activities suffer from low prices, stiff competition from the mainland, a small local market, unsuitable climate, and/or other problems.

The potential for brackish and saltwater aquaculture, particularly shrimp, is regarded as more promising. However, brackish and saltwater aquaculture is still in a research-and-development stage, with profitability for large-scale operations yet to be proven. Also, various land use policies and regulations make profitability difficult to achieve, and limit development. Finally, concerns over salt contamination of prime agricultural lands and the groundwater supply argue against brackish and saltwater aquaculture for most Mokuleia lands.

Increased demand for agricultural land in Hawaii as a result of land shortages on the mainland should not be anticipated, since such mainland land shortages are not expected. On the mainland, as in Hawaii, there is a large supply of fallow agricultural lands. Furthermore, this supply is expected to increase given genetic engineering advances which promise higher yields for crops, increased resistance to diseases and pests, and increased tolerance to variations in climate.

In contrast to this demand, the supply of prime agricultural lands available to profitable crops is enormous. Since 1970 over 42,000 acres of land have been freed from sugar production (about 8,800 acres on Oahu and 33,600 on the Neighbor Islands). Some of the land freed from sugar and pineapple production has or will be converted to urban, diversified agriculture, and aquaculture uses. Also, some of the land freed from pineapple use on Oahu was converted to sugar production. Making allowances for the various conversions, the bulk of the 80,000 acres which has been freed from plantation agriculture remains fallow or is in pasture or some other low-profit holding operation awaiting discovery of profitable crops. (Even though considerable agricultural land is available, it should be noted that the supply of parcels for small-scale farmers is limited. This is partially because added expense for improvements makes it uneconomical for large land owners to subdivide their lands into small agricultural lots.)
The supply of fallow prime agricultural land probably will increase given the unfavorable outlook for the sugar industry. Nine of the thirteen sugar plantations in Hawaii are unprofitable and the Federal price support for sugar is scheduled to remain unchanged until at least 1991. In fact, some unprofitable mills remain in operation temporarily only because of lease and/or energy agreements.

Furthermore, some plantations continue as land-holding operations awaiting discovery of profitable replacement crops.

Many of the lands freed or to be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for crop and aquaculture production. Also, water is available for most of these lands, particularly lands freed from sugar production.

Finally, some additional land has been made available to diversified agriculture in government-sponsored agricultural parks throughout the State.

In summary, the amount of prime agriculture land required to accommodate growth of diversified agriculture is very small compared to the huge supply that is available for profitable crops. The Mokuleia project requires too little land to materially affect this land demand/supply balance. Thus the project will not limit growth of diversified agriculture.

Application of Land Evaluation and Site Assessment (LESA) System

The Hawaii State Constitution was revised in 1978 to include the following statements concerning agriculture (Article XI, Section 3):

"The State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The legislature shall provide standards and criteria to accomplish the foregoing."

"Lands identified by the State as important agricultural lands needed to fulfill the purpose above shall not be reclassified by the State or rezoned by its political subdivisions without meeting the standards and criteria established by the legislature and approved by a two-thirds vote of the body responsible for the reclassification or rezoning action."
The Land Evaluation and Site Assessment (LESA) Commission was assigned the task of identifying and recommending, for adoption by the Legislature, a system to identify important agricultural lands (IAL) and developing procedures and criteria to reclassify land to or from IAL designation. The LESA Commission Report and corresponding legislative recommendations were submitted to the 1986 Legislature, but were carried over to the next session since no action was taken. Therefore, at this time LESA remains a proposal that has not yet been adopted into law by the State Legislature. Its provisions are still subject to review and change and its final form or adoption is far from certain.

The LESA Commission report defines IAL as lands capable of producing high agricultural yields, lands which produce commodities for export and local consumption, lands not currently in production but needed to attain desired projected levels of agricultural activities and income, and lands designated by public policies as important agricultural lands resulting from some unique quality, setting or use. Excluded are lands which are inappropriate or infeasible for agriculture, or which would provide greater benefits in a non-agricultural use.

For a given parcel, an IAL designation is to be based on Land Evaluation (LE) and Site Assessment (SA) factors. Briefly, the recommended LE rating reflects soil quality, and is based on an average numerical score of five past soil surveys. Site Assessment (SA) factors express the value of a site in terms of locational, environmental, and operational factors. Included are such considerations as government plans, onsite or proximity to various agricultural facilities and improvements, parcel size, and compatibility with and impact on neighboring land uses.

Based on the proposed LESA methodology, the LESA Commission developed Illustrative Generalized IAL Maps which show the IAL having the highest ratings while providing sufficient area to accommodate the LESA projections for agricultural land requirements. Included in the Illustrative Generalized IAL Maps is a portion of the Mokuleia lands proposed for development. According to the Department of Agriculture, nearly all of the Mokuleia area identified as Parcel A(1) (approximately 890 acres) is within the Illustrative IAL boundary. Parcel A(1) has LE ratings of 71, 77, 79, 83 and 94 on a scale of 12 to 96.

It should be noted, however, that the designation of the Mokuleia lands as IAL is questionable in that the LESA agricultural-land projections used in developing the Illustrative Generalized IAL Maps, as well as the Maps themselves, appear to contain a number of questionable assumptions:
- The projected growth of diversified agriculture and aquaculture appears to be excessively optimistic. It is assumed that many unprofitable crops will become profitable, that Hawaii farmers will be able to undersell low-cost summer crops from California, and that each and every activity will experience rapid growth.

- The LESA contingency of 29,500 acres is excessive, especially since LESA projects a requirement for less than 9,000 additional acres of prime agricultural lands. The contingency is large primarily because the LESA methodology implicitly allows for expansion of sugar operations—an unlikely possibility. Furthermore, the contingency amounts to double counting since optimistic projections have a built in contingency.

- The LESA methodology assumes that prime agricultural lands that were freed from sugar and pineapple production and placed in pasture or some other low profit operation will stay in these uses. This is very unrealistic in that these are holding operations for land until profitable crops can be identified.

- The LESA methodology assumes that sugar production is a healthy industry, and that sugar lands would be unavailable for more profitable replacement crops.

- The Illustrative Generalized IAL Maps allocate prime agricultural lands to certain activities which do not need such lands (e.g., aquaculture should be allocated the agriculturally low quality coastal lands at Kahuku).

Verification of the assumptions is hampered as the assumptions and analyses which underlie the LESA projections have not been made available for public inspection.

Once a parcel has been designated as IAL, the LESA Commission recommendations provide for a redesignation to urban or some other use based on a demonstrated change in economic or social conditions, and where the requested designation will provide greater benefits to the general public than its retention as IAL. A two-step process is recommended:

1. The LE and EA methodology is reapplied to determine whether conditions have changed sufficiently to warrant a reclassification from IAL status. (An example would be a change in County plans to urbanize the area).
2. The proposed development is subject to three criteria:
   a. Does the proposal conform to the State Plan?
   b. Does the proposal conform to the County Plans?
   c. Will the project provide a public benefit that overrides the IAL designation?

Applying the first step of the proposed LESA process for redesignating the Mokuleia lands from IAL to urban and other uses, no known changes in conditions would warrant a change in the LESA ratings and a corresponding reclassification from IAL status. However, as discussed above, it should be noted that the original IAL designation for the Mokuleia lands is questionable.

Applying the test of parts (a) and (b) of the second step of the proposed LESA process, the proposed development does contribute to various State and County goals, objectives, and policies regarding job creation, increased income, housing, and recreation. Regarding agriculture, the thrust of the State Plan is to assure the availability of agricultural lands. As discussed previously, the proposed Mokuleia development requires too little land to materially affect the land/supply situation; the amount of prime agriculture land required to accommodate growth of diversified agriculture is very small compared to the huge supply that is available for profitable crops.

Applying the final test of the second step of the proposed LESA process, the proposed development will provide a public benefit that overrides the IAL designation. At the same time, the development will not adversely affect plantation agriculture, nor adversely impact growth of diversified agriculture.

Mitigating Measures

Since the Mokuleia project is not expected to adversely affect agriculture, no mitigating measures are required.

L. NOISE

Existing Conditions

The primary land uses that will potentially be affected by the project are public and private beach parks and residences located between the shore and Farrington Highway. Noise sources affecting these areas now are categorized as:
* Surf
* Motor vehicle traffic on Farrington Highway
* Aircraft
* Wind in the trees
* Birds and people activities

Measurements of existing noise levels in the area were made continuously over a two-month period, utilizing a sensor located at two different locations on the Episcopal Church camp property. One location was midway between the highway and the shoreline, while the other was 54 feet seaward of the highway. Though these measurements were made in 1977, they are considered representative of the existing conditions.

The typical diurnal noise level variation in the populated area had an hourly equivalent sound level (L$_{eq}$) of 47 dBA at night and a maximum of L$_{eq}$ of 65 dBA during the day. At night the noise sources were primarily the surf and wind in the trees. During the day, motor vehicles, aircraft, birds and people activities also contributed to the total noise level.

Occupants of beachfront residences experienced relatively high, continuous noise exposures attributed to the surf. The surf is a high-level, linear noise source that generally attenuates 3 dB each time a person doubles his distance from it. It masks practically all motor vehicle noises in beachfront homes. On the average, surf noise exceeded existing aircraft noise by 10 dB at a beachfront location directly under the departing flight path.

Occupants of typical residences directly on Farrington Highway experienced a lower level of surf noise and a greater contribution of motor vehicular noise. The average total day-night sound level (L$_{dn}$) was 61 dBA over a 21-day period. Motor vehicle noise contributed an average of 51 dBA to the total, while aircraft noise contributed an average of 53 dBA. The surf, wind in the trees, birds and people activities were the dominant noise sources, contributing about 60 dBA, L$_{dn}$, and controlled the average total noise exposures in housing along the highway at that time.

**Proposed Action**

Development of the project site will involve land clearing, site preparation, construction of infrastructure and buildings, and the installation of landscaping.
Anticipated Impacts and Mitigative Measures

A noise study by Darby & Associates is included in the Draft EIS as Appendix K. The various construction phases of a development project may generate significant amounts of noise; the actual amounts are dependent upon the methods employed during each stage of the process. Piledrivers; earthmoving equipment such as bulldozers; and diesel powered trucks will probably be the loudest equipment used during construction.

The State Department of Health (DOH) Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu, specifies maximum allowable levels of noise for each use zone contained in the City and County of Honolulu's comprehensive Zoning Ordinance. Allowable noise levels from the project site are:

Preservation (P-1) and Residential (R-1 through current A-7)

Daytime (7 a.m. to 10 p.m.): 55 dBA

Nighttime (10 p.m. to 7 a.m.): 45 dBA

Apartment (A-1 through current A-5)

Daytime (7 a.m. to 10 p.m.): 60 dBA

Nighttime (10 p.m. to 7 a.m.): 55 dBA

These standards apply to non-impulsive sounds. The allowable level for "impulse" noise is 10 dB(A) above those listed. The Comprehensive Zoning Code (CZC) also regulates noise levels emanating from private property and is usually confined to stationary noise sources.

Since it is anticipated that noise generated during construction will exceed allowable limits, a permit will be obtained from DOH. DOH may grant permits to operate vehicles, construction equipment, power tools, etc. which emit noise levels in excess of the allowable limits. Required permit conditions for construction activities are:

"No permit shall allow construction activities creating excessive noise ... before 7:00 a.m. and after 6:00 p.m. of the same day."

"No permit shall allow construction activities which emit noise in excess of ninety-five dBA ... except between 9:00 a.m. and 5:30 p.m. of the same day."
"No permit shall allow construction activities which exceed the allowable noise levels on Sundays and on ... [certain] holidays. Activities exceeding ninety-five dB(A) shall [also] be prohibited on Saturdays."

In addition, construction equipment and on-site vehicles or devices requiring an exhaust of gas or air must be equipped with mufflers.

Traffic noise from heavy vehicles traveling to and from the construction site will be minimized to daylight hours in residential areas and will comply with the provisions of Title 11, Administrative Rules Chapter 42, Vehicular Noise Control for Oahu enforced by DOH.

Because sound attenuates with distance, the farther away people are from a noise source, the less the sound will affect them. Thus, during construction in the proposed mauka resort and residential areas, the potential noise impact to persons in the housing and parks along Farrington Highway will be minimal. However, construction operations in some of the shore resort parcels will have greater noise impact on persons in the abutting land use.

After the proposed resorts are completed and are in operation, persons in the abutting land uses will potentially be impacted by noise from the stationary equipment servicing the complex, such as air conditioning and pool pumps. Noise levels from such equipment must not exceed the allowable noise limits in the aforementioned DOH and CZC noise regulations.

As the project develops, there will be an increase in traffic on Farrington Highway, causing higher traffic noise levels primarily to housing directly on the highway. Presently the maximum hourly averaged noise level \( L_{eq}(1hr) \) at 50 feet from the center of the road is about 56 dBA during the weekdays and about 60 dBA during the weekends. Because Farrington highway has only two lanes and is directly accessed by driveways, the average vehicle speed will be reduced as the traffic volume increases. Traffic noise increases more rapidly with increasing vehicle speed as compared to increasing traffic volume. Thus, there tends to be a limiting effect on traffic noise levels. For example, the maximum predicted traffic noise level, for the years 2000 and 2005 tends to limit-out at 62 to 63 dBA despite significantly greater traffic volumes. These predicted noise levels are 2 to 3 dBA greater than that presently experienced on weekends, but may be 5 to 6 dBA greater than that presently experienced on weekdays. It is to be noted that the maximum predicted noise levels do not exceed the noise criteria of 67 dBA as recommended by the
Federal Highway Administration (FHWA) for "picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, hotels, schools, churches, libraries, and hospitals." For proposed housing on the mauka side of Farrington Highway, acceptable noise will exist if posted speeds of 35 mph are used and if building setbacks are at least 50 feet.

Occupants in the proposed project will be exposed to noise from aircraft operations from Dillingham Airfield. Dillingham Airfield is operated by the State Department of Transportation and has a single runway 5,000 feet long. Only daylight visual flight rule operations requiring good weather and visibility are conducted by civil aircraft. Aircraft operations at Dillingham Air Field are now dominated by single-engine airplanes towing gliders. Military use of the airfield involves helicopters and light fixed wing aircraft. The number of operations at the field has declined lately: e.g., in 1980 there were 82,406 civilian power operations (ops) and 21,930 military ops while in 1985 there were 60,494 civil ops and 5,060 military ops. For analytical purposes aircraft noise contours based on 120,000 civilian power operations have been used.

The noise contour use the day-night noise level (L_{dn}) which is a time averaged dBA noise level over 24 hours that includes a 10 dBA penalty for any noise events occurring at night (10 p.m. to 7 a.m.). Most federal agencies including the Department of Housing and Urban Development (HUD) and the Department of Defense (DOD) recommend that housing not be located in areas where L_{dn} 65 is exceeded. For future planning, the Federal Environmental Protection Agency (EPA) in reference 4 has established long range goals of:

"Through vigorous regulatory and planning actions, reduce environmental noise exposure levels to L_{dn} 65 dBA or lower, and in planning future programs concerned with or affecting environmental noise exposure, to the extent possible, aim for environmental noise levels that do not exceed an L_{dn} of 55 dBA. This will ensure protection of the public health and welfare from all adverse effects of noise based on present knowledge."

Because of the open lifestyle in Hawaii, it is often recommended that L_{dn} 60 not be exceeded for residential and resort areas.

All of the proposed residential and resort parcels mauka of the highway and Resort Parcel 1 should never experience aircraft noise levels exceeding L_{dn} 55. Also the figures indicate that L_{dn} 60
should not be exceeded on Resort Parcels 6, 7 and 8. It is estimated
that about 90% of the aircraft operations per year are in a tradewind
pattern and that there are no operations about 26 days per year due to
excessive crosswinds. Exhibits identifying Resort Parcel numbers are
included in Appendix K, Noise Study.

The recent use of Dillingham Airfield by the military is lessening.
However, it is possible that in the future there could be sporadic
training exercises involving helicopters. More conservative contours
were generated to address helicopter noise, that is, they are in
excess of actual existing noise exposures and are not necessarily
directly comparable with civilian noise contours.

The State Department of Transportation commenting on the DEIS
indicated that development of combined military and civilian noise
contours would be helpful. This comment was received after the
deadline for public comment (3/30/87 – the deadline was 3/25/87).
Upon the availability of Military data, it is the applicant intent to
restrict resort/residential development within the 60 Ldn and
greater areas unless special noise mitigation features are
incorporated into the structures. In the 55-60 Ldn noise impact
area, a disclosure will be made to advise developers and tenants that
the areas are subject to noise from aircraft activity.

Residents in the proposed resort and residential areas abutting (or
near) the sugar cane fields will experience noise exposures from cane
operations. Sugar cane fields are harvested very year (alternating
fields) and last about two weeks a year. According to the Manager of
Waialua Sugar Company, there is flexibility in harvesting, and by
mutual coordination and cooperation, these operations can be timed to
minimize the impacts on surrounding uses.

Housing and resort facilities located near the cane haul road will
experience noise events from passing cane haul trucks when the fields
serviced by the cane haul road are being harvested. Noise exposures
along the cane haul road caused by cane haul trucks and other vehicles
which service the fields near the project were estimated. It is
estimated that there will be about two weeks per year when cane haul
trucks will use the road. Day-night noise levels (Ldn) on those
days are predicted to be 55 dBA or less assuming a setback of at least
50 feet from the cane haul road. Though the total noise exposure does
not exceed the aforementioned criteria, persons may complain of noise
from the large cane haul vehicles which will be much greater than the
ambient noise level (typically 84 dBA at 50 feet).
Another noise event that will be experienced by persons in the proposed project will be aircraft flyovers when the sugar cane fields are sprayed with insecticides, herbicides, etc.

Building setbacks and designs will take into account the recommendations of the noise study.

There is a potential for noise generated in commercial and industrial areas to impact residential areas. The applicant believes that any impacts would be minimal because residential areas are buffered from commercial/resort activities by a golf course fairway. In addition, the new commercial resort areas abutting developed areas are on oceanfront lands where wave noise is expected to mask resort/commercial noises.

The applicant will follow all City and State laws and regulations related to noise. In addition the applicant will follow City ordinances relating to the separation of resort/commercial and residential districts. Current ordinances require setbacks, solid walls, and landscaping. In certain instances, uses are restricted within the commercial resort districts where there is an abutting residential district. In addition the applicant intends to develop restrictive covenants for the commercial/resort development which will ensure a harmonious relationship with the residential development in close proximity including restrictions on noise, and other items incompatible with residential development.

The proposed development will contain two golf courses and a number of other recreational activity centers. Recreational activities conducted on these sites may generate noise which may impact the residential areas. The applicant believes that the noise impacts of these facilities on residential areas will be minimal and that numerous mitigating measures are available.

The primary mitigating measure will be in facilities design. For the Golf Course and Clubhouse the siting of the clubhouse facilities, their orientation and the location of the tees and greens on the course will have a major impact on the potential noise impact of the facilities. The siting and design, as well as landscaping, will be major considerations during the design phase of the golf complex. Selection of maintenance equipment which includes noise minimization features can also mitigate against noise impacts. In addition the scheduling of maintenance operations and golf activities can also be done to minimize noise impacts.
The same mitigation measures as apply to the golf courses also apply to other recreational activity centers. In addition, the proposed Mokuleia Community area will have a community association which will be a forum for balancing recreational needs of the community with those of the nearby residents for minimal noise impacts. This organization will assure that the rules and regulations governing the various recreational facilities of the development will continue to meet the needs of the community that they serve.

M. AIR QUALITY

Existing Conditions

Present air quality in the project area is estimated to be very good since there are no major contributing sources of air pollutant emissions other than vehicles traveling on nearby roadways and isolated sugar cane fires.

Impacts

An air quality study was conducted by Barry D. Root and his findings are found in Appendix J. Except for dust emissions during the construction phase of the development, no significant short-term direct air quality impacts are expected. Adequate control measures exist to limit the impact of windblown dust, but special care will have to be exerted to ensure that previously developed residential areas are not subjected to excessive levels of particulate pollution from construction activities.

Indirect air quality impacts are expected to result from new demands for electrical energy. This impact is most likely to occur in the vicinity of existing power plants such as the Kaha Plant on the Wai'anae coast where increased levels of particulates and sulfur dioxide can be expected. Maximum use of solar energy designs in project development can at least partially mitigate the magnitude of this impact. New methods of generating electrical power such as wind or ocean thermal energy conversion may eventually also play a mitigative role in this regard.

Increased traffic generated by the Mokuleia Development will increase emissions of carbon monoxide along Farrington Highway in the project area. Modeling of current and projected weekend peak hour worst case concentrations of carbon monoxide at the intersection of the main project access road and at Thomson Corner indicates that projected
levels will be well within allowable State and National ambient air quality standards with or without project development. For that reason no specific air pollution mitigation measures other than those proposed in the traffic impact study for the project are deemed to be necessary.

The modeling study does indicate, however, that installation of a traffic light at the intersection of the main project access road and Farrington Highway sometime before project completion should result in lower concentrations of carbon monoxide than would be the case without such a signal.

Mitigative Measures

Short-Term

As previously indicated the only direct short-term adverse air quality impact that the proposed project is likely to create is the emission of fugitive dust during construction. State of Hawaii regulations stipulate the control measures that are to be employed to reduce this type of emissions. Primary control consists of wetting down loose soil areas. An effective watering program can reduce particulate emission levels from construction sites by as much as 50 percent. Other control measures include good housekeeping on the job site and pavement or landscaping of bare soil areas as quickly as possible.

Long-Term

Once completed, the proposed Mokuleia Development is expected to have little direct impact on the air quality of the surrounding region.

Indirect long-term impacts in the form of increased air pollutant emissions from power plants serving new residences in the project area can be mitigated somewhat by planning and implementing solar energy design features to the maximum extent possible.

Other indirect long-term air quality impacts are expected in those areas where traffic congestion can potentially be worsened by the addition of vehicles traveling to and from the proposed project. Project planners can do very little to reduce the emission levels of individual vehicles, but the installation of traffic signals at the main intersection of project traffic with Farrington Highway and at Thomson Corner could decrease traffic queuing times at these intersections, thereby decreasing projected air pollution impacts at these critical locations.
Carbon monoxide modeling conducted as a part of this report indicates that no special traffic control measures will be necessary to ensure compliance with State and National air quality standards even under worst case traffic and meteorological dispersion conditions.

Because the stringent national vehicular emissions reduction program now being pursued is entirely the product of perpetually changing government regulations, it is always possible that economic conditions or other factors could lead to an early abandonment of the program. If that were to occur, then the projected pollutant levels presented in this study could be too optimistic. On the other hand, it is possible that technological innovation may lead to new vehicular power systems that produce few or none of the currently regulated atmospheric pollutants.

In any case, this study indicates that currently proposed mitigative measures for traffic congestion along roadways leading to and from the project area should be sufficient to meet existing air quality requirements and no further air pollution mitigation measures are proposed. It is noted, however, that tall, dense vegetation can provide some screening of residential areas from larger airborne particulates generated along roadways and near construction areas. It is thus recommended that wherever possible such vegetative cover be included in the landscaping plans with plantings occurring as early in the development process as practicable.

N. VISUAL

A Visual Impact Assessment was conducted by Michael S. Chu, Land Architect, and his findings are found in Appendix M, and summarized as follows:

Existing Viewing Areas

Due to its bowed configuration, the entire North Shore is considered to be one viewshed ranging from Kaena Point to Kawela Bay with a maximum viewing distance of 18 miles across. In order to determine the visual quality of the Mokuleia area, the entire North Shore viewshed was studied, beginning at the farthest reaches of this viewshed and moving inward towards the Mokuleia site. Off-site viewing points considered included Sunset Beach, Pupukea Beach Park, Waimea Bay, Haleiwa Beach Park, Haleiwa Alii Beach Park, Kualoa State Park, Puukiki Park, Camp Erdman, Army Beach, Mokuleia Beach Park, park near the apartment area at Waialua, and roadway views.
The Mokuleia area was described as unique. The absence of urbanization, dispersion of man-made elements, and abundance of natural vegetation (particularly ironwood trees) over a substantial stretch of the highway attributes to this character.

Based on an inventory and assessment of off-site views and the establishment of several vertical benchmarks, the probable visual impact zone generated by the proposed Mokuleia development lies between the Army Beach to the west and Ka'ika Recreational Park to the east. Views from the east were considered the more critical of the two.

**Anticipated Impacts and Mitigating Measures**

Based on the Mokuleia conceptual plan, specific visual impacts that may be expected are as follows:

- The visual quality of each individual parcel and the general Mokuleia area will be noticeably altered.
- The proposed six- to seven-story buildings along the coastal parcels will likely be visible and prominent from several off-site public viewing points. Army Beach, Mokuleia Beach Park, park near the apartment area at Wailua, and the Ka'ika Recreational Park are within the determined visual impact zone.
- Existing roadway views from Farrington Highway (between Army Beach and Mahinaai Road) will be altered and will likely include substantial views of the proposed development in both the mauka and makai directions.

The capacity of the Mokuleia area to assimilate urbanization of the nature proposed, while retaining its visual integrity, may rely upon a development concept that de-emphasizes building prominence in favor of visual compatibility, e.g., Mokaha Sheraton and the Kikaola Plantation on Kauai.

Mitigating measures which may help to reduce visual impact include the following:

- Reduction in building heights.
- Increase shoreline setbacks to include angled building envelopes.
Retention of existing trees and siting of buildings among/behind the trees for maximum screening.

Provide extensive landscaping using plant material that are consistent with the visual quality of the area and will assist in the screening of structures.

Use of muted building colors to blend in with the background.

0. SOCIO-ECONOMIC CHARACTERISTICS

The socio-economic impact of the proposed resort development was studied by John Child and Company and Community Resources, Inc. (Appendices B and C).

1. Population

Existing Conditions

On the project site, there are currently nine tenant households (six for ranch employees and three rented on a month-to-month basis to non-employees). Approximately 31 people live in these homes.

The project site is located in the U.S. Census Bureau's "Waialua Division", consisting of census tracts 99.01, 99.02, and 100. (To avoid confusion with the town of Waialua, this area will be referred to as the "North Shore"). Other possibly affected nearby areas include the Koolauloa division (tracts 101, 102.01, and 102.02) and the Wahiawa division (tracts 90 through 95.05). Below Wahiawa, the communities of Waipahu and Mililani (tracts 87.01 through 89.03) represent possible labor supply sources, although it is not anticipated that these areas would be otherwise impacted by the project. The North Shore is considered the "Primary Study Area"; Koolauloa and Wahiawa, the "Secondary Study Areas"; and Mililani/Waipahu the "Tertiary Study Area".

Exhibit 15 shows the boundaries of these various portions of the overall Study Area. Exhibit 16 shows differences between the census areas and the City's Development Plan areas for the North Shore and Koolauloa. In the Development Plan Areas, the areas known as Sunset Beach, Waimea, and Pupukea (with a total 1980 population of about 3,200) are considered part of the "North Shore," although they are in the Koolauloa Census Division. (However, census figures to be quoted here for the North Shore...
would exclude these areas.) Thus, the combined North Shore/Koolaaua Development Plan Areas are equivalent to the combined North Shore/Koolaaua census divisions. Additionally, the combined Wahiawa and Mililani/Waipahu areas are approximately equal to the City's "Central Oahu" Development Plan Area.

As of the 1980 U.S. Census, the North Shore's population was 9,849. Major ethnic groups were Filipino (32%) and Caucasian (31%). The median age of 26.3 years was somewhat lower than the islandwide median, although the proportion of senior citizens on the North Shore exceeded the islandwide proportion. Average educational levels on the North Shore are behind those of the overall Oahu population. Approximately two-thirds of the North Shore population lived in two communities—the sugar plantation town of Wailua (population 4,051, nearly one-half Filipino) or Haleiwa (population 2,412, with a cosmopolitan ethnic composition dominated by Caucasians, Filipinos, and Hawaiians). The project site is located in "Block Group 9" of census tract 99.01, which includes the beachfront areas known as Mokuleia (which has no official boundaries) and Wailua Beach, as well as scattered inland homes; the 1980 population was 650, of which 70% was Caucasian.

Also as of the 1980 census, the Koolaaua Division population was 14,195 (predominantly Caucasian and Hawaiian); the Wahiawa Division population was 41,562 (45% Caucasian, due to the large military presence in the area); and the combined Mililani/Waipahu population was about 50,000.

The North Shore, Koolaaua, and Wahiawa populations are all characterized by significant poverty problems. In 1980, compared to islandwide figures, median family incomes were lower and proportions of the population below official "poverty level" were higher. Proportionately more people were renters rather than owner-occupants, and larger percentages of median family income were required to pay rental costs than elsewhere on the island.

The City's General Plan population guidelines say the year 2005 population for the combined North Shore/Koolaaua Development Plan Areas should be held to a figure between 2.5% and 3.3% of total islandwide population, which is now estimated by the State as 954,500. This means a combined North Shore/Koolaaua population between 27,700 and 31,500 in 2005.
For the Mokuleia community along Farrington Highway in the area of the proposed project, certain population changes are also expected even without the project. Rising prices for beachfront residential land throughout Oahu could ultimately result in small pockets of currently cheap rental housing being phased out, to be replaced by tenants or owner-occupants better able to afford the rising land values and property taxes. Additionally, a few homes toward the Kaena Point side of Farrington Highway are on land designated "Preservation" and cannot be rebuilt if destroyed or badly deteriorated.

**Anticipated Impacts and Mitigative Measures**

Based on the proposed development plan and the population and residency characteristics, the average daily population at the proposed development is anticipated to increase from 590 persons in 1990 to 4,680 persons by 2005, as shown in Exhibit 17.

Visitors from Oahu and the neighbor islands are projected to increase from about 180 persons in 1990 to 950 persons by 2005, as shown in Exhibit 18. Out-of-state residents visiting the hotel and condominium facilities are projected to increase from 410 persons in 1990 to 2,530 by 2005.

The majority of the part-time residents are projected to be out-of-state residents while all of the full-time residents are projected as residents of the State, as also shown in the exhibit.

The project's residential component would be consistent with the population distribution range established for the North Shore by the General Plan. The North Shore population distribution range is set at between 1.6% and 1.8% of the islandwide population. The 1984-85 North Shore DP estimates a 2005 year population of 15,600, with 100 unit housing deficiency existing. This represents a 1.6% share of the projected population of 954,500 for the island by the year 2005. If the upper range of 1.8% is used, an additional 600 to 800 units (in addition to the current 100 unit deficiency) can be planned for and still be within the population guidelines of the General Plan. The residential component of the project calls for 700 units.

The impacts of the increased population on traffic, public services and recreation are found in Section F, Infrastructure and Public Service.
## EXHIBIT 17

**MOKULEIA**

**Projected Average Daily Population**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visitors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>590</td>
<td>1,290</td>
<td>2,020</td>
<td>2,840</td>
</tr>
<tr>
<td>Condominium units</td>
<td>0</td>
<td>300</td>
<td>610</td>
<td>640</td>
</tr>
<tr>
<td>Single-family units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal - visitors</td>
<td>590</td>
<td>1,590</td>
<td>2,630</td>
<td>3,480</td>
</tr>
<tr>
<td><strong>Residents:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium units -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>0</td>
<td>330</td>
<td>660</td>
<td>680</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>90</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>420</td>
<td>840</td>
<td>870</td>
</tr>
<tr>
<td>Single-family -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>10</td>
<td>110</td>
<td>330</td>
</tr>
<tr>
<td>Subtotal - residents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total population</strong></td>
<td>590</td>
<td>2,020</td>
<td>3,580</td>
<td>4,680</td>
</tr>
</tbody>
</table>

*Source: John Child & Company, Inc.*
EXHIBIT 18

MOKULEIA
Projected Population by Residence
1990 to 2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel</td>
<td>180</td>
<td>390</td>
<td>610</td>
<td>850</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>50</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Subtotal</td>
<td>180</td>
<td>440</td>
<td>700</td>
<td>950</td>
</tr>
<tr>
<td>Out-of-state residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel</td>
<td>410</td>
<td>900</td>
<td>1,410</td>
<td>1,990</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>260</td>
<td>520</td>
<td>540</td>
</tr>
<tr>
<td>Subtotal</td>
<td>410</td>
<td>1,160</td>
<td>1,930</td>
<td>2,530</td>
</tr>
<tr>
<td>Total</td>
<td>590</td>
<td>1,600</td>
<td>2,630</td>
<td>3,480</td>
</tr>
<tr>
<td>Part-time residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Single-family</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Out-of-state residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>90</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Single-family</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>90</td>
<td>190</td>
<td>250</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>90</td>
<td>200</td>
<td>260</td>
</tr>
<tr>
<td>Full-time residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>330</td>
<td>660</td>
<td>680</td>
</tr>
<tr>
<td>Single-family</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>340</td>
<td>750</td>
<td>940</td>
</tr>
</tbody>
</table>

Source: John Child & Company, Inc.
2. Economic Development

Existing Conditions

The Mokuleia Ranch manager and nine employees now graze approximately 500 animal units on all parts of the property except the Crowbar Ranch, steep areas, and dairy cattle pasture. Most of these animal units are beef cattle. Some horses are also grazed on the property as brood stock for ranch work purposes or occasional sale to outsiders.

Various amounts of pasture land are also leased on a month to month basis to dairy operations. The number of dairy cattle has ranged from 200 to 1,000 in recent years.

The Crowbar Ranch is actually a department within the overall ranch operations, rather than an independent entity. It provides horse stable facilities, daily grooming and feeding services, and limited equestrian activities. Private owners now board about 80 horses at the ranch, including about 50 polo horses.

For the overall North Shore area, principal current economic activities include the Waialua Sugar Plantation's sugarcane operations and retail/commercial activities in Haleiwa. As with all sugarcane operations in Hawaii, the Waialua plantation's future is uncertain, and the company has reduced its payroll substantially in recent years. Haleiwa retail activities have become increasingly oriented to drive-through visitor traffic, although the nearest major visitor accommodations are at the Turtle Bay Hilton in Koolauola. Other Koolauola economic activities are also primarily tourist-oriented, including the Polynesian Cultural Center and Mormon Temple in Laie as well as several restaurants and arts and crafts shops further south. In Wahiawa, the principal economic activities include pineapple, retail/commercial activities, and other support services for the large nearby military bases (Wheeler Air Force Base and the Army's Schofield Barracks).

On the North Shore, the overall level of economic activity at present is quite limited. This is reflected in certain patterns to be detailed in the following section on "Employment," which will discuss the low number of jobs relative to the labor force, low labor force participation, unemployment, and commuting outside the area for employment.
Anticipated Impacts and Mitigation Measures

Development of the proposed resort project will result in the loss of the animal-raising ranch operations, which have been unprofitable for the landowner. The income from the resort project will more than offset the loss of income associated with ranch operations.

Resort plans also call for development on the current Crowbar Ranch site. However, equestrian facilities of some type are a likely project component. If the polo operations (makai of Crowbar Ranch) are relocated (discussions on this issue are currently being conducted between the landowner and the polo club) mauka of Farrington Highway, stables and other equestrian facilities may actually be expanded.

The economic impact (expenditures and income) of the proposed project was studied by John Child and Company (1986). Their findings are summarized below:

Expenditures

Mokuleia will generate direct, indirect and induced expenditures in Hawaii from the visitors and residents. This group will make direct expenditures for food, accommodations, recreational activities and other goods and services. These direct expenditures will, in turn, generate indirect and induced expenditures throughout the State through multiplier effects.

Visitor Expenditures

Direct expenditures are projected based on the expected average daily visitor population and visitor expenditure patterns observed in the State.

Direct expenditures attributable to the visitors at Mokuleia could be expected to increase from about $18.3 million in 1990 to $105.8 million by 2005, in 1986 dollars.

Based on multipliers estimated by the Hawaii State Department of Planning and Economic Development (DPED), the direct visitor expenditures could be expected to generate indirect and induced expenditures amounting to about $17.0 million in 1990 and $99.3 million by 2005, in 1986 dollars.
Including direct, indirect and induced effects, expenditures in the State attributable to Mokuleia's visitors are projected to increase from $35.3 million in 1990 to $206.1 million by 2005, in 1986 dollars.

Resident Expenditures

This analysis addresses the expenditures attributable to the resident population at Mokuleia. The relationship between direct expenditures and indirect and induced expenditures associated with resident spending in the State has not been quantified.

Based on the average daily population and expenditure estimates, annual expenditures by full-time and part-time residents at Mokuleia could increase from $0 in 1990 to $13.4 million by 2005, in 1986 dollars.

Resident Income

Mokuleia could be expected to have a significant impact on personal and household income for residents of the island and the State. Mokuleia would generate resident income through employee wages, salaries and fringe benefits and as income to proprietors.

Personal Income

Personal income is defined as the wages and salaries paid to the direct construction and operational employees of Mokuleia. Personal income is projected on the basis of average industry wages and salaries and the expected future levels of employment demand.

Annual personal income paid to Hawaii residents in the form of wages and salaries earned directly from establishments at Mokuleia or from its visitors may be expected to increase from $30.3 million in 1990 to $42.3 million by 2005, in 1986 dollars.

Household income

Estimation of total household income effects based on visitor expenditures permits a perspective on the net benefits to statewide household income that would result from the development at Mokuleia.
Total household income generated by visitor expenditures at Mokuleia would include the fringe benefits and proprietor's income paid by establishments that sell goods and services directly to visitors as well as the wages and salaries noted previously. In addition, household income includes income generated through the multiplier effects of indirect and induced expenditures.

It is projected that Mokuleia could annually contribute about $12.8 million to total household income in 1990 and about $74.8 million by 2005, in 1986 dollars.

The impact of the proposed development on State and County finances was studied by John Child and Company (1986). The findings of the study are summarized below:

Revenues

Development at Mokuleia would bring tax revenues to the County and State governments. County government revenues would be in the form of real property taxes on the new facilities. Revenues to the State government would be principally of unemployment taxes, excise taxes, gross income tax and personal income taxes.

County

Based on current real property tax rates in the County, the proposed development at Mokuleia could be expected to generate about $0.7 million in additional real property taxes in 1990 and $4.5 million by 2005, in 1986 dollars.

State

State government revenues are estimated as a residual of total revenues less County government revenues. The tax revenues to the State government attributable to activity at Mokuleia are projected to increase from $1.5 million in 1990 to $8.3 million in 2005, in 1986 dollars.

Thus, total tax revenues to the State and County governments are estimated at $2.2 million in 1990 and $12.8 million by 2005, in 1986 dollars.

Expenditures

The visitors and residents at Mokuleia would necessitate expenditures of public resources.
County

Annual County public expenditures on behalf of Mokuleia's visitors and residents could be expected to total $0.2 million in 1990 and $1.7 million by 2005, in 1986 dollars.

State

Annual State public expenditures on behalf of Mokuleia's visitors and residents could be expected to total $0.2 million in 1990 and $3.3 million by 2005, in 1986 dollars.

Revenue/Expenditure Analysis

The net fiscal impacts of Mokuleia's development to the County and State governments are estimated by comparison in the following sections.

County

Comparison of projected public revenues and expenditures indicates the County government may expect to net about $0.5 million in additional annual revenues in 1990 and $2.8 million by 2005, in 1986 dollars.

The analysis also indicates that additional County government revenues generated by Mokuleia would be about 2.6 to 3.1 times the additional expenditures incurred by the County government.

State

Comparison of the revenues and expenditures, as projected, indicates the State government could be expected to net about $1.1 million in 1990 and $3.9 million by 2005, in 1986 dollars. This indicates a revenue/expenditure ratio averaging about 2.3:1 during the forecast period.

3. Employment

Existing Conditions

Employment at Mokuleia Ranch (including the Crowbar Ranch) is now limited to about ten persons.
The major North Shore employer is the Waialua Sugar Company with about 460 employees. According to U.S. Census figures from 1980 (when the plantation payroll was somewhat larger), there were 864 jobs in the Waialua/Mokuleia census tract 99.01; of these about two-thirds were in agricultural field operations or sugar-mill manufacturing jobs. For census tracts 99.02 and 100 (including Haleiwa and the rest of the North Shore), the job count was 1,167, and nearly one-half of these were in either retail trade or professional services. Thus, the nature of employment is very different in Waialua/Mokuleia from the rest of the North Shore area.

In areas adjacent to the North Shore, the major employers are tourism activities in Koolauola and military bases or pineapple operations around Wahiawa. Below Wahiawa, the communities of Mililani and Waipahu as of 1980 contained about 9,300 jobs, many of them in plantation agriculture, neighborhood retail/commercial centers, and some military activities. In the other direction, the Polynesian Cultural Center in Laie provides about 1,000 jobs (many of them for students or part-time workers), while the Turtle Bay Hilton at Kahuku now employs some 250 persons.

Additional planned future employment centers include expanded resort activities at Kualoa (projected to provide an additional 3,550 jobs in Koolauola and the North Shore) and a high-technology park about Mililani (projected to provide more than 14,000 jobs, although it should be noted that the limited track record of high-technology industries in Hawaii makes this estimate somewhat speculative).

The North Shore unemployment rate has approximately matched the islandwide rate in the 1980's, but the labor force participation rate—particularly among women—has been significantly lower, indicating possible hidden unemployment. Additionally, census data indicate many North Shore residents work less than full time. Compared to the islandwide population, North Shore residents have lower educational levels and a younger median age, both of which suggest fewer job-related skills.

As of 1980, the North Shore civilian labor force totalled 3,837 (compared to the 2,031 jobs in the area), and 27% of employed workers had to commute 45 minutes or more to workplaces far outside the area. Compared to islandwide employment patterns, North Shore workers were more concentrated in blue-collar occupations and less in professional or administrative jobs.
In other nearby areas, the 1980 civilian labor force totalled 6,115 in Koolau; 9,701 in the Wahiawa census division; and 25,494 in the Mililani/Waipahu area. Unemployment in all these areas has exceeded the islandwide rate. The rate has been particularly high in Wahiawa, which also has a low civilian participation rate. Military dependents in the Wahiawa area encounter substantial difficulties in finding employment, both because of distance from Honolulu job centers and because their stays in Hawaii are generally limited to three years.

ECONOMIC QUALITY OF RESORT EMPLOYMENT

1984 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 sugar and pineapple plantation jobs is shown below.

Some implications of this include:

While the sorts of service jobs commonly associated with resorts comprise more than 50% of Hawaii's jobs statewide (although many such jobs would actually serve residents rather than visitors), average wages for most categories fall below the statewide average wage for all private-sector jobs.

Average hotel wage is relatively close to the statewide average, but wages for food and beverage jobs (which are often just part-time) are below 50% of the statewide average.

Average Hawaii Employment and Annual Wages for Industries Associated with Resorts and Plantation Agriculture, 1984

<table>
<thead>
<tr>
<th>Average Employment</th>
<th>Average Annual Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>no.</td>
<td>% of total</td>
</tr>
<tr>
<td>TOTAL PRIVATE SECTOR</td>
<td>332,227</td>
</tr>
<tr>
<td>Selected Resort-Related Industries</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>&quot;Hotels, rooming houses, etc.&quot;</td>
<td>28,262</td>
</tr>
<tr>
<td>&quot;Other services&quot;</td>
<td>58,442</td>
</tr>
<tr>
<td>&quot;Eating and drinking place&quot;</td>
<td>37,628</td>
</tr>
<tr>
<td>&quot;Other retail trade&quot;</td>
<td>54,248</td>
</tr>
<tr>
<td>&quot;Transportation&quot;</td>
<td>22,150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Selected Plantation-Related Industries</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Agriculture, forestry, fisheries:&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td>3,225</td>
<td>1.0%</td>
<td>20,642</td>
<td>133.2%</td>
</tr>
<tr>
<td>Pineapple</td>
<td>1,989</td>
<td>0.6%</td>
<td>14,841</td>
<td>95.7%</td>
</tr>
<tr>
<td>&quot;Manufacturing:&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar Mills</td>
<td>3,117</td>
<td>0.9%</td>
<td>16,715</td>
<td>107.8%</td>
</tr>
<tr>
<td>Pineapple canning</td>
<td>2,241</td>
<td>0.7%</td>
<td>14,654</td>
<td>94.5%</td>
</tr>
</tbody>
</table>


Wages for sugar — the North Shore's current major job provider — are higher than the statewide average, but relatively few people in Hawaii still work in the sugar industry.

If sugar does fail on the North Shore, one alternative is to convert at least some of the sugarcane acreage to pineapple. However, as shown above, average wages in the pineapple industry are lower than in the sugar industry, though not quite as low as in most forms of service employment. Given the small numbers of persons still employed in pineapple, it may also be apparent that pineapple is unlikely to absorb all current sugar workers on the North Shore.
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.

In part because of seasonality, tourism is perceived by some economists as moving Hawaii toward a "dual labor market" or a "dual economy" in which some workers live a substantially better life than others:

> . . . This suggests the growing prevalence in Hawaii of what economists term a dual labor market in which workers become increasingly polarized into separate primary and secondary labor markets. Jobs in the primary market are characterized by high wages, good working conditions, employment stability, chances of advancement, due process in the administration of work rules and, often, labor union representation.

Jobs in the secondary market, in contrast, tend to have lower wages and fringe benefits, poorer working conditions, high labor turnover, little chance of advancement, and often ill-defined work rules. (First Hawaiian Bank, Research Department, 1984.)

Some additional perspectives on these concerns would include:

The choice now facing the North Shore is not between resort jobs and some alternative industry with better-paying year-round jobs. Rather, it is a choice between resort jobs and no additional jobs.

Future employment opportunities should match the educational and skill levels of the population. As noted elsewhere in the EIS the average educational level of North Shore residents (particularly in the Waialua community) is significantly lower than the islandwide average.

Only some resort jobs would be of the "secondary-sector" nature, where job security is punctuated by seasonal lay-offs, split shifts, low wages, etc. In most hotels, workers with seniority have more choice of shifts, protection against seasonal lay-offs, etc.

A recent doctoral dissertation (Boslog, 1985) utilized ten years of Hawaii Health Surveillance Survey data to explore which hotel workers are most likely to hold "primary-sector" vs. "secondary-sector" jobs. The study found that Hawaii-born citizens were slightly more likely than others to have the more desirable "primary-sector" jobs, while foreign-born workers were more likely to be in the "secondary-sector" tourism jobs.
Beuslog also noted that, while hotel workers’ average wages were somewhat less than other private-sector workers in the early 1980’s, hotel wages have been climbing more rapidly than wages in most other Hawaii industries in the 1980’s.

Additionally, she noted that past studies indicate wages represent only about two-thirds of the average hotel worker’s total compensation, with tips and fringe benefits supplying the rest. If this is still true, the 1983 average Oahu hotel worker actually earned slightly more than other private sector workers.

**Anticipated Impacts and Mitigative Measures**

**Employment**

The planned developments at Mokuleia will generate employment during the construction of new facilities and long-term employment in the operation and maintenance of those facilities. Similar to expenditures, employment effects may also be classified as being direct, indirect or induced.

**Construction Employment**

Direct construction employment is that which would be supported directly by the construction of the various facilities at Mokuleia. The direct needs for construction employees are estimated based on the employment experiences of similar facility construction projects in the State. Construction could begin in 1988 and proceed through 2005.

The employment impacts in particular years during the projection period will depend on the construction timing of the various facilities, but could average about 210 full-time equivalent jobs per year between 1988 and 2005.

Including direct, indirect and induced labor requirements, the proposed construction development at Mokuleia would result in a total demand for about 490 full-time equivalent jobs per year during the 18-year projection period.

**Operational Employment**

Based on the development and employment characteristics, Mokuleia is projected to generate about 600 full-time equivalent direct operational employment positions by 1990 and about 2,700 by 2005. The majority of these jobs would be associated with the hotel operations at Mokuleia.
Through indirect and induced effects, the direct operational positions created would generate additional employment elsewhere in the State. According to recent studies on the economic impacts of tourism by the DPED, development as proposed at Hokulei'a could be expected to support about 470 full-time equivalent positions in 1990 and 2,180 by 2005.

Based on these estimates, total operational employment resulting from the Hokulei'a development is projected to increase from nearly 1,100 positions in 1990 to nearly 4,300 positions by 2005.

Labor Demand and Supply

In the social impact assessment for this project prepared by Community Resources, Inc. (Appendix C), an analysis of future labor demand and supply—both with and without the project—was prepared utilizing methodologies and assumptions detailed in that company's report.

Community Resources concluded that, without the Hokulei'a project, the North Shore will have an increasing excess of workers over available jobs, so that by the year 2000 there will be 44% more workers than jobs. This suggests progressively higher rates of unemployment and/or commuting to other places for jobs. With the project, the situation would be reversed, and the number of North Shore jobs may exceed the number of workers by the year 2005.

The labor supply/demand analysis also considered an expanded area, including Koolauloa, Waialua, and Miliami/Waipahu. This analysis included projected labor demand for the Kualima expansion and the Miliami high-tech park, although it is again noted that it is somewhat speculative whether the high-tech park will actually reach full development in the 20-year time frame for this assessment. For this expanded Study Area, labor supply is projected to continue to exceed available jobs although the excess will dwindle over time. By the year 2005, without Hokulei'a and with only one-half full development of the high-tech park, there would be 30% more civilian workers than jobs. With Hokulei'a, the excess of workers over jobs would be 22%. If the high-tech park reaches full capacity and there is no Hokulei'a project, the excess would be 15%. And, only if both the high-tech and the Hokulei'a projects reach full development by the year 2005, the excess would shrink to 9%, bringing the entire expanded Study Area to the edge of full employment or, at worst, a labor shortage.
The availability of a large Central Oahu labor supply makes it somewhat uncertain whether the Mokuleia project would actually experience difficulty in securing workers. It is possible that any labor shortage might be displaced to the Koolauloa area, requiring the Kualima project to draw more upon commuters from the lower parts of Windward Oahu.

Potential employment resources were identified that included (1) increasing the labor force participation among several groups with current low rates: females, military dependents, and the educationally disadvantaged; (2) unemployed and/or underemployed; (3) the high number of people who must now commute outside the area; (4) the large number of future high school graduates expected to seek immediate employment; and (5) former plantation workers.

Sociological and psychological aspects of resort work were also considered by Community Resources (1986) in its social impact assessment. These may be either transitional and temporary or more permanent and inherent. The major transitional impacts reported in other rural Hawaii communities switching from an agriculture- to a tourism-based economy have involved family impacts (marital strains, child care problems, etc.) associated with wives' initial entry into the labor force and/or their changed self-images resulting from exposure to other people at hotels. Community Resources notes that, on the one hand, many North Shore women have already entered the labor force—but, on the other hand, some of the major reserve labor pools still involve women. Thus, some transitional family impacts may be expected but not to the level of severity perhaps experienced in Neighbor Island resort areas 15 to 20 years ago. More enduring impacts may include family logistical problems due to shift work; ethnic differences in job distribution (often a matter of preference, but sometimes a source of resentment as when top management is consistently imported); and alleged negative self-image problems associated with "servant" aspects of tourism (although this has never been measured or documented). For the North Shore, such potential social costs must be weighed against demonstrated negative family and mental impacts associated with poverty or unemployment.
4. Lifestyle

Existing Conditions

On the project site, the nine tenant households (six of them Mokuleia Ranch employees and families) now lead very rural lifestyles. Other Mokuleia residents along Farrington Highway are a mixture of (1) fairly affluent persons (many of these part-time rather than full-time) whose households are "country retreats" and (2) low- or middle-income longtime residents (including many full-time renters) whose rural lifestyles are based on proximity to the ocean. A few of these are known to depend to some extent on the ocean for subsistence, although exact numbers are unavailable. Because of rising property values and taxes for beachfront land, it may be increasingly difficult for such individuals to retain this lifestyle in Mokuleia as time goes by.

The existing Mokuleia Ranch—with its pastureland and grazing animals—add to the rural character of the Mokuleia area. However, most outside users of the property are involved in activities which might be considered "retreats" from urban life elsewhere as opposed to full-time involvement in country living. Such users would include polo game participants and spectators; persons who rent the old Dillingham Estate manor for social events; and users of Camp Mokuleia (described further in Section IV.B.2 on "Recreational Resources"), which leases some of its current space from Northwestern Mutual (new owner in Mokuleia Land Company).

The wider North Shore area is also generally "rural" in character and lifestyle. Physically, the area is characterized by extensive agricultural (primarily sugarcane) uses; numerous recreational activities; low-density residential areas, with a few pockets of higher-density apartments and townhouses in Mokuleia, Waialua Beach, and Haleiwa; and low-density commercial areas in Haleiwa and, to a lesser extent, Waialua.

Socially, there are a variety of very different types of "rural" lifestyles on the North Shore. The town of Waialua—which contained 41% of the North Shore's 1980 population—is a traditional plantation community with a strong communal orientation and a power structure tied to the plantation and/or the labor union. Other parts of the North Shore are more ruggedly individualistic. The North Shore (including the Sunset Beach area) is one of the world's premiere surfing locations, and many local and Mainland youths are attracted to the area for its water recreation potential; this
subculture is fairly transient, but some of its members have settled in to become longtime community leaders. Still other forms of "rural" lifestyles on the North Shore include scattered small farms, retirees, and professional-level residents who commute daily to Honolulu.

Adjacent to the North Shore, Koolauloa residents represent a similar diversity of "rural" lifestyles, but the town of Wahiawa is characterized more by an urban lifestyle and the homogenous barracks and apartment housing for the military personnel and dependents. As previously indicated, Wahiawa faces poverty problems, which are often more burdensome in urbanized areas than in country locations.

**Anticipated Impacts and Mitigative Measures**

Development of the proposed recreational community would involve termination of the current month-to-month leases for the three non-employee households (with approximately seven persons) and elimination of current housing for the six employee households (with approximately 24 persons).

As further discussed in Section IV.P.2, it would also involve elimination of the present polo activities (although these may simply be relocated to another part of the property) and termination of the year-to-year lease of six acres to Camp Mokuleia (although the future of these six acres is still under discussion between the developer and the Church).

In Mokuleia along Farrington Highway, the proposed development would fill in most of the existing large pockets of open space makai of the road. Expected increases in property values for beachfront residential property would be accelerated, suggesting more rapid turnover of these properties (with profits to present owners) and eventual replacement of some current tenants with a relatively more affluent population. The proposed development retains significant amounts of open space and low densities, generally consistent with the current character of Mokuleia.

However, the area will have a more "manicured" appearance than at present, although this is expected to occur to some extent anyway with the gradual increase in beachfront property values.
The on-site Mokuleia resident population may equal or exceed the off-site population along Farrington Highway by the year 2005, and the quality of social interaction between the two groups may depend largely on whether they participate in common community organizations. Off-site Mokuleia residents will no longer live in an isolated area remote from other people and organized recreational amenities. Rather, they will have ready access to golf courses, restaurants, commercial areas, etc. This change will be valued differently by different people.

For the community of Waialua, the proposed development could be a vehicle for preserving at least some of the present social order and "sense of place" if the plantation suffers further reverses or eventual shutdown. This is a speculative but highly significant impact, in that it stands for the preservation of a community now home to roughly 40% of the North Shore population.

For the North Shore as a whole, other lifestyle impacts may include expanded public services and/or private amenities due to a larger de facto population base; increased traffic; potential for further visitor-oriented commercial development in Haleiwa; added impetus for other forms of urbanization (all subject to further governmental land use decisions); increased housing pressure; and an expanded visitor population.

The quality of resident–visitor interaction is important to both the long-term viability of the proposed project and the quality of life for North Shore residents. Studies reviewed in the project social impact assessment (Community Resources, 1986) suggest that major determinants of resident attitudes and behavior rarely involve economic benefits. Rather, they usually have more to do with residents' age, perceptions of visitor respect for local culture, level of displaced political resentment, and competition for resources such as ocean recreational areas. The proposed project is intended to be a self-contained destination area, which would minimize any tendency of visitors to wander into residential areas or "local" recreational areas. However, it is expected that more visitors will be visible on the North Shore in the future purely through growth in the islandwide visitor level and consequent numbers of persons renting cars to drive around the island. Interviews with rental car agencies and activities desks in various rural Hawaii resort areas suggest that visitors who do leave self-contained resorts tend to tour the island rather than only the nearby areas; thus, any future sense of intrusion will more likely be attributable to increased number of tourists islandwide than to Mokuleia guests alone.
The social impact assessment prepared by Community Resources anticipates possible increases in family and individual stress on the North Shore due to increased housing pressure resulting from City population policies.

Project impacts are expected to be of a dual and opposing nature. On the one hand, the availability of several thousand jobs will further increase housing pressures and associated social stress. On the other hand, without substantial employment opportunities, less affluent current residents may be expected to bear most of these social costs, whereas resort employment (combined with the advantage of already possessing housing within the area) may enable them to cope with anticipated stresses much more adequately than would be the case if the regional economy remains depressed.

Possible job training programs oriented toward already-housed local residents would thus also represent mitigation of increased housing pressure and associated stress.

Another type of social stress is crime. Increased population normally results in increased crime rates due to more opportunities for crime. Some scholarly studies indicate that tourist populations result in more crime than resident populations, although these studies tend to contradict each other in regard to the exact types of crime which increase. Community Resources has reviewed Hawaii crime data in rural resort areas and has also interviewed numerous police personnel in these areas to determine their perceptions of crime consequences from resort development. The study concluded that some relationship between tourism and crime does appear to exist, but in a variety of minor and often indirect ways. Relatively little crime impact is usually observed at resort destination themselves or in nearby residential communities, but there are often greatly increased problems with petty thefts from visitors at beach parks or other tourist attractions. Perpetrators are often juveniles, and delinquency rates have increased after resort development in other rural areas. Such problems are more acute in areas with "street scenes" such as Kailua-Kona or Lahaina. As a self-contained destination area, Mokuleia is less likely to increase crime rates than would the expansion of tourist-oriented "street scenes" in Waikiki or West Maui.
Most Mokuleia resident complaints about crime now involve illegal firearms use (e.g., target practice) in the Kaena Point area or illegal marijuana growing in the mauka areas. In both cases, the increased de facto population caused by the project may be expected ultimately to reduce these illegal activities. Mitigations would include strong project security in the mauka areas and cooperation with police in searching for illegal marijuana patches before the area is opened to the public. For the Kaena Point area, strong warnings to Mokuleia guests of the area's remoteness and poor roads should dissuade most people from exploring the region and thus protect them from harassment.

A final element of the social impact study involved preliminary documentation of area residents' issues and concerns through interviews with community leaders and community dialogue meetings. Persons interviewed were primarily from the Waialua and Mokuleia areas. Their concerns fell into six broad categories:

Jobs and business opportunities—Community informants strongly stressed the need for jobs to preserve the Waialua community, their desire for some type of job training, and, in a few cases, their apprehensions that resort jobs could not substitute for agricultural jobs.

Public facilities and services—Residents saw infrastructure improvements for the resort (water, wastewater treatment, and roadways) as benefiting the entire Mokuleia area. Most welcomed the prospect of improved public access to the shoreline, although there was some concern over possible competition for recreational facilities throughout the North Shore.

Level of resort clientele—Some residents favor an upscale, exclusive clientele, while others want more "ordinary" guests because they do not want nearby residents to feel excluded.

Traffic—There were numerous questions about both traffic congestion and road safety issues.

Lifestyle changes—Some community informants expressed concern about the project being a precedent for further urbanization in general, or about particular outcomes such as a road around Kaena Point. There were also questions about the types and numbers of people who would live in the new community.
Need for commitment and communication—Many residents inquired about the best possible mechanisms for ensuring that developer promises are kept, and the developer has told them that conditions attached to land use approvals are the best form of commitment. Residents also strongly urged a continued communication process throughout the project planning stage.

5. **Low/Moderate and Employee Housing**

The availability of low/moderate and employee housing is a concern of both the State and City governments. The Hawaii State Plan and City and County General Plan both express a desire to encourage the availability of low/moderate and employee housing. The availability of affordable housing is a concern shared by the applicant.

**Impacts and Mitigating Measures**

Increased pressures on North Shore housing costs and availability is anticipated even without the Mokuleia project due to City population policies. The Mokuleia project would inevitably add to such pressures, particularly if an overall labor shortage does develop. Programs to maximize employment among those already housed in the area and nearby would serve as a housing mitigation function.

Current City policy has been to impose a set aside of affordable housing units equal to at least 10 percent of the proposed housing units in a development. The application of this policy was varied over the years, and it is currently being reevaluated under a proposed Community Benefit Assessment Ordinance. Normally, the low/moderate housing requirement has been imposed through the zoning process by means of an Unilateral Agreement. For Turtle Bay resort rezoning, the Unilateral Agreement approved by City Council contained a requirement that the developer provide low-moderate income housing opportunities within or outside of the project site for residents living in the Koolauloa and North Shore region by constructing and offering for sale, in cooperation with the City Department of Housing and Community Development, a number of dwelling units equal to ten percent of the number of dwelling units not a part of a full service hotel operation (Ordinance 86-99). For West Beach resort rezoning, the Unilateral Agreement provided in lieu of the 10 percent low/moderate income housing, an option for payment of a certain amount to be deposited into the housing assistance fund (Ordinance 86-09).
Like Turtle Bay resort and West Beach resort, similar mitigating measures to meet affordable housing requirements will be part of the Unilateral Agreement for the development at Mokuleia, which will be determined and designed through the legislative process of rezoning. At this level of planning, it is only possible to outline the options for meeting the affordable housing requirement, which at this point there are three: (1) construct the units on site, (2) construct the units off-site, and (3) payment of money. Another option to accomplish the housing requirement is the dedication of land. In terms of housing types, attached and/or detached rentals as well as for sale units will be given consideration. All of these options will be discussed in consultation with the Department of Housing and Community Development, and in meetings with the community as the project proceeds through other levels of planning, especially in the rezoning process and in seeking approvals of an Urban Boundary change through the Land Use Commission.

P. INFRASTRUCTURE AND PUBLIC SERVICES

1. Traffic and Roads

The traffic impact on the proposed recreational destination at Mokuleia on the North Shore of Oahu, was studied by Parsons Brinckerhoff Quade & Douglas, Inc. (Appendix L). Their report is summarized below:

Existing Conditions

Access to the project site is via Farrington Highway which is the only arterial highway serving this area. It is a two-lane, two-way, undivided state highway generally running through residential communities and cane fields inland and along the coastline (See Exhibit 19). Farrington Highway varies in width from 20 to 22 feet and is on level terrain with narrow shoulders.

In Wailua, the highway pavement becomes wider with various cross streets and driveways entering the highway. At Thomson Corner, Farrington Highway connects to Kaukonahua Road which serves Wahiawa and Haleiwa bound traffic. In the southeasterly direction, the road provides access to Waialua, and connects to Kunia Road, Kamehameha Highway and the H-2 Freeway via Wilikina Drive. To the north, Kaukonahua Road feeds Weed Circle, a traffic rotary which also serves Kamehameha Highway and Wailua Beach Road. From here traffic can continue toward Wahiawa, Waialua, or into Haleiwa and other points north of Haleiwa.
On this side of the island there are no restraints on capacity other than the highway itself. There is a potential of capacity restraint travelling to the north shore in Haleiwa where left-turn traffic and motorists pulling off to park on the roadside queue traffic in both directions.

Traffic Conditions

Existing traffic volumes were determined from manual field counts and data from previous counts taken by the State Highway Division. Weekday traffic volume (two-way) on Farrington Highway at Kapalau Bridge near the project site was approximately 1,300 vehicles per day (vpd) in 1984. Earlier counts were higher, averaging 1,800 vpd in the mid-1970's and 1,450 vpd in the early 1980's (Exhibit 20).

Peak hour volumes in the 1984 weekday sample at Kapalau Bridge occurred between 3:45 and 4:45 PM, during which 116 vehicles per hour (vph) were counted. Analysis of conditions on the two-lane highway during the weekday peak hour using the Highway Capacity Manual shows Level of Service A. Definitions of Level of Service are provided in the traffic report (Appendix L).

Weekend traffic conditions were sampled on April 5-6, 1986, which coincide with the opening of the polo season (see Exhibit 21). Daily two-way traffic volumes at Kapalau Bridge were estimated to be 2,400 vpd on Saturday and 3,500 vpd on Sunday. Peak hours identified by the field counts are 2:00 to 3:00 PM on Saturday and 1:15 to 2:15 PM on Sunday. Two-way peak hour volumes counted on Farrington Highway west of Mahinale Street were 237 vph on Saturday and 402 vph on Sunday.

Analyses show Level of Service B in Saturday's peak hour and Level of Service C during Sunday's peak hour. Field observations indicated better levels of service, probably attributable to the relatively short stretch of highway (approximately 3 miles) and the lack of slow moving vehicles in the traffic stream.

Traffic volumes on the other side of Wai'alea, near Thomson Corner (Kaukonahua Road intersection) were also recorded by the State Highways Division. Weekday volume was approximately 5,210 vpd in 1984. A review of the counted volumes indicates an average growth of 1.2 per cent per year (see Exhibit 20).
### EXHIBIT 20

**HISTORICAL TRAFFIC VOLUMES**

*Vehicles/Day*

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Source: State of Hawaii, Department of Transportation, Highways Division, Planning Branch. Count Stations C-23-D and 22.
EXHIBIT 21
FIELD TRAFFIC DATA

MOKULEIA TRAFFIC COUNTS
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COUNT TAKEN ON SATURDAY, 04/05/86 BY LH AND KD
PAGE 1 OF 2

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10:15-5:00 TOTAL 39 582 624 23 29 32 1329

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FARRINGTON
HIGHWAY

MAHINAAI
STREET

WAIALUA

NORTH

KAINA POINT

← C
← D

→ E
→ F
# Exhibit 21

**Field Traffic Data**

**Mokuleia Traffic Counts**  
**Intersection:** Farrington Hwy. at Mahinaai St.  
**Count Taken on Sunday, 04/06/86 by Ko and Lu**  
**Page 2 of 2**

### Count Volumes

<table>
<thead>
<tr>
<th>Time</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Total</th>
</tr>
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<tbody>
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<td>80</td>
<td>1</td>
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### Total

<table>
<thead>
<tr>
<th>Time</th>
<th>Total</th>
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<tbody>
<tr>
<td>10:00-5:00</td>
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<tr>
<td>10:15-5:00</td>
<td>2177</td>
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</table>
The weekday peak hour volume in 1984 near Thomson Corner was 619 vph between 6:45 and 7:45 AM; the afternoon peak hour occurred between 4:30 and 5:30 PM, in which traffic volume was 500 vph. The maximum volume at this location was estimated to be 770 vph during the peak hour on Sunday.

Existing highway levels of service near Thomson Corner were computed to be "C" during weekday peak hours and "D" in the Sunday peak hour. Using estimated turn volumes for the Sunday peak hour, the longest delays are for vehicles wishing to turn left from Kaukonahua Road (from Weed Circle) toward Wai'alu. Level of Service D would be experienced.

Proposed Action

The proposed action is a recreational development which includes golf courses, camp sites, hiking and equestrian trails, and other facilities. Recreational homes, resort hotels and condominiums, and other related commercial areas are planned to support these activities.

Anticipated Impacts and Mitigative Measures

The traffic impacts of the proposed 4,000 unit recreational development were evaluated for two cases: full development in year 2005 and partial development of 2,500 units in year 2000.

Potential traffic impacts of the proposed project were identified by projecting future traffic volumes from existing and planned projects. Using traffic generation analyses, estimates are made to show the increase in traffic due to the project. These projected numbers are summarized in Exhibits 22 and 23.

From these analyses the significant traffic impacts can be expected on Farrington Highway between the project site and Wai'alu, at Thomson Corner, and within the project site.

Since Farrington Highway will provide access to the project, traffic volumes are expected to increase. The analyses of year 2000 conditions with the proposed project show Level of Service E in the weekend peak hour. Traffic demands on weekdays would be served at Level of Service D or better. For the ultimate development in year 2005, predicted weekday and weekend peak hour traffic demands would result in Level of Service E conditions on the existing highway. Exhibit 24 summarizes the highway conditions.
## EXHIBIT 22

### TRAFFIC GENERATION

<table>
<thead>
<tr>
<th>Vehicles per day (In + Out)</th>
<th>Weekday</th>
<th>Weekend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Net*</td>
</tr>
<tr>
<td><strong>Year 2000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel &amp; Condominiums</td>
<td>11,180</td>
<td>5,160</td>
</tr>
<tr>
<td>Golf Courses</td>
<td>2,280</td>
<td>460</td>
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<tr>
<td>Commercial</td>
<td>5,920</td>
<td>590</td>
</tr>
<tr>
<td>Recreational Homes</td>
<td>2,940</td>
<td>1,580</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>22,320</td>
<td>7,790</td>
</tr>
</tbody>
</table>

| **Year 2005**               |         |         |         |         |
| Hotel & Condominiums        | 18,450  | 7,130   | 22,310  | 8,170   |
| Golf Courses                | 2,280   | 460     | 1,950   | 390     |
| Commercial                  | 7,690   | 770     | 10,900  | 1,090   |
| Recreational Homes          | 4,020   | 2,210   | 4,440   | 2,150   |
| **TOTAL**                   | 32,440  | 10,570  | 39,600  | 11,800  |

* Increase in traffic on Farrington Highway at project limit (east or Waialua side)
## EXHIBIT 23
### NET TRAFFIC - PEAK HOURS

<table>
<thead>
<tr>
<th>Vehicles per hour</th>
<th>Weekday (AM)</th>
<th>Weekday (PM)</th>
<th>Weekend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td><strong>Year 2000</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel &amp; Condominium</td>
<td>273</td>
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<td>Golf Courses</td>
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</tr>
<tr>
<td>Commercial</td>
<td>8</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Recreational Homes</td>
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<td>25</td>
<td>50</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>351</td>
<td>115</td>
<td>297</td>
</tr>
<tr>
<td><strong>Year 2005</strong></td>
<td></td>
<td></td>
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<tr>
<td>Hotel &amp; Condominium</td>
<td>385</td>
<td>91</td>
<td>287</td>
</tr>
<tr>
<td>Golf Courses</td>
<td>15</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Commercial</td>
<td>11</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>Recreational Homes</td>
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<td>35</td>
<td>70</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>488</td>
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### EXHIBIT 24

**TRAFFIC CONDITIONS**

Farrington Highway

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<th>Traffic Volume (vph)</th>
<th>Level of Service*</th>
<th>V/C Ratio</th>
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<td>EB</td>
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<td><strong>Existing</strong></td>
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<tr>
<td>Weekday AM Peak Hour</td>
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<tr>
<td>Sunday Peak Hour</td>
<td>276</td>
<td>126</td>
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<tr>
<td><strong>2000 With Project</strong></td>
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<td></td>
</tr>
<tr>
<td>Weekday AM Peak Hour</td>
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<td>158</td>
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</tr>
<tr>
<td>Weekend Peak Hour</td>
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<td>696</td>
</tr>
<tr>
<td><strong>2005 With Project</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekday AM Peak Hour</td>
<td>546</td>
<td>183</td>
</tr>
<tr>
<td>Weekday PM Peak Hour</td>
<td>449</td>
<td>716</td>
</tr>
<tr>
<td>Weekend Peak Hour</td>
<td>896</td>
<td>887</td>
</tr>
</tbody>
</table>

* for existing 2-lane highway: 10-foot lanes, no shoulders
Widening of the existing highway would be necessary to increase capacities. Improvements to the two-lane highway such as removing roadside obstructions and widening travel lanes to 12 feet could increase capacity by about 30 percent; the condition during the weekend peak hour, however, would remain at Level of Service E (LSE). Since LSE on two-lane highways describe probable delays due to the inability to pass slow moving vehicles, a passing lane or pull-off areas could be provided to minimize delays. Widening to a multilane facility would increase capacity to approximately four times the peak traffic demand, which does not appear to be appropriate in light of existing conditions elsewhere.

The low level of service may not translate to unacceptable operational conditions. The procedure to calculate capacity and determine the levels of service on a two-lane highway from the Highway Capacity Manual also estimates that the average speed on the highway, if not otherwise regulated, would exceed the posted 35 mile per hour speed limit. The calculation also assumes extended (longer than the four miles of Farrington Highway involved here) segments of the highway, whereby delays due to speed differences would be significant.

At Thomson Corner, the increased traffic demands caused by the project will create long delays for vehicles turning left from Weed Circle toward Wahiawa before year 2000. The analysis also indicates that all of the stop-controlled movements at the intersection will have demands greater than available capacities in year 2005. At Thomson Corner, the traffic report concludes, signalization will be needed. Signalization of the intersection would alternately assign to the various conflicting movements the right to use the intersection; the analyses show, in all cases, below capacity conditions. Traffic volumes and operating conditions at this intersection should be monitored and signalization provided when warranted. With signalization, however, increased air pollution and interruption to vehicle movements will occur.

Traffic impacts beyond the Mokuleia-Waialua area are expected to be significantly less. Two existing highways, Kaukonahua Road and Kamehameha Highway, provide service south toward Wahiawa. Kamehameha Highway, Haleiwa Road, and the proposed Haleiwa Bypass Road provide service northward through Haleiwa. Traffic volumes between Honolulu and Haleiwa are expected to be affected more by factors other than the proposed project, such as increases in islandwide population, tourism activity, and development elsewhere. Construction of the proposed Haleiwa bypass highway would ease the
expected increases in traffic at Weed Circle. Within Haleiwa, existing commercial activities and recreational areas could become destinations for traffic generated by the proposed project.

The traffic report recommends that Farrington Highway within the project limits be widened to provide a median lane for left turn traffic. The median lane will improve traffic operations by allowing traffic desiring to make left turns from the highway to vacate the through lane; in addition, traffic desiring to enter the highway from a driveway or side street will have a refuge area available so that only one lane of traffic needs to be crossed at a time.

Turn volumes at the intersection of Farrington Highway and the proposed access road were estimated for the weekend peak hour in years 2000 and 2005 to determine localized improvements that will be needed (Exhibit 25). The following recommendations were made for the proposed intersection:

* Signalize the intersection when traffic volumes or conditions warrant this improvement; the predicted volumes indicate that the unsignalized intersection will reach capacity in the middle of year 2001.

* The access road (Road A) should be at least four lanes wide; two lanes should be provided on the access road approach to the intersection so that left and right turns onto Farrington Highway can be separated.

* A separate dedicated left turn lane should be provided for westbound Farrington Highway-to-access road traffic.

* A deceleration lane should be constructed for eastbound Farrington Highway traffic turning right into the access road.

* Driveways from the commercial areas, hotels, or other uses should be located as far as possible from the intersection; desirable minimum distances are 400 feet along Farrington Highway and 300 feet along Road A.

Summary

The proposed project will increase traffic volumes on Farrington Highway in the Mokuleia-Waialua area. Levels of service on the existing two-lane highway will reflect the increased traffic, with
EXHIBIT 25

MAKAI

↑

→ To Keana Pt.

FARRINGTON

203 (271) →

145 (272) →

ROAD A

To Golf Courses,
Residential Areas,
Recreational Areas

122 (264) →

HIGHWAY

213 (276) ←

403 (696) ←

LEGEND

403 YEAR 2000
(696) YEAR 2005

EXHIBIT 25

TRAFFIC ASSIGNMENT

WEEKEND PEAK HOUR
the existing Sunday peak hour level of Service C changing to Level of Service E with completion of the proposed project. The existing highway, however, has sufficient capacity to serve the predicted peak hour volumes.

At Thomson Corner, signalization will be needed. Without signalization, the increased traffic volumes will cause very long delays to traffic movements which would be controlled by existing stop signs or which must yield to oncoming traffic.

The traffic increases on other roadways farther from the project will be smaller due to the distribution of demands; the increase will be a small portion of existing traffic and will not have any significant impact on traffic conditions. Within the project limits, improvements are recommended to minimize the adverse effects of the increased traffic volumes.

2. Recreational Resources

On Site Recreational Resources

On the project site, the primary current recreational activities are private ones—equestrian activities (polo and other facilities at the Crower Ranch stables) and camping at Camp Mokuleia.

As detailed in Section III.A.3, the 18 acres leased by the Hawaii Polo Club now comprise Hawaii’s major site for polo matches, attended by as many as 2,000 spectators.

Additionally, Mokuleia Land Company now leases, on a year-to-year basis, the easternmost six acres of its 27-acre beachfront parcel to the Episcopal Church. The Church’s Camp Mokuleia consists of its own three acres to the east and these six leased acres. Camp activities, available to the general public on a fee basis, include (1) weekend camping programs, which attract a mix of groups and individuals, and (2) summer camping for schools and other organized groups, such as the handicapped, cancer patients, and immigrant children. The camp director estimates 20,000 clients were served in 1985. Most camp facilities are located on the Church’s own three acres. The six acres leased from Mokuleia Land Company are primarily in open space but also contain thatched huts used by Kamehameha Schools for a Hawaiian instruction program; parking for visitors; and beach and recreational facilities for campers. The Church has initiated a fund-raising program to add substantial new facilities to Camp
Mokuleia. The long-range plan for camp improvements assumes ultimate acquisition (purchase or long-term lease) of the six acres now leased from Mokuleia Land Company. The master plan for these six acres envisions constructions of various youth-oriented facilities (cabins, campgrounds, and various sports playing fields), while new adult-oriented facilities would go on the Church's own three acres.

Hauka portions of the property contain a number of hiking trails and a jeep access trail (now washed out in one location) to Peacock Flat. Because of liability concerns, the property owner has recently been reluctant to permit public access to these trails. However, there are reports of illegal use of the land by some hunters.

Currently there is also no legal public access across Mokuleia Land Company property to the shoreline, although entry may be gained by walking along the beach. This shoreline offers the potential for diving, swimming, beachcombing, and shorecastng. However, heavy surf often renders the area hazardous, particularly in the winter months, and community informants report little use of the Mokuleia shoreline below private lands, except by a small number of area residents who are very familiar with conditions there.

**Off-Site Recreational Resources**

Off-site but nearby on Farrington Highway are several other camping or beach park areas:

In *The Beaches of O'ahu*, Clark (1977) defines the "Mokuleia Beach Shoreline" as consisting of the six-mile stretch extending from Camp Harold Erdman on the western (Kaena Point) end to Puuiki Beach Park (off of Crozier Drive) on the eastern side. He identifies and characterizes the following specific beach areas:

(1) **Camp Harold Erdman** is a YMCA facility. Although access is limited to YMCA uses, its popularity as a summer camp for children — along with year-round availability for leadership training, conferences, retreats, etc. — makes it one of the best-known stretches of the Mokuleia Beach Shoreline to the Oahu public at large. Clark states that water activities include diving, snorkeling, and swimming. He characterizes the ocean as generally calm during the summer but subject to strong currents from October through April.
(2) Hokuleia Army Beach facilities are limited to military personnel, although it has the widest and cleanest sandy beach of the Hokuleia stretch. However, states Clark, these areas are exposed to very severe rip currents and lateral currents during the winter months, especially during high surf periods. Over the years, this particular section of the Hokuleia Beach Shoreline has been the scene of many serious and fatal swimming incidents.

(3) Kealia Beach includes the shoreline fronting the two small westernmost shoreline parcels proposed for resort development within this project. According to Clark (p. 105), the "most popular section of the beach is the Pu' u o Hakili area, the site of a former fishing shrine. The wide sand beach here is reached by following any of a number of unimproved roads through the brush to the shoreline. The area is frequented by fishermen and occasionally by campers." (It should be noted that legal access would now occur only along the shoreline, and that camping above the high-water mark is technically trespassing.)

Water activities include diving, swimming, and shorecasting. Clark recommends extreme caution in entering the water during winter months when surf is large. He characterizes the ocean as "relatively safe on calm days," but says along-shore currents are "insistent" even then.

(4) Hokuleia Beach Park is the only developed public facility within the project area. Water activities include diving, shorecasting, and swimming. Available facilities include a comfort station, cooking stands and picnic facilities, a large grassy playground, public and emergency phones, and 65 parking stalls. The park is windy and shadeless, although the City has tried unsuccessfully to plant trees there (personal communication, Yukio Taketa, Chief, Advanced Planning Section, Department of Parks and Recreation, June 19, 1986). There are tentative plans for a new bath house and parking lot lights.

The beach fronting the 11.7-acre park lies on the leeward side of a sandy point. It is moderately wide but steep, and is somewhat protected by the broken offshore reef. However, Clark (p. 105) adds his usual admonition that there are "dangerous currents from October through April, especially when surf is big."
According to the Custodian of Permits and Records for the City Department of Parks and Recreation (personal communication, Ray Hasegawa, June 19, 1986), limited restroom facilities at the park require limiting the availability of camping permits to a total of 15% (each for up to ten persons) at any one time. He said the park is in little demand among campers most of the year due to its harsh physical character and risky swimming condition; however, on three-day weekends, Mokuleia Beach Park is among Oahu’s most popular camping sites, apparently because its remoteness is appealing to city dwellers seeking an escape from urban environments.

(5) Mokuleia coast, between park and Laau Paena St., residential area, is a shoreline stretch not specifically described by Clark. This includes the coastal area fronting the 27-acre project parcel and the abutting Camp Mokuleia. There is currently no public access except along the sandy shoreline. Residents interviewed indicate that little swimming takes place there but other activities include net throwing, pole casting, daytime and night diving for lobster, and some limu picking around Camp Mokuleia. There are no estimates of extent of usage, although Mokuleia Land Company personnel report observing infrequent use, and other residents say that wintertime rough waters usually limit food-gathering activities to a limited number of persons very familiar with the area.

The public Facilities map for the City Development Plans indicates the City intends to acquire Mokuleia Land Company’s entire 27-acre parcel for Mokuleia Beach Park expansion purposes. No money for this purpose is included in the present CIP budget. The Public Facilities map indicates the acquisition is to take place between one and seven years in the future, although the current CIP program states that it will be more than seven years in the future.

(6) "Mokuleia Beach" is Clark’s term for the coastal area fronting the current main residential pocket on Farrington Highway (i.e., Laau Paena St., Mokuleia Beach Colony, etc.); the large 82-acre project parcel which includes the current polo field location; and the private Castle and Cooke recreation area to the east (several cottages serving as an executive retreat for management personnel). As with most of the Mokuleia Beach Shoreline, Clark warns of dangerous currents in the winter months, particularly in times of large surf, but notes that
water activities do include swimming and diving, as well as shorecasting and beachcombing. However, the entire shoreline above the high-water mark is privately-owned, which sharply limits public access. People nonetheless can reach the beach, either through trespassing or along the shoreline, and area residents report recurring litter problems.

The City North Shore Development Plan Public Facilities map indicates a "site-undetermined" public park should be developed somewhere in the vicinity of Ka'ahulu Bay on Nokuleia Land Company's 82-acre parcel. However, the map also indicates that acquisition of such a park site (of indeterminate acreage) is more than seven years in the future, and no City funds have been appropriated to date.

(7) Puuiki Beach Park is privately-owned, with access limited primarily to Waialua Sugar employees. It is located off Waialua Beach Road rather than Farrington Highway. The reef structure there provides better protection against high waves and currents than most other portions of the Nokuleia Beach Shoreline, although the beach is steep, a mixture of sand and pebbles, and the ocean bottom is rocky rather than sandy.

The park serves important social and recreational functions for the Waialua community. Waialua Sugar Company has dedicated a ballfield for the community Little League and makes the four pavilions available for local church and other non-profit groups. Intrusion into, or congestion of, this park would be a sensitive social impact. However, the location is off the main highway which would be used by resort guests, and a sign clearly marks the park as a private facility.

(8) Kaena Point State Park The Kaena Point State Park wraps around Kaena Point. According to DLNR planners, the emphasis of the park (improvements and usage) is on the Waianae side due to more favorable beaches and camp grounds. Improvements to the North Shore side are not presently foreseen. Possible impacts may include greater visitation to the Kaena Point State Park and triggering the eventual need for improvement.
Future Recreational Needs

The State Comprehensive Recreational Plan (SCORP) is embodied within the State Recreation Functional Plan and is intended to represent a broad view of outdoor recreational opportunities, problems and issues in the State of Hawaii and to propose coordinated action toward improving the quality of outdoor recreational opportunities for State of Hawaii residents and visitors.

SCORP provides the following recommendations for the North Shore area:

The North Shore Planning Area stretched from the area just east of Kawela Bay to Kaena Point. Included are the residential areas of Sunset Beach, Waimea, Haleiwa, Waialua and Mokuleia.

The North Shore has an abundance of existing coastal recreation areas including the Mokuleia Beach Park, Pupukea Beach Park, Waimea Bay Beach Park, Kaika Point State Recreation Area, Ehukai Beach Park, Haleiwa Beach Park, Haleiwa Alii Beach Park, and the Haleiwa Boat Harbor. An offshore resource area, the Pupukea Marine Life Conservation District (MLLCD), is managed by the State Division of Aquatic Resources. Inland of Mokuleia area, there are the special resource management areas of Mount Kaala and Pahole Natural Area Reserves.

Future parks planned for the area include Mokuleia Beach Park expansion, Puuiki Beach Park, Haleiwa Beach Park expansion, Haleiwa Regional Park expansion, Kaika Point State Recreation Area improvements, Kawailoa Beach Park, Waimea Bay Beach Park expansion, and Ehukai Beach Park expansion.

Need for Action

Inland Recreation: There is expected to be a medium need for action on inland recreation like hiking, camping and picnicking.

Coastal Recreation: There are high need for action anticipated on swimming, sunbathing, diving, surfing, beach camping and beach picnicking; and a medium need for action on fishing.

Facility Based Recreation: There is expected to be a high need for action on facility based recreation like field games, court games, playground equipment and pool swimming; and medium need for action on tennis and golf.
Other Recreation Activities: There appears to be a high need for action on walking as a recreation activity; and medium need for action on jogging and bicycling activities.

Respondents in the Leeward/Central/North Shore areas regarded beach parks as the most important recreation facilities. The importance of facilities and programs were ranked by respondents from high to low as follows: beach parks, recreation programs, zoo, children's equipment, quiet parks, ballfields, gymnasiums, basket/volleyball courts, pools, campgrounds, tennis, botanic gardens, and golf courses.

Proposed Alternative Actions
Provide for inland hiking and camping recreation activities.
- Implement budgeted improvements such as at the Kaena Point State Park.
- Identify other potential inland recreation areas for future development.

Provide for swimming, sunbathing, surfing and fishing coastal recreation activities. Also provide for beach camping activities.
- Implement budgeted improvements at beach parks such as Haleiwa Alii Beach Park, and Mokuleia Beach Park.
- Consider development of other planned beach facilities like Mokuleia Beach Park expansion, Puuiki Beach Park and other beach parks identified earlier.

Provide for athletic fields, sport courts, swimming pools and tennis.
- Consider improvement of existing or development of new recreation areas to provide for facility based recreation needs.

Provide for golf course activities.
- Consider improvement to the existing Kahuku Golf Course and/or increasing accessibility to existing and proposed private courses at Turtle Bay to accommodate future users.
- Given the expense of constructing and operating a golf course, identify other private development efforts in the vicinity as another alternative to a public initiated projects.

Provide for walking, bicycling, jogging recreation activities.

- Explore options for providing additional trails and paths for walking and hiking activities.

- Pursue implementation of the Statewide Master Plan for Bikeways.

- Consider these recreation activities in improving roadways and construction new roadways.

- Consider development of other planned recreation areas/facilities or identified potential resource sites.

The Public Facilities map for the North Shore Development Plan indicates the City intends to acquire Mokuleia Land Company's entire 27-acre parcel (including the six acres leased to Camp Mokuleia) for Mokuleia Beach Park expansion. No money for this purpose is included in the present public works budget. The Public Facilities map indicates the acquisition would occur between one and seven years in the future, although the current Capital Improvements Program states it will be more than seven years in the future. The City Development Plan also indicates a "site-undetermined" public park somewhere in the vicinity of Kai'ahulu Bay on Mokuleia Land Company's 82-acre beachfront parcel (which includes the 18 acres now used for polo). However, the plan also indicates that acquisition of such a park site (of indeterminate acreage) would be more than seven years in the future, and no City funds have been appropriated to date.

**Anticipated Impacts and Mitigative Measures**

The project would have numerous impacts, primarily within Mokuleia's Farrington Highway corridor. Not the least of these would be the provision of the project's own recreational characteristics—golf courses, restaurants and evening entertainment, sports facilities, possible theatre complex, etc.

As discussed in Section III.A.3, discussions between the developer and the Hawaii Polo Club are now going on as to possible relocation to expanded polo facilities to another, more mauka portion of the property.
The developer is also still talking with the Episcopal Church about its desire to acquire the six leased acres for Camp Mokuleia. As a good-faith gesture, the property owner has modified its tentative plans for the 27-acre parcel to leave the six-acre portion in landscaped open space, pending further negotiations with the Church. However, if the entire 27 acres are developed for resort use, the nature of the camping experience at Camp Mokuleia would change, since the camp would be limited to a three-acre site between two more urbanized parcels.

While no definite plans or arrangements have been made, the developer's current intent is to improve the jeep access road to Peacock Flat (possibly with general public access); improve hiking trails; develop camping and/or picnic facilities in the mauka areas; and perhaps set aside a zone for hunting. These plans are essentially dependent on finding a contractor who would operate these mauka recreational facilities, financing needed improvements through small user fees. The developer has initiated talks with several prospective operators, including the Episcopal Church (since the mauka recreational activities appear complementary to the Camp Mokuleia experience).

Other likely project impacts include:

1. Public access to the shoreline will increase due both to standard City requirements for such access and to the developer's publicly-stated intention to provide such access, as well as public parking facilities. However, at the present stage of project planning, there is no final determination as to the exact location of access trails, or the number of parking stalls. The applicant will comply with the requirements of the Public Access Ordinance 43ll.

2. Increased use of the beach by resort guests and the general public could present safety problems due to the strong currents which often accompany high surf in winter. This could be mitigated by prominent warning signs, provision of lifeguards, and provision of attractive swimming pools in the hotels to provide guests the option to use pools rather than the ocean.

3. Project approval as planned would preclude long-range City plans to expand Mokuleia Beach park and establish a new park on Kaalua Beach. However, existence of public park sites on the Development Plans in no way ensure the implementation of
these sites as park areas. In the five years that the two sites have been designated on the North Shore Public Facilities Map neither site has been selected for funding and, therefore, remain no closer to reality than they were in 1983 when the North Shore Public Facilities Map was first adopted.

Although the project proposes the deletion of two proposed public parks, it also offer opportunities for increased recreational uses of the beach and mountain areas, perhaps equal to or greater than the potential of the two deleted parks, one of which is site undetermined and planned for seven years and beyond (since 1983). Although specific site locations and plans are not illustrated, it is the applicant's stated intent in the EIS that beach access-ways and parks are an integral component of the development and that they will be provided to meet recreational needs. These recreational needs will be developed and determined through discussions with the community, Departments of Land and Natural Resources and Parks and Recreation, as well as with the City Council, throughout the entire planning process. The exact location, scope and design, and the type and number of beach accessways and parks will reflect the results of these discussions.

Recent experience (Kuilima and West Beach) suggests that the approval process generally provides the public and government agencies with ample opportunities to improve and enhance public recreational amenities as part of the overall political approval process, including accessways to beaches, beach promenades, parks, trails and other uses. Therefore, removal of park sites from the development plan exchanges a potential for government-financed recreational opportunities for guaranteed developer financed recreational opportunities.

(4) The nature of camping and recreational experiences of the existing Mokuleia Beach Park would be altered. The "remote-ness" aspect of those experiences would be lost to the extent that development in the area is perceived as urban. On the other hand, landscaping improvements on the adjacent 27-acre resort parcel and the perception of increased security due to resort development in the area may provide aesthetic and mental incentive which would make the camping and recreational opportunities available at the Mokuleia Beach Park attractive to a larger number of Oahu's residents.
Some current Mokuleia residents may feel a sense of intrusion or competition with “outsiders” (resort guests and new residents, along with other Oahu residents attracted by increased public access). This could focus on aesthetic aspects of the beach experience, food-gathering, or both. It is doubtful that large numbers of project guests would pick limu or dive in rough waters for lobsters, although a few may try shore-casting. Near-shore ocean food resources have been dwindling islandwide due to population pressures and increased fishing, and continuation of this trend in the Mokuleia area might be attributed (correctly or incorrectly) to project visitors and residents.

Outside the Farrington Highway corridor, little impact is expected. Puuiki Beach Park—a sensitive area for the Waialua community—is off the main highway corridor and marked “private.” Evidence discussed in Section IV.0.4 suggests that few guests leave destination resort areas, and, when they do, they tend to tour the entire island. Future visitor presence at North Shore recreational areas is expected to increase primarily as a function of islandwide tourism growth. At the same time, it is reasonable to expect that the Mokuleia project may have some disproportionate impacts on visitor presence at particularly scenic nearby spots, such as popular surfing areas in times of high surf.

The State Comprehensive Recreational Plan (SCORP) has identified needs for a variety of recreational activity on the North Shore. Although the proposed development will limit the opportunity to pursue some of these needs, it will, on the other hand, mitigate against these losses by fulfilling many of the other recreational needs listed in SCORP’s Proposed Alternative Actions, e.g., provide for golf course activities, tennis courts, inland hiking and camping, trails and paths, and other athletic sports activity.

3. Water Distribution

Existing Conditions

The project is currently served by two private water systems. One water system consisting of a well, reservoir and distribution system serves a small portion of the property being proposed for development and the developed lands along the shoreline located between parcel B and C proposed for development. The well has a capacity of 830,000 gallons per day.
The other water system provides agricultural water for the bulk of Parcel A and Parcel B. The system consists of a well, booster pumps and a distribution system.

In 1980/1981 three new wells were drilled on the property, two at elevation 200' and one at elevation 400'. These wells have a capacity of 4.5 MGD per day.

In 1981 the Waialua area was designated by the Board of Land and Natural Resources as a water control area. This designation requires that the BLNR approve all requests for expansion of preserved uses or development of new sources. (A preserved use is an existing water use prior to designation of the water control area.)

In February of 1986 the Board of Water Supply prepared an Environmental Assessment for proposed improvements to the Waialua-Kahuku regional water systems. MDC as a large land owner and water user, requested to be a consulted party. The improvements being proposed include new source developments in the Mokuleia area. MDC indicated its desire to work with the BWS and to alert the Board to its intention to increase water usage in conjunction with the proposed development of a recreational resort community.

Proposed Actions

MDC proposes to develop a potable water system to be dedicated to the Board of Water Supply to service the potable water requirements of the proposed development. The system will require the improvement of existing wells, installation of transmission lines, water pumping stations and reservoirs. The development is expected to require approximately 2 million gallons per day of potable water.

In addition MDC proposes to develop a new private water system to provide irrigation water for the two golf courses being proposed as part of the master plan. The system will require improvement of existing well or wells and installation of new distribution and storage facilities.
Impacts

Water currently used for agricultural purposes on the property proposed for development will be used for the irrigation of golf courses.

The Department of Health is vested with the responsibility to ensure that public water systems in the State are providing water which is in compliance with the State's drinking water regulations known as Chapter 20, Title II, Administrative Rules, and are in compliance with all other applicable terms and conditions of Chapter 20. 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. If a new water source is developed to supply this project, the source and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively. Section 11-20-29 of Chapter 20 requires that 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 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 bear his or her seal upon submittal.

Section 11-20-30 requires that new or substantially new or substantially modified distribution systems be approved by the Director of Health.

Approval authority for Section 30 has been given to the Board of Water Supply for water distribution systems under their jurisdiction.

Mitigating Measures

The existing wells on the property demonstrate an abundance of water on site for development.

The wells are within a BLNR Water Control area. BLNR will have an opportunity to conduct a review of all of the relevant facts prior to granting the request for water usage by the development.
While the Mokuleia area is within the Waialua Water Control Area it is part of a sub-area which has estimated sustainable yields substantially in excess of the amount actually used. Accordingly, there is more than sufficient water for existing uses and all proposed additional uses.

The system will be developed to Board of Water Supply standards for dedication, therefore ensuring a system development in accordance with long established proven technologies.

The developer will comply with the requirements of Section 11-20-29 and 11-20-30 of Chapter 20, Title 11, Administrative Rules and Regulations. As State law is very explicit in detailing the approval requirements and process for new sources and distribution systems for drinking water, no further mitigating measures are necessary. The developer and his engineering consultants will work closely with the Department of Health and its designees in meeting the requirements of the law.

4. Sewage Disposal

Existing Conditions

Existing sewage on the property is disposed of in cesspools.

The City is studying a wastewater treatment plant (WWTP) which will serve the Waialua and Haleiwa sewerage district. The proposed WWTP does not presently contemplate serving the proposed development since the development is currently not included in the City's North Shore Development Plan. However, this does not preclude possible joint construction and use of the WWTP if required approvals are obtained by the applicant.

If a separate wastewater treatment plant is constructed in conjunction with this development and dedicated to the City and County for operation and maintenance, it will have to be built according to City standards. Effluent disposal should be compatible to the proposed Facilities Plans and water quality management plans for the drainage area.

Proposed Action

A modern sewage disposal system will have to be developed to accommodate the sewage generated by the proposed development.
A complete sewage system normally consists of four elements. They are: (1) a collection system consisting of gravity laterals and mains; (2) a transmission system consisting of pump stations, force mains and gravity mains; (3) a processing plant for the level of treatment recommended by State and City agencies responsible for such recommendations; and (4) an effluent disposal system consisting of injection wells or other approved disposal method.

**Impacts**

Short term impacts include the construction related impacts of noise, dust, and traffic delays created by construction projects.

Long term impacts of a sewage treatment plant include: visual impact of the plant, potential odor of the plant, noise from plant operations, necessity to dispose of treated effluent, and necessity to dispose of solid waste product generated by the plant.

At the present time the applicant is considering two options for providing the necessary sewage treatment facilities. These options are the independent development of a sewage treatment plant by the applicant for dedication to the City & County of Honolulu, or the participation in the City’s plan to develop a sewerage system for the North Shore. The applicant is in the process of evaluating the alternatives.

Advantages and disadvantages of the two alternatives which have been proposed include the following:

<table>
<thead>
<tr>
<th>Developer Built Plant:</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td></td>
<td>Ability to match timing of plant construction with development sched.</td>
<td>Higher initial cost of two Plants. Higher long term operating costs.</td>
</tr>
</tbody>
</table>

| Participation in City Regional | Lower initial cost and lower operating costs. | Plant may not be in operation in time to meet needs of development in proposed development schedule. |
Mitigating Measures

The City Department of Public Works has suggested a developer built plant could be constructed on the site of the city regional facility with coordination of design that would allow for lower long-term operating costs as well as acceleration of construction to meet the projected development timetable.

Site selection for the proposed city regional plant and the proposed developer built plant are undetermined at this time, however would likely be located Mauka of Farrington Highway based on engineering and environmental requirements. The location of the Waste Water Treatment Plant (WWTP) west of Dillingham Field under discussion at the time the Draft EIS was being prepared is no longer under consideration as a location for the Proposed City Regional Plant. The proposed location is now approximately a mile east of the proposed Mokuleia Development and Mauka of Farrington Highway.

Short term impacts from construction can be mitigated by complying with Department of Health regulations regarding construction noise and adhering to City & County ordinance relating to grading and building which contain provisions mitigating against noise and dust.

Long term impacts from operations of the plant can be minimized by careful site selection. Selecting a relatively remote location for the sewage treatment plant will mitigate the visual, noise, and odor impacts. Less remote locations would require visual and noise barriers such as walls, landscaping and buffers. Odor problems can be mitigated by increased monitoring, more sophisticated instrumentation, and proper facility management.

Effluent disposal location and method will be determined in consultation with the Department of Health, the Department of Public Works, and the Board of Water Supply based on geological information and engineering reports.

The entire sewer system design and construction will be subject to review by a number of concerned government agencies.
5. **Solid Waste**

**Existing Conditions**

Solid waste generated on the property by residents and by ranching operations is disposed of by a private collection agency.

**Impacts**

There will be an increase in the amount of solid waste generated. For single family development, waste collection is expected to be provided by the City. Private refuse agencies are expected to provide collection services for other project uses. Private refuse collection companies dispose of the material in private or public landfills. Public landfills may be subsidized by taxpayers.

**Mitigating Measures**

The proposed development provides $2 in revenue for every $1 of expenses in State and County finances. Therefore, to the extent that there is a public subsidy in landfills, the development will be contributing at least its fair share of these costs.

6. **Drainage**

**Existing Conditions**

The project site consists of a coastal plain and foothills which terminate in the Wai'anae Mountains. The site contains a number of drainage ways through which storm runoff from areas inside and outside of the property boundary eventually reach the ocean. There is one major drainage course which runs though the development site. For the most part this drainageway serves a drainage basin which is outside of the property boundary. Portions of the site proposed for development currently are drained by means of sheet flow. Under normal conditions runoff from the drainage basin accumulates in the lower portions of the area proposed for development both mauka and makai of Farrington Highway. These low areas serve as natural retention basins and water that has accumulated in these low areas percolates slowly into the ground or evaporates. Sand berms at the oceanfront normally prevent water from discharging into the ocean. Under storm conditions the natural holding capacity of the lower areas are exceeded by the output of the drainage basin and flood waters overtop the natural sand berms and storm waters are discharged directly into the
ocean. Once the flood waters have been released, wave and wind action restore the sand berms and runoff is no longer discharged into the ocean until flood conditions sufficient to overtop the sand berm again occur.

At the present time no permanent connection between the ocean and the property exists. Drainage is discharged into the ocean under storm conditions. Ocean waters do not flow onto the subject property through the drainage courses because the sand berms are normally in place and because the property is at an elevation higher than sea level.

Proposed Action

Development of the project will include a drainage system built to County standards which will accommodate the existing drainage requirements of the site as well as provide for any increase in runoff due to the addition of improvements which will change the permeability of the surface in some areas.

While a specific drainage plan has not been adopted for the development at this level of planning, it is anticipated that maintaining levels of discharge into the ocean at current or lower levels will be accomplished primarily by increasing the holding capacity of retention basins on the property proposed for development. To this end, the conceptual plan (Exhibit 12) shows large open areas and recreational areas within the lower sections of the property mauka of Farrington Highway. The purpose of concentrating these open areas and recreational areas in the area is to provide areas for flood water retention on the property.

Clarification

The conceptual plan as shown on Exhibit 12 contains a large degree of "artistic license" and is not intended to represent an actual development. A number of agencies and individuals have interpreted the plan as showing the creation of saltwater lagoons with a permanent connection to the ocean. The applicant wishes to emphasize that no such connection is planned. What is planned is that the existing situation of intermittent discharge into the ocean will be continued and that the expanded retention basins necessary to accomplish this will be integrated into the development as a design element. It is further clarified that existing pond and future drainage basins may not necessarily be combined. The following is a basic discussion of the mechanics of the proposed system:
Within the area to be developed drainage will be handled in a conventional manner to standards of the City & County of Honolulu Department of Public Works. Conceptual plans call for the enlargement of or improvement of Makalena Stream throughout the property. Runoff will be directed to a retention basin to be provided mauka of Farrington Highway. The basin will dissipate the speed of the runoff and provide an opportunity for particulate matter to settle out. From the retention basin the runoff will be directed through a bridge (under Farrington Highway) to the ocean.

**Impacts**

Anticipated impacts include short term construction related impacts such as noise, dust, traffic disruption and air pollution due to use of diesel equipment. Long term impacts should be an improvement in the drainage throughout the project area, a lessening of particulate matter discharged into the ocean during periods of storm runoff, and the visual impact of altered topography due to drainage improvements.

Alteration of the drainage retention basins mauka of Farrington Highway may have some impact on existing wildlife habitats in existing ponds. The elimination of ponding areas makai of Farrington Highway may have an impact on wildlife supported by those ponds.

No impacts of the following nature are anticipated:

Saltwater intrusion into areas mauka of Farrington Highway will not occur as there is to be no connection with the ocean.

Nearshore changes in salinity are not anticipated as there is no permanent connection to the ocean and discharge into the ocean is expected to remain at or below current levels under storm conditions.

Flooding of improvements planned for areas currently shown on Flood Insurance Rate Maps (FIRM) as being subject to flooding, City and County of Honolulu Ordinances which mandate mitigating measures such as minimum floor level elevations and other drainage improvements before permitting development within such areas.
Mitigating Measures

Drainage improvements will be developed to City & County standards to ensure that adequate and appropriate improvements are made. Impacts from short term construction activities will comply with Department of Health Noise Requirements as well as County Grading Ordinances will feature protective measures to mitigate dust and erosion.

Visual impacts of the proposed drainage improvements will be subject to the overall design criteria for the proposed recreational/resort community. These design criteria are expected to include landscaping requirements, setbacks as well as material and texturing requirements which can be used to mitigate changes in visual impacts.

Impacts on wildlife habitats can be mitigated in the following ways:

New retention basins mauka of Farrington Highway can be designed to minimize or eliminate the possibility of mixing drainage waters and existing pond waters by providing for separation between the areas using existing ground or built up areas to separate the habitats from new retention basins. The necessity of these measures is unknown at this time. All of the existing ponds currently receive drainage waters at the present time to some extent.

Actual drainage designs can be developed in consultation with U.S. Department of Interior, Fish and Wildlife Division, and the Department of Land and Natural Resources in order to minimize or eliminate drainage impacts on wildlife.

7. Electric and Telephone Services

Existing Conditions

Power and telephone service to the site is currently supplied by overhead lines along Farrington Highway. Power to these lines is supplied by the Waialua Substation which has limited available capacity to serve the subject development.
Proposed Action

Electrical and telephone infrastructure will have to be upgraded to serve the development.

Impact

The existing electrical system will have to be upgraded to accommodate the new development. Hawaiian Electric will require a new substation to be installed at the proposed Mokuleia Substation site (TMO: 6-8-6130). This lot is now owned by HECO. This future substation is located on Farrington Highway less than a mile from the subject development. Ultimately, two 46 kv circuits from the Waialua Substation will be required to serve the new substation. These circuits will be built on existing pole lines on Farrington Highway to the new substation. In addition a substation will have to be located on site at the development. Throughout the development an underground electrical system will be installed. Telephone capacity can be increased as necessary.

Mitigating Measures

The developer will work closely with HECO in order to find an appropriate on-site location for a substation as well as to ensure that timely service can be provided.

No other mitigating measures are necessary since the electric company has indicated that adequate service can be provided.

The electrical system within the development will be built to County standard. Utility lines will be underground to mitigate any visual impacts.

The developer will maintain contact with Hawaiian Telephone Co. to assure necessary service levels.

8. Public Access and Parking

Regional public accesses to the beaches are located along the shoreline at the Mokuleia Beach Park. This City and County of Honolulu park abuts the applicant's 27-acre oceanfront parcel.

The project site currently affords public access to the beach and mountain areas on a limited basis.
Access to the portion of the property on the beach side of Kamehameha Highway is allowed for two purposes. One is for polo activities only and these occur on the northern corner of the property. Currently, the three levels of polo participants currently using the site include active participants, who are the players, number about 30; associate members, which make up the "social club" of about 100 members; and between 500 to 2,000 spectators per event (Personal interview with Michael Daily, April 22, 1986). On this portion of the property, there is public access to the beaches along the shoreline only.

Originally intended for members of the Episcopal Church, the Camp now offers facilities and services throughout the year to the general public. It offers weekend camping programs, which attract a mix of groups and individuals, and summer camping for schools and other organized groups, such as the handicapped, cancer patients and immigrant children. In 1985, the church served approximately 20,000 clients. (Personal conversation with Reverend Brian Gieves, May 1, 1986).

Access to the mountain portion of the project is limited due to safety and liability. Requests for access are evaluated to ensure that users have adequate knowledge and liability protection.

Proposed Action

With outdoor recreation being a major component of the proposed project, this development will include provisions for optimizing general public access to the project site. The actual number and locations of public access is undetermined at the time of this writing and this section provides a preliminary scope of what will be included in the public access component.

The beaches are accessible along the shoreline. The developer intends to make this access more convenient by providing right-of-ways through the project area, possibly through the grounds of the hotels and condominiums.

A unique advantage afforded by the project site is mountain access, and this is envisioned for the purposes of camping and hiking. While the mountains would be generally opened to the public, the security and management of the mountain property may require a reasonable user fee.
Anticipated Impacts and Mitigative Measures

The establishment of onsite public access will provide greater effective access to the shoreline and its food gathering resources. While current fishers of the area may eventually feel a sense of crowding, it is noted that the resort clientele who will use the beaches will probably not compete for food resources. Their activities will probably be limited to sunbathing, swimming, surfing and sightseeing.

A potential negative impact of greater beach public access is that it will unavoidably expose more users to rough winter ocean conditions. Also, shoreline littering may increase both near the project area and along the beach fronted by private homes. Mitigation measures for these include posted warnings and/or lifeguard supervision; and maintenance of the beach areas near the project site.

Possible negative impacts of greater mountain access include increased opportunities for crimes dependent on some isolation (e.g. marijuana growing) and the safety of inexperienced hikers and campers. Mitigation measures for these impacts lie in the management and security program for hiking and camping.

The applicant will work with the Department of Parks and Recreation of the City and County of Honolulu and the Department of Land and Natural Resources to implement Park Dedication Ordinance No. 4621 and Public Access Ordinance No. 4311 to ensure the adequacy of both recreational facilities and Beach and Mountain Access.

9. Fire Protection

Existing Conditions

Currently fire protection is provided to the region as follows:

<table>
<thead>
<tr>
<th>Station/Company</th>
<th>Distance</th>
<th>Response Time</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waialua, Engine 14</td>
<td>7.3 miles</td>
<td>10 minutes</td>
<td>5</td>
</tr>
<tr>
<td>Wahiawa, Engine 16</td>
<td>11.0 miles</td>
<td>17 minutes</td>
<td>5</td>
</tr>
<tr>
<td>Waipahu, Engine 12</td>
<td>21.0 miles</td>
<td>40 minutes</td>
<td>6</td>
</tr>
</tbody>
</table>

Two engines and one ladder is the standard dispatch for all reported structure fires outside the Waikiki and metropolitan areas.
Current Insurance Service Office (ISO) guidelines recommend a standard response distance of not more than four miles for engine and ladder companies, and a ladder company may not be required where there are less than five buildings of three or more stories. A response time of three to five minutes is acceptable.

**Anticipated Impacts and Mitigative Measures**

The Fire Department has stated that the existing fire protection is considered inadequate for the proposed project in regards to distance and response time, and has requested a minimum of 25,000 square feet be set aside for a jointly funded (public-private) fire station, housing a minimum of one engine and 15 personnel. The applicant is willing to look into this matter.

As part of the proposed potable water transmission system throughout the project area, lines with adequate fire flow capacity and fire hydrants will be installed by the applicant within the proposed roadways. The locations of fire hydrants will be reviewed by the Board of Water Supply and the Fire Department when construction plans are submitted for approval.

10. **Police Protection**

The City and County of Honolulu Police Department divides the island of Oahu into four districts as follows:

<table>
<thead>
<tr>
<th>District #</th>
<th>General Areas Included</th>
<th>Headquarters Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>East Honolulu and Primary Urban Center up to Nuuanu</td>
<td>Honolulu</td>
</tr>
<tr>
<td>2</td>
<td>Milliken, Wahiawa, and North Shore up to Waimanalo Bay</td>
<td>Wahiawa</td>
</tr>
<tr>
<td>3</td>
<td>Red Hill, Pearl City, Waipahu, Ewa and Waimanalo</td>
<td>Pearl City</td>
</tr>
<tr>
<td>4</td>
<td>Waimanalo to Kahuku</td>
<td>Kaneohe</td>
</tr>
<tr>
<td>5</td>
<td>Nuuanu to Airport area</td>
<td>Kalihi Valley</td>
</tr>
</tbody>
</table>
In one of the three beats along the North Shore, Hokulea is in Beat 227 of District 2 which ranges from Kaena Point to the Wai'alea Long Bridge. Other North Shore areas provided police protection by the Wahiawa headquarters extend from Long Bridge to Anahulu Bridge (Beat 228) to Waimanalo (Beat 229).

A main station, the Wahiawa Police Station, is staffed by a major, a captain, 3 watch commanders (lieutenants), and 3 sergeants. Three shifts, or watches, operate from this station. Each shift has about 20 people, including 1 watch commander and 3 sergeants (Personal interview with Major John Gerard, May 29, 1986).

The Wahiawa District had the lowest overall number of major crimes reported during 1984, accounting for 7 percent of the total Islandwide number reported (City and County of Honolulu Police Department, 1985).

The Kahuku Police Substation, which is under the Kauai Police Station, recently became operational. The Police Department currently has long range plans to establish this as a main station, although implementation of this plan depends on funding. When this change occurs, the entire North Shore, including the project area, will be included in the Kahuku District (Personal communication with Carol Sodesten, City and County of Honolulu Police Department, May 23, 1986).

Proposed Action

The proposed project will introduce a de facto population of 4,680 people within the project site.

Anticipated Impacts and Mitigative Measures

The proposed project will generate occasional, unavoidable demand for police services. While specific crimes related to rural resorts have not been fully addressed in interviews with police personnel nor studied in detail, the following are observations raised by police personnel and other community informants for consideration:

1. Construction related crime generated by the project would probably be typical of other construction sites. These mostly pertain to the theft of construction material, which occasionally occurs on the North Shore now.
2. The only resort in the vicinity of the North Shore is the Turtle Bay Hilton and Country Club in Kahuku. Currently, this resort does not seem to generate unique resort related crime.

3. The most frequent tourist-related crime on the North Shore is theft of valuables from parked cars and beaches, particularly at scenic points, surfing spots, or congested areas. Many people pointed out, however, that these crimes do not stem from any kind of hostility towards tourists. Rather, tourists are easy victims because of the "vacation attitude" of being carefree about your belongings, coupled with the feeling that nothing bad happens in "paradise".

The project area itself and the Mokuleia region do not currently have major crime problems. Crimes in the region reported to police generally are due to the area's relative isolation and include marijuana growing, illegal firearms practice and speeding.

The proposed project would, in effect, reduce the area's current isolation. While increased population generally means a higher number of crimes, this increase may also change the nature of crimes.

4. Other police-related concerns included evacuation management, in the event of tsunamis and other disasters, and the likelihood that the residential component of the project may generate crimes typical of residential subdivisions, such as burglaries and automobile-related crimes.

The proposed establishment of the Kahuku Substation as a full Police Station will not automatically increase police services. The delivery of police services is based on a sufficiency of personnel and other resources. If an increase in population were to occur in a particular area, police services would not increase without an increase in the total authorized police manpower.

The applicant will be taking other measures towards providing on-site security. Buildings and other facilities within the project site will be designed with adequate attention to the principles of general health and safety. In addition, private security services will be provided within the resort facilities and mountain access will be controlled to manage access and security.
11. Schools

Existing Conditions

The public schools nearest to the project area are Waialua Elementary School (grades Kindergarten through six) and Waialua High and Intermediate School (grades seven through twelve).

Waialua Elementary School, located adjacent to the Waialua Recreation Center, currently operates self-contained classrooms, where students generally remain in one classroom throughout the school day. Waialua High and Intermediate, located at the junction near Mokuleia, makes heavy use of portables to accommodate increasing enrollments. Current enrollment at the latter facility is 1,145 students (Personal communication with Gervacio Buenconsejo, June 2, 1986).

Both elementary and secondary schools are currently operating at capacity.

Proposed Action

The proposed project includes a residential component of 700 single family units. In addition, 1,200 resort condominiums may ultimately have some residential characteristics.

Anticipated Impacts and Mitigative Measures

Based on preliminary project information, it is estimated that the residential component of the project will generate 40 to 80 elementary school-aged children and 30 to 100 students in grades seven through twelve (State of Hawaii Department of Education letter dated June 27, 1986).

It is noted that the types of housing units are a major determinant in enrollment projections. While it is anticipated that the proposed housing will be market rate units, no price ranges nor desired markets were provided to the Department of Education personnel. The projected enrollment may therefore be modified to accommodate specific market ranges. When this occurs, specific facility accommodations can be better projected. The applicant will maintain communications with the Department of Education in order to ensure that necessary levels of staffing and classrooms will be available at the affected schools.
12. Health Care Facilities

Existing Conditions

The project area is in proximity to two acute care hospitals. Wahiawa General Hospital is located in Central Oahu. This 69-bed acute care hospital contains 50 medical/surgical beds, 5 critical care beds and 14 obstetric beds. As with other hospitals located outside of Honolulu, Wahiawa General Hospital experiences low occupancy. In 1985, an average of 67.3 percent of the hospital beds were occupied (State Health Planning and Development Agency, State Department of Health, 1986).

Kahuku Community Hospital is located on the North Shore. This hospital contains 11 beds, 6 of which are medical/surgical; 2, critical care; and 3, obstetric. Kahuku's 1985 occupancy rate was 47.7 percent (State Health Planning and Development Agency, State Department of Health, 1986). Because of the North Shore's relative isolation from major medical service, Kahuku maintains a helipad for medical evacuation helicopters furnished by the Medical Assistance to Safety in Traffic (MAST) program based at Wheeler Air Force Base.

Proposed Action

The proposed action will introduce a de facto population of 4,680 within the project site.

Anticipated Impacts and Mitigative Measures

There will be an occasional and unavoidable demand for emergency services for the future population of the project site. In the event that neither hospital is able to meet major emergency needs, patients can be flown by MAST to Honolulu.

Because the existing acute care hospitals are currently experiencing low occupancy rates, it is not expected that the proposed project will cause undue strain to either of these hospitals.

It is anticipated that the private and public health care network would develop according to the needs of the population and that these facilities would expand if necessary. It is also noted, however, that historically, rural and suburban residents often tend to utilize hospitals located in metropolitan Honolulu for
their hospital needs, even though they may live a short distance from a rural/suburban hospital. This trend accounts for the relatively low occupancy rates of the out-of-Honolulu hospitals. Unless Wahiawa General and Kahuku Community Hospitals greatly expand their facilities, it is expected that the project residents will continue this trend.
PART V

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS
WHICH CANNOT BE AVOIDED AND MITIGATING MEASURES

A. AGRICULTURE

Adverse Effect

The redesignation and rezoning of approximately 1,000 acres of agricultural land from agricultural to resort, residential and other uses, will result in lost agricultural land.

Mitigating Measure

Ranching operations conducted by the applicant are not profitable but allow the owner to maintain the appearance and security of the property. An alternative use will be of economic benefit to the owner.

The agricultural impact analysis which is appended to the EIS indicates that there is no adverse impact to the State of Hawaii or City and County of Honolulu agricultural productivity because of the large pool of agricultural lands made available due to reductions in sugar and pineapple acreage and the lack of profitable alternative crops. Therefore no mitigating measures are necessary.

B. NOISE (Construction)

Adverse Effect

Construction activities at the site will generate noise.

Mitigating Measures

The State Department of Health (DOH) Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu, specifies maximum allowable levels of noise for each use zone contained in the City and County of Honolulu's Comprehensive Zoning Ordinance. Construction activities which exceed the noise limitations of DOH rules require a permit from the DOH. Traffic noise from heavy vehicles traveling to and from the construction site will comply with Vehicular Noise Control of Oahu enforced by DOH.

C. NOISE (Aircraft)

Adverse Impact

Portions of the proposed resort development will be subject to $L_{dn}$ in excess of 60 dB during sporadic military training exercises conducted at Dillingham Field.
Mitigating Measure

Restrict resort/residential development within 60 fn and greater areas unless special noise mitigation features are incorporated into structures. In the 55-60 fn noise impact areas, a disclosure will be made to advise developers and tenants that the areas are subjected to noise from aircraft activity.

D. TRAFFIC

Short Run Adverse Impact

Construction activities may disrupt traffic temporarily when construction activities are conducted in or near roadways.

Mitigating Measures

Contractors will observe State and County ordinances dealing with work conducted on or near roadways.

Long Run Adverse Impact

Traffic will increase due to the establishment of visitor facilities and the new residential development being proposed.

Mitigating Measures

Parsons, Brinckerhoff, Quade & Douglas, traffic engineers, prepared a traffic impact analysis for the proposed Mokuleia Development and found that existing roadways are adequate to handle the traffic generated by the proposed development with certain improvements. The applicant will follow the recommendations of the traffic study. The applicant will work with the State Department of Transportation and the City Department of Transportation services in order to coordinate the implementation of the recommendations.

E. WATER CONSUMPTION

Adverse Impact

The proposed Mokuleia Development will require approximately 2.0 million gallons of potable water per day. In addition, the development will require approximately 1.5 to 2.0 million gallons per day of irrigation water.

Mitigating Measures

The Mokuleia Aquifer is a sub-zone of the Waialua Water Control area controlled by the Board of Land and natural resources. Studies indicated that the Mokuleia Area has an abundance of water and a sustainable yield of 20 million gallons per day. Less than 40% of
that yield is in use today. Use of additional water at the Mokuleia Development will provide economic benefits to the North Shore area without causing any water shortage.

F. LIFESTYLE CHANGES

Adverse Impact

The social impact assessment identifies concerns about changes in lifestyle which might be prompted by the proposed development.

Mitigating Measures

The social impact assessment indicates that lifestyle and perceived lifestyle changes are subjective in nature. In addition that different individuals may be impacted differently or perceive the impacts as different. For example, an unemployed person or person facing an uncertain employment future in a struggling industry or a person that commutes over an hour each way to work may welcome the availability of jobs generated at the proposed project. On the other hand, a person who has sought out the rural lifestyle on the North Shore knowing the drawbacks may not be happy about the prospect of further development in the North Shore area although new jobs or economic growth will occur.

The applicant has made a conscious effort to keep the lines of communication open with the community in order to discover the community concerns. The applicant will continue this communication through the planning period and beyond. The communication program will allow the applicant to continue to identify and attempt to mitigate the concerns of the community.

G. INCREASED NEED FOR UTILITY SERVICES

Adverse Impact

Additional demand will be placed on the utility companies to serve the new project.

Mitigating Measures

The applicant has been in contact with the Telephone and Electric Companies to advise them of the proposed project. Both companies indicate that current facilities in the area are inadequate to serve the proposed development. However, both companies indicate that the services can be upgraded in the development time frame outlined for the project. The applicant will pay for improvements to the system as required by the utility companies. The companies will be kept informed of the development's progress. The applicant's consultants will continue to coordinate plans with the utility companies.
H. INCREASED NEED FOR PUBLIC SERVICES

Adverse Impact

The need for public services such as police, fire, schools, parks and recreational facilities will increase due to the increase in visitor and resident population generated by the project.

Mitigating Measure

As indicated in the impact on State and local finances, the proposed development will generate $2 in revenue for every $1 in additional expenditure required. In addition the developer will comply with County ordinances which require dedication of land for parks.

I. SEWAGE AND SOLID WASTE

Adverse Impact

Additional population will generate increased sewage for treatment and increased solid waste for disposal.

Mitigating Measures

The applicant will provide treatment facilities for the proposed development or will participate with the County in the development of the Mokuleia STP so that the facility is adequate to serve the proposed development. Operations of sewage treatment plants have traditionally been paid through user fees or subsidized by tax revenues. Solid waste disposal for commercial development in Honolulu is provided by private enterprise and presumably the costs are covered by the fees paid. Residential solid waste disposal is generally provided by the County. Given the revenue/expenditure ratio of the proposed development is a minimum of two to one the development will pay more than its fair share for these services.

J. WETLANDS

Adverse Impact

Increased human activity may impact ecosystem supporting endangered waterbirds.

Mitigation Measures

Work with division of Fish & Wildlife and Dept. of Land and Natural Resources to develop program to minimize human impact. Measures may include setbacks, landscaping and fencing.
PART VI

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS
OF RESOURCES AND THE RELATIONSHIP BETWEEN LOCAL
SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE
MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Construction and operation of the proposed recreational resort development at Mokuleia will result in the irretrievable commitment of resources. During the construction phase labor, land, building materials and capital will be committed to the development of the project. Once committed labor is irretrievable, and building materials may have some salvage value but it is likely to be small. Capital committed to the project cannot be used for other projects and the land, once improved with infrastructure and buildings, is likely to remain committed to the designated use during the economic life of those improvements.

Ongoing operation of the development as a resort recreational community will result in the long term commitment of land with agricultural potential to resort, recreational, residential and commercial uses. This loss of agricultural land is not expected to have a negative impact on the agricultural production or potential production of the State of Hawaii or the City and County of Honolulu because of the large amounts of agricultural land that has been released and is forecasted to be released from sugar and pineapple operations.

Water consumption will be increased with the proposed development; however, the Mokuleia aquifer from which water will be supplied is in surplus and there are no known proposals which would alter this situation. Currently excess water from the Mokuleia aquifer is discharged into the ocean unused. Operation of the development will require the long term commitment of labor to provide the services and maintenance necessary for the proper functioning of the development.

In the long run assuming a successful enterprise the capital committed to the development of the project will be paid back and can then be used for alternative uses. A successful economic venture may in fact lead to capital creation which in the long run would provide an increase in the capital available for investment.
The proposed Mokuleia development will result in a change in land use which will involve environmental trade-offs.

In the short run, development of the proposed project will result in the reduction of lands available for agricultural use and a number of negative environmental impacts necessitated by construction activities including construction noise, dust and traffic impacts. These same construction activities will contribute to the economic well being of the local construction industry including contractors, construction workers, and material suppliers. The increased economic activity will contribute to the well being of the State and County economies.

The major long-term benefit of the proposed project is the creation of an economic asset which will provide long-term job opportunities and an expansion of Hawaii's major export industry. Beneficiaries of the positive economic impact will be hotel employees, hotel operators, other tourist businesses, the land owner, and State and local tax revenues. Negative impacts are outlined in Section V, Adverse and Unavoidable Effects.

The proposed project poses no long-term risks to health and safety.

Development of the project will result in the foreclosure of alternative uses for the land during the economic life of the project.
PART VII

UNRESOLVED ISSUES

Environmental Impact Statements (EIS's) typically make preliminary suggestions for mitigations. Actual requirements, however, are imposed through the political and regulatory process, which may involve negotiations between government decision makers and private landowners or developers.

Public input during the EIS and/or subsequent hearing process can affect the outcome of these negotiations. In recent years, some requirements have been made on a standardized basis. For example, for projects containing residential units, an "inclusionary zoning" requirement of ten percent for low-to-moderate income units is often executed. These types of mitigation requirements are sometimes unrelated to EIS impact findings or mitigation recommendations.

At the City level, "unilateral conditions", or one-sided voluntary agreements by the project proponent, have normally been attached not to Development Plan approvals but to final zoning approvals. Presumably the latter stage is the point in time closest to project implementation and thus the best time for government decision makers to assess true needs. Also, zoning is a more detailed level for government control than Development Plan approvals—hence, the more appropriate level for imposing conditions.

Because there have been questions about the legality and equity of unilateral conditions, the City and County of Honolulu is now considering several new measures which would revise the present system:

1. "Development Agreements", a bilateral agreement process which would vest rights to develop at an early stage in return for firm detailed commitments by the developer to provide socio-economic and other mitigation measures; and

2. A "Community Benefit Assessment" (CBA) ordinance, which would set the total dollar amount for such mitigations according to formulas which consider such factors as location, extent of up-zoning, etc. The current CBA concept would rely on the EIS to recommend priorities for allocating assessed dollars (or other in-kind measures) among the various potential mitigation measures.
As of this writing, it is uncertain whether either of these measures will actually be adopted or, if so, in what exact form.

It should also be noted that the development plan process is only one of many processes that the applicant will have to follow and receive approval prior to development of the project. Each process focuses on different issues and requires different levels of details for evaluation. Below is a summary of major processes required, actions on which are taken separately:

(1) GENERAL PLAN

The General Plan is a STATEMENT OF LONG RANGE social, economic, environmental and design objectives and policies for the general welfare and prosperity of the people of Oahu. IT IS NOT A LAND USE PLAN for the development of specific parcels of land.

Issue: Should the General Plan Resort Policies be amended to add the AREA OF MOKULEIA as a SECONDARY RESORT AREA.

Scope: Limited to the following areas:

Need for additional resort areas.

What are the alternatives for meeting this need?

Suitability of the Mokuleia Area as a Secondary Resort Area compared to the alternatives.

Contribution to the general welfare and prosperity.

Consistency with the Hawaii State Plan.

2. DEVELOPMENT PLAN

Development Plans are relatively detailed guidelines for the physical development of the Island. IT IS A LAND USE PLAN that shows the type of land use for EVERY PARCEL OF LAND on Oahu. It also includes statements of standards, principles and controls for the various land use categories. IT IS NOT, HOWEVER, A ZONING ORDINANCE. Amendments to the Development Plans are PROJECT SPECIFIC for a SPECIFIC PARCEL OF LAND.
Issue: Should the North Shore Development Plan be amended to reflect a RECREATIONAL RESORT COMMUNITY on lands owned by Mokuleia Land Company that includes:

- 313 acres for Resort (3,300 units)
- 331 acres for Residential (700 units)
- 342 acres for Golf Course (36 holes)
- 33 acres for Commercial

Scope: Areas of review include:

- Consistency with the General Plan Objectives and Policies.
- Consistency with the provisions of the North Shore Development Plan.
- Review of Project concept/land use patterns.
- Review of Project impacts and mitigating measures.

3. STATE LAND USE CLASSIFICATION

The State of Hawaii has classified lands on Oahu into three (3) categories: (1) Conservation, (2) Agriculture, (3) Urban.

Issue: Should the lands proposed for development by Mokuleia Land Company be reclassified from Conservation/Agriculture to Urban.

Scope: Areas of review include:

- Project scope, concept, and need.
- Review of project impacts on environment, resources, and services in the area.
- Conformity with Hawaii State Plan/Functional Plans/Coastal Zone Management.
- Consistency with Honolulu's General Plan/Development Plan.

4. ZONING

Zoning consists of an ORDINANCE and a MAP. The ORDINANCE sets specific DEVELOPMENT and DESIGN standards for the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for Agriculture, Industry, Business, Resort, and Residences. The ZONING MAP places all property into various ZONING DISTRICTS.
Issue: Should the land proposed by Mokuleia Land Company for development be rezoned to:

- Residential
- Commercial
- Resort

Scope: Areas of review include:

- Consistency with General Plan/Development Plan/State Land Use Classification.
- Project details including density, floor space, bulk, heights, type of activities, parking, circulation and accessways, open space, etc.
- Social impact assessment.
- Unilateral agreement provisions.

5. SHORELINE MANAGEMENT PERMIT

A Shoreline Management Permit (SMP) is required for any development within the Shoreline Management Area (SMA) boundaries established by the City Council.

Issue: Property makai of Farrington Highway is in the Shoreline Management Area and will require the issuance of a Shoreline Management Permit.

Scope: Areas of review include:

- Provisions for adequate access to beach areas.
- Provisions for solid and liquid waste treatment, disposition, and management.
- Impact of wildlife preserves/recreation areas.
- Impact on scenic amenities/coastal views.
- Impact on water resources/protection from flood and tsunami hazards.
Impact on soil conditions/vegetation/shoreline processes.

Impact on historical/archaeological resources.

Consistency with General Plan/Development Plan/Coastal Zone Management Program.

The issues listed below are areas that will probably require continuing discussion and assessment during the above described processes, including the process of Legislative approvals, in order to arrive at the most appropriate method of mitigation.

1. **Wetlands**

The applicant has indicated support of the Hawaiian Waterbird Recovery Plan and its intention to continue to provide suitable habitats after development of the project. Information provided within the EIS indicates that areas currently being used by endangered birds were created accidentally as the result of mining operations within the past ten years and are not part of the area's natural or historic ecosystem. The applicant's biological consultant and various agencies have suggested a number of alternative mitigation measures which could be adopted to preserve and improve the current habitats. The applicant believes that it is inappropriate at the development plan level of planning to commit to a specific habitat preservation and improvement program when the most viable mitigation measures are not readily apparent. The applicant has committed to work with the Department of Interior, Division of Fish and Wildlife and the Department of Land and Natural Resources in order to achieve an acceptable resolution to this issue. None of the information received during the EIS process indicated that proposed development and use of the site as a waterbird habitat were mutually exclusive.

2. **Parks, Ocean and Mountain Access**

The EIS discusses park, ocean and mountain access with an expanded discussion of recreational needs as provided in the State's SCORP report. The applicant has indicated that "private" recreational amenities will be an integral part of the proposed development plan. The applicant has recognized the need for additional park areas as well as mountain and ocean access which are required by law. In addition to the legal requirements the applicant recognizes the
political process inherent in the approval process and believes that specific park and access programs are best achieved within the framework of that process.

3. Housing (low, moderate and employee)

The EIS discusses a number of alternative methods by which housing requirements imposed on developers have been met. The most recent communication from the city's Department of Housing and Community development indicates that the city's policy is currently under review. In the past the issue of low moderate housing has been addressed at the time of a Boundary Amendment and at the time of a request for change in zoning. The applicant recognizes that there will be a requirement and that there are a number of alternatives for meeting that requirement however cannot know what public policy will be at the time that approvals will be granted (and presumably what low moderate or other housing requirements will be imposed.)

4. Sewage Treatment Plant

The applicant has proposed two alternatives for handling the sewage generated by the proposed development: participation in the City’s proposed regional plant for the area or development for dedication to the city of a WWTP to serve the development.

At the present time it is not possible to determine if participation in the city's proposed system is feasible because of the uncertainty of the timing of both the city system and the proposed development.

The department of public works has proposed that the developer built plant be built on the site of the proposed city plant as an alternative to two plants in two separate locations. The applicant will study this option.

The applicant's first preference is to participate in the City's proposed regional plant however a final commitment cannot be made until a number of aspects of that participation can be more definitely determined including the following: locations of the city plant, cost of participating in the development, timing of the city plant, funding of the city portion of the plant, and special engineering considerations.

The applicant believes that two viable options for providing for the sewage needs of the proposed project have been discussed and that the technology and public approval processes are sufficiently developed so
that the sewage of the project could be handled in an effective and environmentally sound manner under either alternative.

5. Dillingham Field

Based on information received by the applicant there appears to be some confusion as to the impact of aircraft operations at Dillingham Field on the proposed development. A study of noise impacts commissioned by the applicant indicated that the proposed development could be developed based on current noise standards. Both the FAA and the State Department of Transportation indicated no objections assuming that recommended noise limits and disclosure were made to potential developers and residents. Neither the FAA or the Department of Transportation (Operator of the Field under long term lease from the Military) indicated any safety concerns in their comments or in subsequent conversations with the applicant.

A 1979 study of the Dillingham Airfield indicated an AICUZ covering portions of the proposed development, however an April 6, 1987 communication from Director of Facilities Engineering provides a March 6, 1984 letter recommending that an ICUZ be established for Dillingham Field. Verbal communications indicated that the recommendation had not been acted upon.

Safety Zones for Dillingham field have not been established by the Military although Planning Criteria established in 1981 and provided by the military indicate a methodology for their determination. The letter from Director Facilities Engineering indicated that the field is under civilian control and that the civil authorities should be contacted. Telephone contact indicated no safety concerns.

Clarification of the situation will require further communication with military commands in Hawaii to obtain a clear military position. This communication will be initiated by the applicant and additional studies undertaken if deemed necessary.
PART VIII

ALTERNATIVES TO THE PROPOSED ACTION

The purpose of this section is to develop, describe, and weigh alternatives to the proposed action which can involve significant trade-offs among the uses of environmental resources.

For the purpose of this EIS four (4) alternatives have been considered. None of the alternatives are considered economically feasible.

A. No Action

This alternative would result in no action being implemented. The impact of this alternative would be that the project site would remain, at best, essentially as it is today. However, because current operations on the site have been unprofitable, it is very likely that the ranching activities would be reduced, and perhaps totally eliminated. Further, other activities like the equestrian uses will probably have to be terminated for the same reason. This alternative would suggest that the owner of the land reassess the compatibility of this investment within its investment portfolio.

Among the alternatives to be considered would be to continue to hold the property in its current state for future development, selling the property to another investor in total or selling portions of the property to a variety of investors. The property is currently subdivided into a number of saleable parcels. Additionally, the owner could consider some other development option for the property; however, none of the other alternative developments appear feasible.

None of the adverse environmental effects which would result from the development of the property as proposed would occur; however, none of the positive impacts would be achieved either, including infrastructure improvements, provisions for mountain and beach accesses, added recreational opportunities, creation of jobs and the long-term economic benefits to the area and the residents.

Should the property be sold off in pieces the opportunity to master plan one of the last large oceanfront to mountain properties on Oahu would be lost.

B. Agricultural Development

While the site does possess lands with agricultural potential for more intensive use, the pool of agricultural land which has been released from sugar and pineapple cultivation has continued to increase in the recent past and is expected to increase in the future statewide and on
Oahu. This pool of land continues to await the development of profitable export crops.

This alternative would not be economically feasible to implement.

C. Residential Development

Residential development on a large scale is another option considered but rejected as being impractical, both from a marketing standpoint and in terms of its impact on public services and facilities in the area. Also, it would not provide long-term employment benefits.

Mokuleia is not an area to encourage major residential growth, where residents would have to travel great distances to their place of employment. The environmental impacts, especially on public services and facilities such as schools and transportation, will be more severe than the proposed action. In addition, State and County revenue/expenditure ratio can be expected to decline when compared to a resort project with employment and economic activities.

D. Recreational

The North Shore of Oahu is an area which has a number of recreational amenities which are heavily used by the general public. These include numerous surfing beaches as well as the numerous beach parks. The North Shore also contains a number of private recreational facilities including the Boy Scout Camp at Pupukea and the YMCA facilities at Camp Erdman. The State of Hawaii has for many years been acquiring lands in the Kaena Point area for the proposed Kaena Point State Park, a large regional park which will eventually provide a wide array of recreational activities to the general public.

The Mokuleia site has the potential for providing excellent recreational opportunities. The land owner has reviewed the recreational potential of the property including golf, equestrian activities, polo, hiking, camping, and others, and has determined that none of the activities alone or in combination would be economically viable.

The existence of the proposed Kaena Point Regional Park Plan located less than two miles west of the proposed Mokuleia Development and the existing Mokuleia Beach Park between two of the existing Mokuleia Development Parcels raises questions as to the need for additional public facilities in the area. This, combined with the increasing demand for limited public funds, makes the possibility of acquisition by a State or local government remote.

Thus the lack of economic viability for a private developer and the lack of funds and the existence of other planned projects in the area make the acquisition and development of the Mokuleia site by government remote.
E. Alternative Site Designs

The current proposal for the Hokuleia development has been developed based on recommendations from architects, engineers and other professionals as well as input from government agencies and community groups in the Hokuleia area. The current proposal was developed to provide for the greatest number of positive impacts and the least number of negative impacts. Implications of intensifying or reducing the major uses of the property are discussed below:

<table>
<thead>
<tr>
<th>Resort Use</th>
<th>Positive Impacts</th>
<th>Negative Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased:</td>
<td>Potential increased economic activity</td>
<td>Increased density of development less in character with the area.</td>
</tr>
<tr>
<td></td>
<td>Increase in jobs created both in construction and in permanent jobs.</td>
<td>Increased impact on traffic, air quality, and community lifestyle.</td>
</tr>
<tr>
<td></td>
<td>Increased economic viability of the development.</td>
<td></td>
</tr>
<tr>
<td>Decreased:</td>
<td>Less density, more in character with the area.</td>
<td>Less potential economic activity and potential for fewer jobs created.</td>
</tr>
<tr>
<td></td>
<td>Reduced impact on traffic and air quality and on community lifestyle.</td>
<td>May inhibit economic viability of development even with increases in other alternatives such as housing at the expense of recreational and open space uses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced economic viability of the development.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Housing Use</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased:</td>
<td>Provided additional housing units.</td>
<td>Increases residential population above those permitted in the North Shore Development Plan.</td>
</tr>
<tr>
<td></td>
<td>Increased economic viability of the development. However, demand questionable for large scale housing project.</td>
<td>Increased traffic congestion and decreased air quality.</td>
</tr>
<tr>
<td>Decreased:</td>
<td>Reduced traffic and improved air quality.</td>
<td>Decreased economic viability of the development.</td>
</tr>
</tbody>
</table>
Recreation Use                       Positive Impacts                       Negative Impacts
Increased: Additional availability of recreational opportunities in the area. May increase the density of other development to maintain economic viability.

Decreased: Permits greater use of land for uses with higher economic value. Reduced economic viability of the development.
Increased economic viability of the development. Decreases recreational opportunities.

At the present time the Mokuleia Development Proposal is in the preliminary design phase. It is very likely that with further agency and public input that alterations will be made in the development concept. These alterations will be made within the constraints of economic viability, government planning guidelines and community desires. Each alteration will have to be considered individually and collectively to assure that the final plan is acceptable to all parties.
PART IX

THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE POLICIES AND CONTROLS FOR THE AFFECTED AREAS

A. HAWAII STATE PLAN

The proposed Mokuleia development would be consistent with the following objectives and policies of the Hawaii State Plan, as stated in Chapter 226 of the Hawaii Revised Statutes:

Objective and policies for population (Section 5)

(b)(3) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.

Comment: The proposed project will provide a wider range of employment and business opportunities to the Waialua community. It will provide more choices of lifestyle and jobs for this community, particularly for the young people who grew up in the area and want to remain in their hometown.

Additionally, the project may eventually help provide more incentive to the nearby students to seek more education, in order to qualify for the higher-paying managerial jobs.

Objectives and policies for the economy in general (Section 6)

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

(b)(8) Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.

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

(b)(13) Encourage businesses that have favorable financial multiplier effects within Hawaii's economy.
Comment: The proposed project will provide the North Shore with employment and business opportunities. In 1985, the North Shore had 5.1 percent unemployment. The proposed project will generate an estimated 4,890 direct, indirect and induced jobs on Oahu.

These jobs would increase the range of employment choices within a reasonable traveling distance for residents along the North Shore, particularly those in Waialua.

The primary single source of employment is the sugar mill, which provided 3,000 jobs at its peak and currently employs about 460. This project would, in effect, create an alternative employment base.

While the exact breakdown in job choices cannot be determined at this time, the State Tourism Manpower Simulation Model provides a preliminary basis for estimating the type of jobs which might be generated by the proposed Mokuleia development (State of Hawaii, Department of Planning and Economic Development, 1978). Estimated percent distribution by industry and occupation of direct, indirect and induced employment generated by the proposed expansion is as follows: 31 percent of all jobs could potentially be in eating and drinking establishments; 28 percent, in resort and hotel facilities; 22 percent in transportation related sectors; 14 percent in the service sectors; and 5 percent in the retail areas.

Also expected to result from the project is the expansion of business opportunities, particularly in Haleiwa. Commercial developments in this town have been gradually changing to appeal more to the visitor market.

Objectives and Policies for the economy — visitor industry (Section 8)

(b)(3) Improve the quality of existing visitor destination areas.

(b)(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.

(b)(7) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.

(b)(9) Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawaii's cultures and values.
Comment: Waikiki is virtually Oahu's only community which offers a full range of resort facilities. Currently, the area is intensely developed. It is unrealistic to expect Waikiki to undergo major physical changes which will either accommodate increasing lodging demands or provide an alternative to high density resort.

While Waikiki continues to be the "symbol" of Hawaii for many visitors, there is a growing need to provide alternate resort settings which, unlike the high-rise nature of the origin of many visitors, emphasizes the beauty of the island's natural resources. While such alternative settings will be provided to some extent by the proposed expansion of the Kalima resort and the proposed West Beach development, this proposal will add another dimension by providing both mountain and beach recreational resources and accesses within one development. Such a setting will be conducive to fostering an appreciation of Hawaii's cultural relationship to the land.

Other factors which would attract hotel guests to Koko head include:

1. Unique location on Oahu
   - accessible to and from Waikiki, the Honolulu central business district and all areas of Oahu
   - oceanfront, rural environment

2. Range of recreational opportunities
   - onsite golf course, possible polo field, hiking trails, riding trails, camping grounds, tennis, ranch and sports center
   - beach activities including swimming, surfing, windsailing and boating

3. Range of entertainment and commercial services
   - entertainment at hotel facilities
   - variety of food and beverage services at hotel and commercial facilities

The proposed project would significantly contribute to the general welfare and prosperity of residents in the area by offering employment opportunities and encouraging business investments. An employment program for residents of all surrounding communities is another possibility that is being explored.
Objectives and Policies for the physical environment — land-based, shoreline, and marine resources (Section II)

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

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

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

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

Comment: Because the project area encompasses mountain and beach features, it allows for a wide range of both land-based and water-based activities. Land-based activities will be related to residential and resort uses, as well as outdoor recreation, such as golfing, tennis, equestrian-related activities, and camping and hiking. Water-based activities will be related to ocean recreation, such as swimming, diving, boating, and windsailing. These two groups, as well as their subgroups, will be ensured compatibility with each other through the use of physical design barriers, such as buffer zones, and through management practices.

The successful marketability and execution of both the land-based and water-based activities will depend, to a large extent, on the natural beauty of the area. Much of the natural resources and ecological systems will be protected through careful planning and the use of buffer areas between sensitive areas and high intensity uses.

A major physical characteristic of the project area is its topography. The site extends from relatively flat beach frontage to the dramatically steep Waianae Mountains.

The steepness of the mountain slopes does not permit extensive building and the applicant has excluded the 1,900 acres which fall into this category. Proposed uses for the remaining areas, which are relatively flat or gently sloping, will conform to the topography as appropriate.
While the shoreline provides access to the ocean, it is fronted to a large degree by private property which limits convenient ocean access. Mountain access is restricted also by continuous private property. The project will improve the region's overall public access to the resources of the mountains and the ocean.

The determination of the number of right-of-ways, as well as the amenities in conjunction with these accesses, will be based on discussions with the appropriate City and County agencies and with the community.

The natural drainage pattern is another physical characteristic which will be accommodated in the project. Portions of the low-lying area near Farrington Highway are subject to flooding. A preliminary mitigation measure being considered is a catchment pond system to accommodate runoff. It is anticipated that these water areas will be a major feature of the golf course and will provide for passive recreation activities.

Objectives and policies for the physical environment — scenic, natural beauty and historic resources (Section 12)

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

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

Comment: The proposed project will maintain the scenic views and aesthetic enjoyment of the ocean and the mountains through its proposed low density and recreation-oriented community. Additionally, the project will provide for more active enjoyment of these areas by providing access to the beach and the mountains. As stated earlier, mountain access will be controlled by some type of management to ensure preservation of the area and the safety of users.

A study of the site's historic and archaeological resources has been conducted by Archaeological Consultants of Hawaii, Inc. and their findings are presented in other parts of this EIS.

Objectives and policies for facility systems — water (Section 16)
(b)(4) Assist in improving the quality, efficiency, service and storage capabilities of water systems for domestic and agricultural use.

Comment: The proposed project will improve the existing water system in the area by replacing it with a new water system designed to meet the project's needs.

Objectives and policies for socio-cultural advancement — leisure
(Section 23)

(b)(2) Provide a wide range of activities and facilities to fulfill the recreation needs of all diverse and special groups effectively and efficiently.

(b)(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

Comment: This proposal is being designed around the passive and active recreation potentials of the site. The property mauka of Farrington Highway will offer recreational opportunities for a wide range of people and income levels. Currently envisioned are two 18-hole golf courses, tennis courts, polo fields and related equestrian activities, and mountain trails for hiking and camping.

The main recreational feature of the properties makai of Farrington Highway is the beach and the project will provide convenient public access to the shoreline. Users, including resort clientele and the general public, will have opportunities to sunbathe, swim, fish and gather seaweed and seashells.

Priority Guidelines

Priority Guidelines means those guidelines which shall take precedence when addressing areas of statewide concern. The proposal to amend the Development Plan to permit the proposed resort development at Mokuleia is most likely to impact on the Economic (Section 226-103), Population Growth and land resources and Affordable Housing (Section 226-106) of the priority guidelines.

While there are numerous priority guidelines dealing with State policy for every activity in the State, there are a number of priority guidelines which appear to deal directly with the proposal for a resort development at Mokuleia.
Economic (Section 226-103)

(a)(8) Provide public incentive 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 Hawaii's unique location and available physical and human resources.

(B) A clean industry that would have minimal adverse effect on Hawaii's environment.

(C) An industry that is willing to hire and train Hawaii's people to meet the industry's labor needs.

(D) An industry that would provide reasonable income and steady employment.

(b)(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.

Comment: Many of the existing hotel and destination resort developments on Oahu and the Neighbor Islands have met the criteria for desirable industries as discussed in Section 103(a)(8)(A)-(D). Planning and review is an important part of the City and County of Honolulu's Development Plan Process, ensuring participation by various government agencies and the public, thus encouraging the desired development. Additionally, the mandate of Guideline (b)(2) would also be encouraged by providing potential hotel and resort developers with an alternative location on the Island of Oahu.

Population Growth and Land Resources

(b)(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.

Comment: Approval of the proposed resort project at Mokuleia area will allow for the planning and review process of the State and County governments to evaluate land use proposals for the area.
Resort development on Oahu’s North Shore will provide for economic diversification of the area, particularly for the community of Waialua and within the moderate population growth scenario planned for the area. Existing state laws and county ordinances ensure increased public access to shoreline and mountain conservation areas.

Affordable Housing (Section 226-106)

Comment: While none of the seven priority guidelines of the affordable housing section appear to apply directly to the proposed Mokuleia resort development at Mokuleia, to the extent that jobs created in the area provide employment for people already living in the area who are unemployed or underemployed, the affordability of housing for those people will be enhanced. In addition, economic development in labor intensive activities such as resort development give developers and hotel operators a vested interest in assuring that their employees will be suitably housed. This has led to innovative housing and/or transportation alternatives in some jurisdictions.

In summary, amendment of the Development Plan to include a resort development at Mokuleia will be in consonance with a number of the goals stated in the priority guidelines of the Hawaii State Plan.

B. STATE FUNCTIONAL PLANS

The broad goals and objectives of the Hawaii State Plan are translated into detailed courses of action by the State Functional Plans. Ten of the 12 mandated Functional Plans were adopted by the Twelfth State Legislature in April 1984. The Agricultural and Educational Functional Plans were adopted by the Thirteenth Legislature in April 1985. This section identifies the relationship of the proposal to relevant State Functional Plan objectives.

State Agricultural Functional Plan

Objective B, Policy 4: Encourage productive agricultural use of the most suitable agricultural lands.

Comment: Most of the project area is currently designated Agriculture on the State Land Use Map and on the North Shore Development Plan. It is also zoned for agriculture.

A study conducted by Decision Analysts, Inc., examined the potential impact of this proposal on agriculture and aquaculture. It is further discussed in other sections of this EIS. This study has indicated
that it is extremely doubtful that the proposed development will affect adversely the statewide growth of diversified agriculture or aquaculture either immediately or over the long term.

One reason for this finding is that the acreage requirement for diversified agriculture or aquaculture activities that are agronomically suited for the Mokuleia area is relatively small. Less than 1,200 acres would be required to increase Hawaii's self-sufficiency in produce crops to a realistic level which can accommodate the growth of the de facto population to the year 2000. The study also explored various agricultural alternatives, and found that they either produce low returns per acre, were too experimental to guarantee a profitable return, had stiff competition from the mainland and/or a small local market, or were generally unsuitable for this land.

Another basis for the study's finding is that an enormous and growing supply of Hawaii's prime agricultural land has already been freed from sugar and pineapple production. Since 1970, over 42,000 acres of Hawaii's land have been freed from sugar production and over 39,000 acres from pineapple production. Some of this land has been or will be converted to urban, diversified agriculture and aquaculture uses. Some of the formerly pineapple land was converted for sugar production. Making allowances for the various conversions, uncommitted acreage which remains available to diversified agriculture and aquaculture amounts to many tens of thousands of acres, with a large share of this on Oahu. Further, the supply of fallow prime agricultural land probably will increase given the unfavorable outlook for sugar prices. In fact, some unprofitable mills remain in operation temporarily only because of lease and/or energy agreements.

Many of the lands freed or to be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for crop and aquaculture production. Most of these lands already have available water and some additional land has been made available to diversified agriculture in government-sponsored agricultural parks throughout the State.

**State Housing Functional Plan**

**Objective A, Policy 3:** Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

**Objective B:** Assist the orderly development of residential areas sensitive to community needs and other land uses.
Objective B, Policy 1: Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, employment and other concerns of existing communities and surrounding areas.

Comment: The proposed project includes 700 single family and/or attached residential units. The market assessment performed by John Child and Company (June 1986) suggests that the residential component include community lots (less than one acre in a planned resort community) and acreage lots (one acre or more generally found in rural areas). Also possible would be attached and planned unit developments. These projects would increase the housing choices on Oahu through its introduction of residential units and lots in planned recreational communities.

The general location of the proposed residential units is the gently sloping area at the foot of the mountains. While this location offers panoramic views of the coastline, it is also buffered from the more intensely used recreation and resort areas to be located near Farrington Highway, thus affording privacy as well.

All components of the recreational community, including residential uses, will be subject to community input and public agency requirements. Affordable housing requirements will be discussed with the appropriate agencies and to ensure that community issues and concerns are addressed, extensive dialogue with the community is underway.

State Recreation Functional Plan

Objective A, Policy 2: Ensure that intended uses for a site respect community values and are compatible with the area's physical resources and recreation potential.

Objective A, Policy 3: Emphasize the scenic and open space qualities of physical resources and recreation areas.

Objective C, Policy 1: Maintain an adequate supply of recreation facilities and programs which fulfill the needs of all recreation groups.

Objective D: Assure the provision of adequate public access to lands and waters with public recreation value.

Objective E, Policy 3: Coordinate visitor and resident recreation interests to achieve compatible recreation usage.
Comment: This proposal is being designed around the passive and active recreation potentials of the site.

The property mauka of Farrington Highway will offer recreational opportunities for a wide range of interests while maintaining the open space quality. Currently envisioned are two 18-hole golf courses, which will, in effect, become permanent open space. Other recreational areas currently anticipated are tennis courts, polo fields and related equestrian activities, and mountain trails for hiking and camping.

The main recreational feature of the properties makai of Farrington Highway is the beach and the project will provide convenient public access to the shoreline. Users, including resort clientele and the general public, will have opportunities to sunbathe, swim, fish and gather seaweed and seashells.

State Tourism Functional Plan

Objective B, Policy 3: Encourage greater cooperation between the public and private sectors in developing and maintaining well-designed and adequately serviced visitor industry and related developments.

Objective B, Policy 4: Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities.

Objective C: Enhancement of career and employment opportunities in the visitor industry.

Objective C, Policy 2: Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.

Objective D: Development of better relations and mutual awareness and sensitivity between the visitor industry and the community.

Comment: The current planning effort of this project will produce a comprehensive blueprint of what will happen on the property in the next twenty years. This blueprint will help ensure that all of the uses are compatible with each other, will help the community form predictable expectations, and will give some indication of the timing and requirements of public facilities and services.
The project planning includes consideration of social, visual, and environmental factors, including employment, job training, recreational needs, scenic enhancement, shoreline protection, and provisions for adequate services and facilities. Planning for the project is also taking into consideration community concerns and needs. Extensive public awareness and participation in the project is being encouraged to help ensure that community needs are met and that all of the uses are compatible with each other.

C. GENERAL PLAN FOR THE CITY AND COUNTY OF HONOLULU

The General Plan is the City and County commitment to the desirable and attainable future of Honolulu. This section discusses how this project conforms to and implements the General Plan.

Objectives and Policies for Population

Objective B, Policy 2: Provide adequate support facilities to accommodate future growth in the number of visitors to Oahu.

Comment: Based on the anticipated supply and demand relationships for visitor units on Oahu, the visitor industry could be expected to require about 18,900 to 22,700 additional rooms by 2005 (John Child and Company, June 1986). Already intensely developed, Waikiki cannot be expected to accommodate these projected needs, even though it will continue to dominate Oahu's visitor accommodation industry. The proposed project will help the island's visitor industry by further accommodating the lodging needs with the proposed 3,300 resort units.

Objective C, Policy 3: Manage physical growth and development in the urban-fringe and rural areas so that:

a. An undesirable spreading of development is prevented; and

b. Their proportion of the islandwide resident population remains unchanged.

Comment: The project's development concept focuses on land uses and recreational facilities which would be enjoyed by Hawaii families as well as visitors. Land uses are planned to complement the existing image and character of the area. The development is proposed as a low-density, recreation oriented master-planned community.

The project's proposed 700 residential unit development would be consistent with the population distribution range established for the North Shore by the General Plan. The General Plan allocates between 1.6 to 1.8 percent of Oahu's total 2005 population to the North Shore.
In the "Residential Development Implications of the Development Plans," the City Department of General Planning projects a 2005 housing need of 6,000 units for the North Shore, which would support a population of 15,600. This estimated population represents 1.6 percent of the projected islandwide population of 954,500.

If the upper range of 1.8 percent is used, then the North Shore population could reach 17,200. To support this population, an additional 600 to 800 units can be planned for and still be within the population guidelines of the General Plan. These units would be in addition to the current estimated housing deficiency of 100 units.

Objectives and Policies for Economic Activity

Objective A: To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living.

Objective A, Policy 2: Encourage the development of small businesses and larger industries which will contribute to the economic and social well-being of Oahu residents.

Comment: The proposed project will provide the North Shore with employment and business opportunities. In 1985, the North Shore had 5.1 percent unemployment. The proposed project will generate an estimated 4,890 direct, indirect and induced jobs on Oahu.

These jobs would increase the range of employment choices within a reasonable travelling distance for residents along the North Shore, particularly those in Waialua. The primary single source of employment is the sugar mill, which at its peak provided 3,000 jobs and now maintains a current employment of 460. This project would, in effect, create an alternative employment base.

The proposed project would also increase the range of business opportunities for area residents. The market support for retail space at Mokuleia would result from shopping needs of onsite visitors and residents, off-resort visitors and neighboring North Shore residents. These four markets are estimated to generate total annual retail sales ranging from $5 million in 1990 to over $27 million in 2005.

It is estimated that the demand for retail facilities could support about 18,200 square feet in 1990 and 100,700 square feet in 2005 (John Child and Company, 1986).

Objective B: To maintain the viability of Oahu's visitor industry.
Objective B, Policy 6: Permit the development of secondary resort areas in West Beach, Kahuku, Makaha, and Laie.

Objective B, Policy 7: Manage the development of secondary resort areas in a manner which respect existing lifestyles and the natural environment, and avoids substantial increases in the cost of providing public services in the area.

Comment: The applicant has proposed an amendment to the General Plan to include Mokuleia as a secondary resort area.

The market study for this project indicates that, while Waikiki is expected to dominate Oahu's visitor accommodation industry, its share could be expected to decline from its current level of about 93 percent to about 75 percent in 2005. Based on the expansion plans at Kailua and the proposed Mokuleia development, the North Shore is projected to capture a 12.5 percent market share of room demand. West Beach, Leeward Oahu and other areas would capture the remaining 12.5 percent (John Child and Company, 1986).

Based on the anticipated supply and demand relationships for visitor units on Oahu, the visitor industry could be expected to require about 18,900 to 22,700 additional rooms by 2005. This represents a requirement of 9,500 to 13,300 rooms in addition to the inventory which is currently being planned for Oahu.

Already intensely developed, Waikiki cannot be expected to accommodate these projected needs. The proposed project will help the island's visitor industry by further accommodating the lodging needs with the proposed 3,300 resort units.

Both the surrounding and islandwide communities have an image of the Mokuleia area being associated with recreational activities. Land uses are therefore planned to complement the existing image and character of the area. As a result, the development is proposed as a low-density, recreation-oriented community.

The property mauka of Farrington Highway will offer recreational opportunities for a wide range of interests while maintaining the open space quality. Currently envisioned are two 18-hole golf courses, tennis courts, polo fields and related equestrian activities, mountain trails for hiking and camping.

The main recreational feature of the properties makai of Farrington Highway is the beach and the project will provide convenient public
access to the shoreline. Users, including resort clientele and the
general public, will have opportunities to sunbathe, swim, fish, and
gather seaweed and seashells.

Planning for the proposed project is also taking into consideration
community concerns and needs. The developer is currently meeting with
community members to see how this development could address some of
these concerns.

Public costs of providing the necessary infrastructure will be greatly
minimized by the developer’s funding of the project’s needed improve-
ments. Currently being proposed for improvement by the developer are
the following:

Severage system improvements, including a new wastewater treatment
plant, trunk sewer lines, and sewage lift stations (alternatively,
participation in the City’s new Waialua STP is under considera-
tion).

Water systems improvements, including new wells, the water
reservoirs and lift stations, and the construction of water
transmission mains; and

Roadway improvements, including miscellaneous improvements to
Farrington Highway and a primary access road through the project
area from Farrington Highway.

Objective C: To maintain the viability of agriculture on Oahu.

Objective C, Policy 4: Provide sufficient agricultural land in Ewa,
Central Oahu, and the North Shore to encourage the continuation of
sugar and pineapple as viable industries.

Objective C, Policy 5: Maintain agricultural land along the Windward,
North Shore and Wai'anae coasts for truck farming, flower growing,
aquaculture, livestock production, and other types of diversified
agriculture.

Comment: Most of the project area is currently designated Agriculture
on the State Land Use Map and on the North Shore Development Plan. It
is also zoned for agriculture.

A study conducted by Decision Analysts, Inc., examined the potential
impact of this proposal on agriculture and aquaculture. It is further
discussed in other sections of this EIS. This study has indicated
that it is extremely doubtful that the proposed development will affect adversely the statewide growth of diversified agriculture or aquaculture either immediately or over the long term.

Objective E, Policy 1: Encourage the training and employment of present residents for currently available and future jobs.

Comment: The project will make a significant contribution toward preventing large-scale unemployment, especially along the North Shore and in particular the Waialua area. Close to 5,000 direct, indirect and induced jobs are estimated. Efforts to employ local residents to these jobs through employment training programs is one option being discussed with the community.

Objectives and Policies for the Natural Environment

Objective A, Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms and existing vegetation.

Objective A, Policy 5: Design surface drainage and flood control systems in a manner which will help preserve their natural settings.

Objective A, Policy 7: Protect the natural environment from damaging levels of air, water and noise pollution.

Objective A, Policy 8: Protect plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu.

Objective A, Policy 10: Increase public awareness and appreciation of Oahu's land, air, and water resources.

Comment: The existing land features of the site have been carefully considered in the design of the project, leaving the steep terrain in its natural state for recreational enjoyment. There are no plant communities or individual species located on the project site in need of protection (Char's Biological Study, June 1986). Landscaping of the project site will give consideration to the use of native plants suitable to the environment and the need for waterbird habitats will be closely coordinated with the U.S. Fish and Wildlife Service.

Portions of the low-lying areas near Farrington Highway are subject to flooding. Runoff originates offsite and continues onto the project site to the flat area along Farrington Highway. A major feature of
the development will be the enhancement of the natural drainage ways as a recreational and aesthetic amenity within the project. Building designs will take into account and protect against potential hazards of flood or tsunami inundation, and proper measures will be taken to ensure that air, water and noise standards are met.

The project design is focused on the natural setting of the site, and its relationship to the mountains and the ocean. The development will foster a greater awareness and appreciation of the recreation and scenic values and assets of the area.

Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Objective B, Policy 2: Protect Oahu's scenic views, especially those seen from the highly developed and heavily travelled areas.

Objective B, Policy 4: Provide opportunities for recreational and educational use and physical contact with Oahu's natural environment.

Comment: The surrounding community often refers to the mountains in Nokuleia as the "Pali". Like the Koolau range, these mountains are breathtaking and spectacular. This proposal will preserve this view by keeping it free of structures.

Access to the mountains will be planned and managed to permit Hawaii's families and visitors first-hand enjoyment. Several trails now lead from the lowlands to Peacock Flats, a plateau of the Waianae Mountains. These and other similar trails could be developed to offer the opportunity to experience and enjoy the rugged, natural beauty of the region. Camp grounds, developed in conjunction with the hiking trails, could augment the recreational facilities and appeal of the community.

On the properties nakai of Farrington Highway, the project will provide convenient public access to the shoreline.

Objectives and Policies for Housing

Objective C: To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.

Comment: The project's physical setting, preliminary development concepts, and recreation orientation are unique among planned commu-
unities. The project would increase the housing choices on Oahu by providing a living environment for those wishing to live in a recreationally oriented area. The project will provide employment opportunities and stimulate the growth of existing and new businesses in the area. The development's retail facilities are located to be convenient to the project's residents, as well as neighboring residents.

Objectives and Policies for Transportation and Utilities

Objective A, Policy 5: Improve roads in existing communities to reduce congestion and eliminate unsafe conditions.

Comment: The traffic study for this project examined its potential traffic impacts and estimated that, while the existing Farrington Highway will experience an increase in traffic volume, the roadway has sufficient capacity to serve the predicted peak hour volumes (Parsons Brinkerhoff Quade and Douglas, Inc., 1986). The project roadway improvements will be guided by the recommendations contained in the traffic study.

Objective B, Policy 1: Develop and maintain an adequate supply of water for both residents and visitors.

Objective B, Policy 5: Provide safe, efficient, and environmentally sensitive waste-collection and waste disposal services.

Comment: The project will improve the existing water system by replacing it with a new water system designed to meet the project's needs. New water wells, water reservoirs, and other water improvements will be made to upgrade water service in the area.

The City and County of Honolulu is currently proposing to develop a wastewater treatment plan in the Waialua area and the applicant is discussing with the City participating in this effort.

Objective D, Policy 5: Require the installation of underground utility lines wherever feasible.

Comment: All standard utility lines in the project will be installed underground.

Objectives and Policies for Physical Development and Urban Design

Objective A, Policy 4: Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.
Objective A, Policy 7: Locate new industries and new commercial areas so that they will be well related to their markets and suppliers, and to residential areas and transportation facilities.

Comment: All improvements to serve the needs of the project will be provided by the developer in accordance with the requirements and standards of government agencies. The extent of the improvements will be resolved through the planning and zoning processes.

Commercial establishments in the Waialua region are currently limited to a sprinkling of food supermarkets and eating establishments and Waialua residents must travel to Haleiwa and elsewhere for most retail needs. Located three miles west of Waialua Town, the proposed commercial component will provide convenient shopping areas and eating establishments within easy driving distance for Waialua residents. It will also be within walking distance for onsite resort clientele and residents.

Objective D: To create and maintain attractive, meaningful, and stimulating environments throughout Oahu.

Objective D, Policy 2: Integrate the City and County's urban-design plan into all levels of physical planning and developmental controls.

Objective D, Policy 3: Encourage distinctive community identities for both new and existing districts and neighborhoods.

Objective D, Policy 4: Require the consideration of urban-design principles in all development projects.

Objective D, Policy 5: Require new developments in stable, established communities and rural areas to be compatible with the existing communities and areas.

Objective D, Policy 7: Promote public and private programs to beautify the urban and rural environments.

Comment: The proposed plan for a secondary resort area at Mokuleia is based on a two-fold objective. First, the plan strives to recognize, enhance, preserve and improve the area's scenic qualities, recreational environment and rural character. Second, the plan must also contribute to the general well-being of the people living in the area by creating employment opportunities by stimulating growth and by expanding existing businesses.
In keeping with this objective, the plan calls for a low density project which would be compatible to the rural character of the area. The project is centered around a recreational theme that would offer residents and visitors a wide range of leisure-time activities. All the services and facilities, including lodging, dining, recreation, entertainment and commercial uses will be managed in a manner that will benefit both residents and visitors. Special attention will be given to creating a job environment that will diversify the employment opportunities of the area.

The City and County of Honolulu Urban Design Guide will be consulted in the design of the physical plan for the project. The concepts and guidelines of this guide will be incorporated into the physical planning and developmental controls of the proposed project.

In addition to physical compatibility, the project will consider the community's existing needs in the current dialogue program conducted by the developer.

The proposed project will maintain the beauty of the existing area through its landscaping and preservation of the open space quality.

Objectives and Policies for Public Safety

Objective B, Policy 2: Require all developments in areas subject to floods and tsunamis to be located and constructed in a manner that will not create any health or safety hazard.

Comment: The coastal portions of the project, makai of Farrington Highway, are in the Shoreline Management Area, and included in the Flood Hazard Districts of the City. Developments in these areas will require the issuance of a Shoreline Management Area Permit, and construction and location of structures will be designed to meet the safety standards of the City.

Objectives and Policies for Culture and Recreation

Objective B, Policy 1: Encourage the restoration and preservation of early Hawaiian structures, artifacts, and landmarks.

Objective B, Policy 2: Identify, and to the extent possible, preserve and restore buildings, sites and areas of social, cultural, historic, architectural, and archaeological significance.
Comment: An archaeological study of the area was performed by Archaeological Consultants of Hawaii, Inc., and the findings of the study are presented in other parts of this EIS. The applicant intends to follow the recommendations contained therein.

Objective D: To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.

Objective D, Policy 6: Provide convenient access to all beaches and inland recreation areas.

Comment: The project will improve the region's overall access to the resources of the mountains and the ocean. While the shoreline provides access to the ocean, it is fronted to a large degree by private property which limits convenient ocean access. Mountain access is likewise restricted by continuous private property. This project will provide convenient mauka and makai access.

The property mauka of Farrington Highway will offer recreational opportunities for a wide range of interests while maintaining the open space quality. Currently envisioned are two 18-hole golf courses. These will, in effect, become permanent open space. Other recreational areas currently anticipated are tennis courts, polo fields and related equestrian activities, and mountain trails for hiking and camping.

The main recreational feature of the properties makai of Farrington Highway is the beach and the project will provide convenient public access to the shoreline.

It is anticipated that a determination of the number of right-of-ways, as well as the amenities in conjunction with these accesses, will be made in the course of working with the City and County agencies and the community.

D. DEVELOPMENT PLAN FOR THE NORTH SHORE, CITY AND COUNTY OF HONOLULU

Development Plans are relatively detailed guidelines for the physical development of specific regions. They provide for land use and public facilities planning as well as indicate the sequence in which development will occur. This section discusses how the proposed project conforms to and implements the Development Plan.
Development Plan Common Provisions

Section 4: General Urban Design Principles and Controls

Public Views: Public views include views along streets and highways, mauka-makai view corridors, panoramic, and significant landmark views from public places, views of natural features, heritage resources, and other landmarks, and view corridors between significant landmarks. Such public views shall be protected by appropriate building heights, setbacks, design and siting controls established in the CZC....

Comment: The proposed development contains four oceanfront parcels. The (Kaena) view of the ocean from Farrington Highway in the area varies. Beginning west of the proposed development, ocean views are good due to the proximity of Farrington Highway to the ocean and the lack of vegetation or development between the highway and the ocean. There is little view from Farrington Highway to the ocean over the easternmost parcel proposed for development. The width of the parcel and the heavy vegetation make views of the ocean impossible. From this parcel to Mokuleia Beach Park views of the coast and ocean are obscured by a combination of single-family home development and heavy vegetation. (Note: This area contains an additional parcel proposed for development.) There is some view of the ocean from Farrington Highway at the Mokuleia Beach Park; however, it tends to be obscured due to the coastal sand berm made up of windblown sand. East of the park is another parcel proposed for development. Views to the ocean from the highway are non-existent due to the heavy growth of vegetation on the parcel. East of this parcel only sporadic ocean views exist due to the single-family development that lines the coast. The easternmost parcel proposed for development provides for ocean views from the highway in the area of the polo field; however, the ocean views on the bulk of the parcel are obscured due to heavy vegetation. East of the proposed development, ocean views from Farrington Highway are non-existent due to the increasing distance from the coast to the highway and the intervening agricultural and residential uses of the land.

The proposed project will be designed to provide ocean views as much as possible. The resort facilities makai of Farrington Highway will be clustered together and designed so as to minimize structural view obstructions. No structure will exceed 6 to 7 stories.

The view of the mountains is spectacular and this will be maintained through ample open space and a low density development.
Open Space . . . The City's mountains, hills, shoreline and streams shall be considered as major scenic, open space and recreational resources. Adequate public access to these resources shall be incorporated as part of developments adjacent to them . . .

Comment: See discussions in previous section on public views and General Plan Objectives and Policies for Culture and Recreation, Objective D.

Vehicular and Pedestrian Routes: Landscaping shall be provided along major vehicular arterials and collector streets as a means to increase the general attractiveness of the community and the enjoyment of vehicular travel for visitors and residents . . . Pedestrian corridors shall be provided in heavy traffic areas, such as in resort, commercial, and apartment districts . . . Major roadway intersections, particularly along arterial and collector roadways, that serve as key community orientation points shall be made easily identifiable . . . Landscaping controls shall be established for ground level parking areas in order to provide pleasing environments and to help minimize the visual dominance of paved surfaces . . .

Comment: The project access to and from Farrington Highway will be the major roadway intersection. This is intended to be designed to be made easily identifiable through the use of distinctive landscaping, lighting and signage. Landscaping will also be provided along collector streets within the project site. The location and design of pedestrian walkways will be coordinated with other land use features of the plan to ensure convenient and attractive access. Driveways for the resort and recreational facilities will be located as far away as possible from the Farrington Highway intersection to minimize traffic, as well as to provide an attractive setting. All ground level areas will, along with the rest of the development, be generously landscaped.

General Height Controls: Maximum allowable heights for structures in each land use classification and for designated special areas are specified in the special provisions of each development plan. They are intended to establish a general policy for the maximum overall height in the area rather than set specific zoning standards . . .

Comment: See discussion under Special Provisions for the North Shore Development Plan.

Rural: Rural areas are characterized by a preponderance of open and agricultural lands with limited development clustered in small, low density residential areas which have a strong sense of community and
country-like environment. Large-scale agricultural operations or small farms are major economic activities and constitute the predominant land use. Business centers are generally modest in size, low in intensity of use and primarily oriented to meeting the day-to-day shopping and service needs of the surrounding area's residents...

Comment: The proposed project is located in an area designated Rural under the General Plan. While resort development is not specifically categorized under the language of the DP Common Provisions, the development program with its low density recreational theme will embody within its design components "a strong sense of community and a country-like environment."

The overriding thesis of the proposed development is to complement the natural beauty and environment of the area with a low density development reflective of its rural setting.

The resort facilities will be clustered and landscaped in a manner which recognize the natural attributes of the site. (Helping to retain the openness of the site and to diffuse the aura of an urban character, two golf courses will be carefully blended into the project site.) Care will be taken to protect and enhance opportunities for views of the ocean and the mountains with special concern being given to protecting and preserving the shoreline, streams, ridgelines, and steeply sloping area. Public access ways to the shoreline and mountain resources which are currently unavailable to the general public will be adequately addressed under the proposed program.

The proposed commercial center will be low rise and scaled to meet the basic needs of the development. Opportunities will be available for "community-based economic activities which utilize locally available raw materials and the skills of craftpeople living in the area."

The commercial center proposes to incorporate the existing pond at Crowbar Ranch as a central design theme so as to capture the openness and special qualities of the existing waterway.

A guiding principle for rural areas is:

a. The visual attractiveness that distinguishes rural from urban and country from City shall be maintained.

To accomplish this objective, structures generally will be one and two stories in height. Where structures of 6-7 stories in height occur,
they will be placed and landscaped so as to retain the pervading atmosphere of a rural setting. Parking areas, streets, building designs, building and plant materials and colors will be assessed on the basis of their harmony with a country-like environment.

Section 5: General Principles and Controls for Parks, Recreation and Preservation Areas

Parks and Recreation Areas, Community-Based Parks and Recreation Sites, Park Standards for Suburban and New Development Areas:
Suburban and new development areas shall include land for open space and recreation purposes at a minimum of two acres per thousand persons.

Comment: The project is intended to focus upon, improve and expand on the recreational amenities within the area. The development will be a low density project centered around a recreational theme that would offer residents and visitors a wide range of leisure-time activities, including water-oriented uses, hiking and camping, golf, as well as spectator-type activities. The location, size and scope of recreational facilities will be coordinated with the Department of Parks and Recreation and in consultation with the community. The requirements of the Park Dedication Ordinance (4621) and the Public Access Ordinance (4311) will be met.

Section 6: Identification of areas, sites and structures of historical significance

General . . . The continued use, enhancement or preservation of areas, sites and structures [of historical, archaeological or architectural significance] shall be incorporated or promoted in any applicable action by the City.

Comment: A preliminary archaeological investigation was conducted by Archaeological Consultants of Hawaii, Inc. The results of the investigation are presented in other parts of this EIS. Prior to actual development, a more complete survey will be conducted, and steps will be taken to implement the recommendations of the archaeological consultant.

Section 10: Social Impact of Development

Social Impact Factors: In evaluating any proposed development, the objectives relating to the distribution of social benefits shall be
considered. The following factors shall be examined as they pertain to such objectives:

a. Demographic . .
b. Economic . .
c. Housing . .
d. Public service . .
e. Physical; Environmental . .

Comment: The social impact of the proposed development has been examined and the results, including any mitigation measures, are essentially contained in the following reports that are part of this EIS: A Social Impact Assessment by Community Resources, Inc., the Economic and Fiscal Impacts by John Child and Company, an Archaeological Investigation by Archaeological Consultants of Hawaii, Inc., and a Biological Survey by Char and Associates.

Development Plan Special Provisions for the North Shore

The Special Provisions describe the unique features and goals of the specific region. The specific urban design considerations provide guidelines for open space, public views, height controls and density controls.

Comment: There are no special provisions related to resort development in the North Shore Development Plan. Through the public participation process and review procedures, special provisions guiding the development will be incorporated to reflect the desired urban design principles and controls for the project.

Other Controls and Regulations

E. HAWAII COASTAL ZONE MANAGEMENT PROGRAM

As contained in Section 205A-2 of the Hawaii Revised Statutes, the objectives of the Hawaii Coastal Zone Management Program are designed to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The program is also designed to reduce coastal hazards and to improve the review process for activities proposed within the designated zone. The project conforms to following objectives and discussions pertinent to this conformance are contained in previous section of this EIS.
Objectives for Recreational Resource: Provide coastal recreational opportunities.

Comment: See discussion under State Recreation Plan.

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

Comment: See discussion under General Plan Objectives and Policies for Culture and Recreation.

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

Comment: See discussions in General Plan Objectives and Policies for Culture and Recreation, Objective D.

Objective for Economic Uses: Provide public and private facilities and improvements important to the State's economy in suitable locations.

Comment: See discussions under State Tourism Functional Plan.

Objective for Coastal Hazards: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion and subsidence.

Comment: See discussions under General Plan Objectives and Policies for Public Safety.

There are some long-term impacts of the proposed development which should be recognized.

The development of resort facilities makai of Farrington Highway will alter some of the ocean views from the highway. Development will also necessitate the removal or relocation of some existing plant material which will modify the present character of the area.

With the introduction of new activities into the area, and the opening up of previously restricted recreational resources, more people will be attracted to the site. Traffic will increase and the residual effects of automobiles and trucks will cause various changes in the environment in the way of noise and petroleum emissions.
Finally, while development will comply with all Federal, State and County coastal hazard regulations there always remain the threat of storm damage for any coastal development.

P. SPECIAL MANAGEMENT RULES AND REGULATIONS OF THE CITY AND COUNTY OF HONOLULU

The City and County of Honolulu Department of Land Utilization and City Council review development proposed in the Special Management Area based on the guidelines set forth in Section 4., Ordinance 84-4. The coastal portions of the project, makai of Farrington Highway, are in the Shoreline Management Area. The developer will apply for an SMA permit as necessary.
PART X

AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENT POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The proposed project will serve government economic interests and implement government economic policies. The following Objectives and Policies of the Hawaii State Plan are cited as examples:

Section 6, Economy in General

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

(b)(8) Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.

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

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

The following Objectives and Policies from the City & County of Honolulu General Plan are cited:

Objective A: To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living.

Objective A, Policy 2: Encourage the development of small businesses and larger industries which will contribute to the economic and social well-being of Oahu's residents.

The economic benefits of the proposed development outweigh the adverse impacts identified in the EIS.
## PART XI
### LIST OF NECESSARY APPROVALS

<table>
<thead>
<tr>
<th>Approval</th>
<th>Approving Authority</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>General Plan Amendment</td>
<td>City Council</td>
<td>Application filed</td>
</tr>
<tr>
<td>North Shore Development Plan</td>
<td>City Council</td>
<td>Application filed</td>
</tr>
<tr>
<td>Land Use Amendment/Public Facilities Amendment</td>
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<tr>
<td>Zoning</td>
<td>City Council</td>
<td>Application to be filed</td>
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<tr>
<td>Special Management Area Permit</td>
<td>City Council</td>
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<tr>
<td>Grading Permits</td>
<td>Department of Public Works</td>
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<td>Building Permits</td>
<td>Building Department</td>
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<td>Shoreline Certification</td>
<td>State Surveyor</td>
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<td>Subdivision Approval</td>
<td>Department of Land Utilization</td>
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<td>State Land Use Boundary Amendment</td>
<td>State Land Use Commission</td>
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<tr>
<td>Department of Army Permit</td>
<td>U.S. Army Corps of Engineers</td>
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<td>Section 7 Consultation (Endangered Species)</td>
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<td>Request for consultation to be filed</td>
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<tr>
<td>Federal Consistency (with Coastal Zone Management Act)</td>
<td>State Department of Planning and Economic Development (DPED)</td>
<td>Application to be filed</td>
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<td>Conservation District Use Permit</td>
<td>State Department of Land and Natural Resources</td>
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<td>Stream Permit</td>
<td>State Department of Land and Natural Resources</td>
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<tr>
<td>Approval of Drainage System</td>
<td>State Department of Transportation/County Department of Public Works (DPW)</td>
<td>Application to be filed</td>
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<tr>
<td>Approval of Wastewater Disposal System</td>
<td>State Department of Health/County Department of Public Works/County Department of Land Utilization</td>
<td>Application to be filed</td>
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<tr>
<td>Approval</td>
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<td>Approval of Potable Water System</td>
<td>State Department of Land and Natural Resources/State Department of Health/County Board of Water Supply</td>
<td>Application to be filed</td>
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<tr>
<td>Historic Sites Review</td>
<td>State Department of Land and Natural Resources</td>
<td>Application to be filed</td>
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<td>Permit for Construction within State Highway Rights-of-Way</td>
<td>Department of Transportation/County Department of Transportation Services</td>
<td>Application to be filed</td>
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<tr>
<td>Permit for installation of utility Lines within State Highway Rights-of-Way</td>
<td>Department of Transportation</td>
<td>Application to be filed</td>
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<td>Telephone Connection Approval</td>
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PART XII

AGENCIES, ORGANIZATIONS AND PERSONS WHO WERE SENT
A COPY OF THE NOTICE OF PREPARATION (NOP)

The EIS Notice of Preparation ("NOP") was officially published in the Office of Environmental Quality Control ("OEQC") Bulletin on June 8, 1986. The following agencies, organizations and persons received a copy of the NOP.

A. Federal Agencies

1. U.S. Army Corps of Engineers
2. U.S. Dept. of Agriculture, Soil Conservation Service
4. U.S. Dept. of Transportation, Federal Aviation Administration

B. State Agencies

1. Dept. of Agriculture
2. Dept. of Education
3. Dept. of Health
4. Dept. of Land and Natural Resources
5. Dept. of Planning and Economic Development
6. Dept. of Social Services and Housing
7. Dept. of Transportation, Highways and Airports Division
8. Representative Joe Leong
9. Senator Gerald Hagino
10. Office of Environmental Quality Control
11. University of Hawaii Environmental Center
12. University of Hawaii Water Resources Research Center

C. City and County Agencies

1. Mayor's Office
2. Department of General Planning
3. Board of Water Supply
4. Dept. of Housing and Community Development
5. Dept. of Land Utilization
6. Dept. of Parks and Recreation
7. Building Department
8. Dept. of Public Works
9. Dept. of Transportation Services
10. Honolulu Police Department
11. Honolulu Fire Department
D. Community Organizations

1. American Lung Association of Hawaii
2. Audubon Society of Hawaii
3. Bishop Estate
5. Conservation Council for Hawaii
6. Haleiwa Community Association
8. Hawaiian Telephone
9. Kahuku Community Association
10. Kahuku Housing Corporation
11. Kahuku Village Association
12. Koolauloa Community Council
13. Koolauloa Neighborhood Board No. 28
14. Life of the Land
15. Hokuleia Community Association
16. North Shore Career Training Corporation
17. North Shore Neighborhood Board No. 27
18. North Shore News
19. North Shore Realtors Association
20. North Shore Visitors Association
21. Office of Hawaiian Affairs
22. Sierra Club, Hawaii Chapter
23. Sunset Beach Community Association
24. Wahiawa Community and Businessmen's Association
25. Waialua Community Association
26. Waimanalo Falls Park
27. Wahiawa Neighborhood Board

Requests for consulted party status came from J. Parnell and the Kahaluu Coalition. Requests for an informational copy of the NOP came from Belt Collins, and one of the consulted parties listed in the NOP requested that the Department of Labor and Industrial Relations, Office of Employment and Training be a consulted party. The four parties were sent copies of the NOP. Verbal requests to be notified when the Draft EIS was available were received from a Mr. Galloway and a Mr. Lam. The applicant will notify both parties of the availability of the Draft EIS.

Publishing and distribution of the NOP generated 27 written responses including the four listed above. The following summary lists the responding agencies, organizations and persons and indicates the date of the applicant's response to the comments. Following the summary sheet are copies of the correspondence received and the correspondence sent by the applicant in response.
<table>
<thead>
<tr>
<th>Agencies, Organizations and Individuals</th>
<th>Date of Comment</th>
<th>Date Comment Received</th>
<th>Date of Response</th>
</tr>
</thead>
</table>

### A. Federal Agencies

1. U.S. Army Corps of Engineers
   - Date of Comment: 07/01/86
   - Date Comment Received: 07/07/86
   - Date of Response: 02/17/87

2. U.S. Dept. of Transportation,
   Federal Aviation Administration
   - Date of Comment: 06/20/86
   - Date Comment Received: 06/23/86
   - Date of Response: 02/17/87

3. U.S. Dept. of Interior,
   Fish and Wildlife Services
   - Date of Comment: 06/25/86
   - Date Comment Received: 06/26/86
   - Date of Response: No response required

### B. State Agencies

1. Dept. of Agriculture
   - Date of Comment: 07/08/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

2. Dept. of Education
   - Date of Comment: 06/27/86
   - Date Comment Received: 07/07/86
   - Date of Response: 02/17/87

3. Dept. of Health
   - Date of Comment: 07/08/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

4. Dept. of Planning and
   Economic Development
   - Date of Comment: 07/08/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

5. Dept. of Transportation,
   Highways and Airports Division
   - Date of Comment: 06/30/86
   - Date Comment Received: 07/07/86
   - Date of Response: 02/17/87

6. University of Hawaii Water Resources
   Research Center
   - Date of Comment: 07/03/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

### C. City and County Agencies

1. Building Department
   - Date of Comment: 06/20/86
   - Date Comment Received: 06/25/86
   - Date of Response: 02/17/87

2. Honolulu Fire Department
   - Date of Comment: 07/09/86
   - Date Comment Received: 07/11/86
   - Date of Response: 02/17/87

3. Dept. of Housing and
   Community Development
   - Date of Comment: 07/01/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

4. Dept. of Land Utilization
   - Date of Comment: 07/11/86
   - Date Comment Received: 07/15/86
   - Date of Response: 02/17/87

5. Dept. of Parks and Recreation
   - Date of Comment: 06/30/86
   - Date Comment Received: 07/05/86
   - Date of Response: 02/17/87

6. Honolulu Police Department
   - Date of Comment: 06/24/86
   - Date Comment Received: 06/26/86
   - Date of Response: 02/17/87

7. Dept. of Public Works
   - Date of Comment: 06/27/86
   - Date Comment Received: 06/30/86
   - Date of Response: 02/17/87

8. Dept. of Transportation Services
   - Date of Comment: 06/28/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

9. Board of Water Supply
   - Date of Comment: 07/07/86
   - Date Comment Received: 07/09/86
   - Date of Response: 02/17/87

### D. Community Organizations

1. Belt, Collins & Associates
   - Date of Comment: 06/19/86
   - Date Comment Received: 06/23/86
   - Date of Response: No response required

   - Date of Comment: 07/08/86
   - Date Comment Received: 07/10/86
   - Date of Response: 09/13/86

3. Kahaluu Coalition
   - Date of Comment: 06/18/86
   - Date Comment Received: 06/23/86
   - Date of Response: 02/17/87

4. Mokuleia Community Association
   - Date of Comment: 06/27/86
   - Date Comment Received: 06/30/86
   - Date of Response: 02/17/87

5. North Shore Career Training
   Corporation
   - Date of Comment: 06/26/86
   - Date Comment Received: 06/30/86
   - Date of Response: 02/17/87

6. North Shore Neighborhood Board
   No. 27
   - Date of Comment: 08/27/86
   - Date Comment Received: 08/30/86
   - Date of Response: 02/17/87

7. J. A. Parnell
   - Date of Comment: 06/18/86
   - Date Comment Received: 06/23/86
   - Date of Response: 08/13/86

8. Sierra Club, Hawaii Chapter
   - Date of Comment: 07/10/86
   - Date Comment Received: 07/11/86
   - Date of Response: 02/17/87

9. Wahiawa Community & Businessmen's
    Association
   - Date of Comment: 07/23/86
   - Date Comment Received: 07/28/86
   - Date of Response: 02/17/87
DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
ATTN: Mr. Barry R. Okuda
BUILDING 199
1991 Bishop Street
HONOLULU, HAWAII 96813

July 1, 1986

Mr. Barry R. Okuda
C/o Barry R. Okuda, Inc.
Panishi Tower, Suite 1920
2001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

Thank you for the opportunity to review and comment on the EIS Preparation Notice for the proposed development at Makaha, Wahiawa, Oahu. The following comments are offered:

a. Suggest the applicant contact Operations Branch (telephone: 438-9258) for the Department of the Army permit requirements.

b. The flood hazards have been addressed on page 3 of the report covering the project description-conceptual plan.

Sincerely,

[Signature]

Edward Cheung
Chief, Engineering Division

[Date: 7/7]

BARRY R. OKUDA, INC.

February 17, 1987

Mr. Kee Y. Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 220
P.O. Box 1150
Honolulu, Hawaii 96858-5440

Dear Mr. Cheung:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Makaha, Oahu.

Thank you for your comments to the EIS Prep Notice on the Makaha Development. We respond as follows:

Comment a.

The applicant has contacted the Department of the Army regarding permit requirements.

Sincerely,

[Signature]

Barry R. Okuda

[Date: 2/17]
June 20, 1986

Mr. Barry R. Okuda
Federal Aviation Administration
Bldg. 2000, Room 2E-610
Honolulu, Hawaii 96815

Dear Mr. Okuda:

We have received the Environmental Impact Statement Preparation Notice
Transmitted on June 16, 1986, for the proposed development at Makaha,
Kailua, Oahu. Our only comment regards the evaluation of noise impacts.

The Notice states that the traffic noise along Farrington Highway will be
evaluated, but there is no mention of aircraft noise impacts. Due to the
proximity of Dillingham Airfield, the impact from aircraft noise should
also be assessed since this area is subject to aircraft overflights.

Sincerely,

David J. Welhouse
Airport Engineer/Planner
Henry A. Sumida
Airports District Office Manager

February 17, 1987

BARRY R. OKUDA, INC.

U.S. Department of Transportation
Federal Aviation Administration
Airports District Office
Bldg. 2000, Room 2E-610
Honolulu, Hawaii 96815

Attn: Mr. Henry A. Sumida

Subject: Response to Comments on the EIS Preparation Notice for the Proposed
Development at Makaha, Oahu

Gentlemen:

Thank you for your comments on the subject Prep Notice. We respond as follows:

A Project Noise Study was prepared by Darby and Associates. The Darby study
examined the potential aircraft noise impacts. The information in the Darby study
will be summarized and included in the Draft EIS. In addition, the entire study will
be appended to the Draft EIS for those wishing to review the noise impacts in more
detail.

The Darby study indicated that only Resort sites 6, 7 and 8 (see map in study) would
be subject to noise levels between L_max, 55 and L_max, 60 from civilian power
operations. In addition, Mr. Darby states that buildings on sites 7 and 8 could be designed to shield
those on the outside of the buildings on the ocean side from levels above L_max, 55. None
of the projected noise levels from civilian operations exceed the L_max, 60 exterior limit
recommended by Darby and Associates.

The Darby study also indicated that Resort sites 6, 7 and 8 and a portion of site 5 may
be subject to 45 L_max, 50 to 75 L_max, 60 noise levels from sporadic military training exercises
using helicopters. The sporadic and infrequent nature of these exercises lead the
applicant to conclude that they should be considered as temporary short term impacts.
Noise levels from these unpredictable operations are no greater than those experienced
from sugar harvesting or construction activities and historically of much shorter duration.
United States Department of the Interior

FISH AND WILDLIFE SERVICE

Mr. Barry R. Ohuda

Mr. Barry R. Ohuda, Inc.

Faunui Tower, Suite 2000

1991 Bishop Street

Honolulu, Hawaii 96813

Re: Environmental Impact Statement Preparation Notice, Proposed Development at Nokuleia, Waimanu, Oahu

Mr. Ohuda:

The Service has completed its review of the subject Notice of Intent and has no comments to offer at this time. Please provide us with a review copy of the Draft Environmental Impact Statement.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Koehn

Project Leader

Office of Environmental Services

CC: HHFPO - HHFO

EILR

FSPA, San Francisco

No Response Required

Save Energy and You Serve America
Mr. Barry R. Okuda  
July 8, 1986  
Page 3-

LAND EVALUATION AND SITE ASSESSMENT SYSTEM

The Hawaii State Constitution requires that the State provide standards and criteria to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and ensure the availability of agriculturally suitable lands. The Constitution also provides for the identification of “important agricultural lands.” Once identified, these lands may be reclassified or rezoned only after meeting the criteria established by the State Legislature and approved by two-thirds vote of the body responsible for the reclassification or rezoning action.

The Land Evaluation and Site Assessment (LESA) Commission was assigned the task of identifying and recommending, for adoption by the Legislature, a system to identify important agricultural lands (IAL). The recommendations of the Commission, if approved by the Legislature, would carry out the constitutional mandate to protect important agricultural lands.

From the illustrative maps (1:24,000 scale) which apply the IAL methodology as part of the work of the LESA Commission, nearly all of the area identified as Parcel A(i) (approximately 590 acres) is within the illustrative “Important Agricultural Land” (IAL) boundary as defined by the LESA Commission ("A Report on the State of Hawaii Land Evaluation and Site Assessment System", February 1986). The IAL area is capable of producing high agricultural yields, lands which produce commodities for export and local consumption, lands not currently in production but needed to attain desired projected levels of agricultural activities and income, and lands designated by public policies as important agricultural lands resulting from some unique quality, setting or use.

The Parcel A(i) site has Land Evaluation (LE) ratings of 73, 77, 79, 81, 86 and 94 on a scale of 13 to 96 (Land Evaluation - Oahu Exhibit A; LESA Commission Report). Briefly, the LE ratings represent the physical characteristics of the soil resources of Hawaii. The LE ratings are a composite of the soil conservation service soil survey, land study bureau detailed land classification, and the agricultural lands of importance to the state of Hawaii (IAL) system (1972). The following classification system should also be considered in the Draft EIS.

The LESA site has Soil Conservation Service (SCS) soil series found on the five parcels. A full description of all the applicable SCS soil types should be included in the Draft EIS along with similar references to the land study bureau detailed land classification for Oahu (1972) and the Agricultural Lands of Importance to the State of Hawaii (IAL) system (1972). The following classification system should also be considered in the Draft EIS.

Mr. Barry R. Okuda  
July 8, 1986  
Page 3-
Although the LEAA Commission Report and corresponding legislative bill were not acted upon by the Legislature this past session, the Department of Agriculture believes that the definition and identification of "important agricultural lands" by the methodology proposed by the LEAA Commission provides the most comprehensive and rational indication of the relative importance of agricultural lands in the State.

OTHER ISSUES

The Draft EIS should include discussion on the following issues:

- the effect of the proposed development on the ongoing cultivation of sugar cane in fields adjacent to the portion of the project on the mauka side of Farrington Highway;
- Chapter 165 of the Hawaii Revised Statutes, which limits the circumstances under which existing farming operations may be closed as a nuisance;
- the broader economic and resource impact on the State from the irrevocable loss of approximately 30 acres of prime agricultural land;
- a description of the existing agricultural use on the subject parcel and the potential of establishing viable alternative agricultural uses on the project site;
- the impact on agriculture in the surrounding area resulting from the withdrawal from the Wai'anae Groundwater Control Area of 2.1 million gallons per day of potable water and an unstated amount of lesser quality irrigation water for the golf courses;
- the relationship of the proposed development to existing and other urban developments in the North Shore Development Plan area;
- how the proposed project conforms to the State Agriculture Functional Plan and its objectives and policies, particularly, implementing Action 8(5)(c).

We will provide further comment upon our receipt and review of the Draft EIS.

Sincerely,

[Signature]
JACK K. SUWA
Chairman, Board of Agriculture

cc:
DPED
DID
DGF
CSDC

rec'd 7/9
February 17, 1987

Mr. Susan Petersen, Chair
Board of Agriculture
Department of Agriculture
P.O. Box 22153
Honolulu, Hawaii 96823-0159

Dear Mr. Petersen:

Thank you for your comments of July 8, 1984 on the subject of the Waikiki Sugar Company's application for a new sugar mill on the North Shore of Oahu.

I am writing to provide you with the following information:

1. Impact of Existing Sugar Cultivation Adjacent to the Proposed Site

Waikiki Sugar Company cultivates sugar on the adjacent parcel to the north of the proposed site. It is anticipated that the proposed development will affect the sugar fields in the area. We are working closely with the sugar company to ensure that the impact on their operations is minimized.

2. Chapter 151, Right to Farm

The applicant is aware of the right to farm act and is willing to accommodate the proposed project. The applicant believes that the proposed development will not significantly impact the current agricultural operations.

3. Impact on State Agriculture

The Agricultural Impact Report prepared by Decision Analysts Hawaii, Inc. examines the issue and concludes that there will be no significant impact on state agriculture.

4. Rejection of Alternative Use and Alternative Crop

The decision to reject alternative uses of the site was based on the potential for the existing agricultural use. The study concludes that the potential for alternative agricultural uses would not be feasible.

5. Impact of Proposed Water Use on Surrounding Agricultural Uses

The EIS discusses the potential impact of water usage on the existing agricultural uses. It is anticipated that the proposed water use will not significantly impact the agricultural operations in the area.
Mr. Susan Peterson, Chair
February 21, 1987
Page 3

6. The Compatibility of the Proposed Development with Other North Shore Urban Developments

The applicant in proposing General Plan and Development Plan Amendments. The approval process will weigh the proposed development's compatibility with existing and other planned developments. The Draft EIS will discuss the comments the applicant has taken to ensure the compatibility of the project with the North Shore area, including proposed densities, height limits, landscaping and other visual items. In addition, the applicant has established communications with area residents to ensure input from the local populace.

7. Compliance with Agricultural Functional Plan, Implementing Action Article 15.14.1

Implementing Action Article 15.14.1 essentially requires that there be an overriding public interest to justify the changing of agricultural land to other uses. The EIS provides a forum for weighing the positive and negative aspects of the proposed development. This information can then be used by the approving authorities, including the State Land Use Commission and the City Council, in determining if this text has been met. It is the applicant's opinion that the benefits of the proposed action strongly outweigh its adverse impacts, including the reduction of agriculture designated acreage.

Thank you for your comments. We look forward to your Department's comments on the Draft EIS.

Sincerely,

[Signature]

Barry R. Okuda
Department of Education

STATE OF HAWAII
DEPARTMENT OF EDUCATION

June 27, 1987

Mr. Barry R. Okuda
C/O Barry R. Okuda, Inc.
Puuohi Tower, Suite 1000
1801 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

SUBJECT: EIS Preparation Notice for Makaha Project

Our review of the proposed residential unit that allows 700 single family units and 1,200 condominium units indicates that it may generate the following additional enrollment in our schools:

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>GRADES</th>
<th>APPROXIMATE ENROLLMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wai'alea Elementary</td>
<td>K-6</td>
<td>60 - 100</td>
</tr>
<tr>
<td>Wai'alea High/Inter.</td>
<td>7-12</td>
<td>40 - 80</td>
</tr>
</tbody>
</table>

The elementary and secondary schools are currently operating at capacity; therefore, additional classrooms may be required to accommodate the needs at these schools.

We would appreciate being informed of the progress of the development on a timely basis in order that adequate classroom space is assured at the affected schools.

Should you have any questions, please contact Mr. Minoru Inouye at 737-4743.

Sincerely,

[Signature]

Francis M. Matanaka
Superintendent

FMI: 31

cc OES
G. Kamada, Central Dist.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY STATEMENT
February 17, 1987

Mr. Francis H. Matsumoto
Superintendent
Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Re: Response to Comments on the EIS Preparation Notice for the Proposed Development at Makaha, Oahu

Dear Mr. Matsumoto:

Thank you for your comments of June 27, 1986. We respond as follows:

A decision of the project's impact on educational facilities will be included in the Draft EIS.

It is the applicant's intention to continue communications with the Department of Education in order to ensure that adequate classroom space and staffing levels will be planned for the affected schools.

Again, thank you for your comments.

Sincerely,

BARRY R. OKUDA
Assistant

BARRY R. OKUDA, INC.

STATE OF HAWAII
DEPARTMENT OF HEALTH

Mr. Barry R. Okuda
P.O. Box 2360
Honolulu, Hawaii 96804

July 9, 1986

Dear Mr. Okuda:

Subjects: Environmental Impact Statement Preparation Notice for Proposed Development at Makaha, Wahiawa, Oahu

Thank you for allowing us to review and comment on the proposed EIS preparation notice. We provide the following comments:

Drinking Water

The Preparation Notice for this development states that the applicant will design and construct a water system to support this project, a 4,000 unit resort at Makaha. The developer plans to dedicate the water system to the Board of Water Supply to operate and maintain. A separate irrigation system will also be developed for the golf course.

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 20, Title 51, Administrative Rules, and are in compliance with all other applicable state and conditions of Chapter 20. 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. If a new water source is developed to supply this project, please be advised that this source and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively.

Briefly, 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 bear his or her seal upon submission.

In 1981, Makaha Homesteads submitted draft engineering reports for source approval of three groundwater wells in Makaha. These wells and the proposed water system were intended to support an agricultural subdivision. Our records indicate that the approval process was incomplete and the three wells did not receive Section 29 approval. If these three wells are intended to support the proposed resort project, Section 29 approval must be completed. The project engineer should contact the Drinking Water Program concerning Section 29 requirements.
Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director of Health. Approval authority for Section 30 has been given to the Board of Water Supply for water distribution systems under their jurisdiction.

Should you have any questions regarding Chapter 70, Title 11, Administrative Rules, please contact the Drinking Water Program at 318-2155.

Notes

1. Concerns regarding the proposed development are directed toward probable noise impacts due to the integration of various land use designations.
   
a. Noise from activities associated with the use of recreational areas can have adverse effects, in terms of annoyance, on adjacent residents. The proposed concept of situating residential units adjacent to golf course areas may result in noise disturbances from activities including ground maintenance and club activities.
   
b. Noise from activities associated with commercial and resort facilities can have an adverse effect on the residential community within the development, increase in vehicular traffic, including heavy vehicles utilized for delivery and services, buses travelling to, and from the resort areas and vehicles within off-street parking areas, may result in negative noise impacts.

2. Additional concerns are directed toward possible external noise impacts on the proposed development.
   
a. Noise from aircraft and associated activities at Dillingham Airfield may have an adverse affect on the proposed development, especially residential areas. It should be noted that EPA has established, as a guideline, a level of 35 dBA for residential areas.
   
b. Areas east and west of the proposed location are presently utilized for agricultural purposes. Noise associated with these activities can have a negative impact on residential areas. Additional disturbances may occur from heavy vehicles utilized to transport agricultural products while travelling through or near the development.

3. Plans must be included for implementation of mitigative measures to minimize noise from these concerns cited above.

4. Activities associated with the construction phase must comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.
   
a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the regulations.
   
b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers.
   
c. The contractor must comply with the conditional use of the permit as specified in the regulations and conditions issued with the permit.

5. Traffic noise from heavy vehicles travelling to and from the construction site must be minimized in existing residential areas and must comply with the provisions of Title 11, Administrative Rules Chapter 47, Vehicular Noise Control for Oahu.

Sincerely yours,

[Signature]

JAMES H. BEDA
Deputy Director for Environmental Health

cc: C&C Department of General Planning

[Stamp] 7-6-16
February 17, 1987

Mr. James E. Ikeda
Environmental Health
Department of Health
P.O. Box 318
Honolulu, Hawaii 96813

Re: Response to Comments on the EIS Preparation Notice for the
   Proposed Development at Makuhai, Oahu

Dear Mr. Ikeda:

Thank you for your comments of July 8, 1986 on the subject Prep Notice. We respond as follows:

Drinking Water

The applicant in proposing to construct and dedicate a new water system to the board of Water Supply to serve the proposed development. The system will be designed to comply with all laws and regulations, including Chapter 20, Title II, Administrative Rules, and all other applicable terms and conditions of Chapter 20. If a new water source is developed to serve the project, then Sections 11-20-20 and 11-20-30 of Chapter 20 will be met. Engineering, Surveysor of Hawaii has been retained as the water and engineering consultant for the project. Compliance with the above-mentioned regulations and other approval requirements of the new system will be met in a timely manner.

Noise

1. Noise from Mixture of Land Uses
   a. Recreational noise
      The potential for recreational noise will be addressed in the EIS.
   b. Resort and commercial noise
      The potential for noise from resort and commercial use to impact on residential use will be discussed in the EIS.
   c. Noise from stationary equipment
      Noise from these sources will be within limits imposed by Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu.

2. External Noise
   a. Aircraft noise
      These noise impacts will be discussed at length in the Draft EIS.
   b. Agriculture noise
      The potential noise impact of agricultural operations are addressed in the Draft EIS.

3. Mitigation Measures
   a. Community Noise Control for Oahu
      Contractors will obtain a noise permit if construction noise exceeds allowable levels.
      Construction vehicles and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers.
      The contractors must comply with conditions specified in the permit.

4. Vehicle Noise Control for Oahu
   Contractors must comply with Title II, Administrative Rules Chapter 42.

In addition to the comments discussed in your letter, the noise study discusses the impact of traffic noise from Farrington Highway on proposed resort and residential properties. In addition this project's noise development is subject to noise impacts from a new land used when the sugar fields west of the proposed development are harvested. These impacts and mitigating measures are discussed in the noise study by Derby & Associates and in the Draft EIS.

Thank you for your comments.

Sincerely,

[Signature]

BARRY R. OKUDA
February 17, 1987
Page 2
Mr. Barry R. Ohlde
P.O. Box 500
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Ohlde:

Subject: EIS Preparation Notice for Proposed Development at Makaha, Oahu

We have reviewed the subject EIS preparation notice and recommend that the EIS include the following items:

1. A discussion of the relationship of the proposed development to the County General Plan and Development Plan. The 1985-86 annual review of the North Shore Development Plan indicates that, based on the projected population on the North Shore by the year 2020, only modest development proposals could be accommodated. The review also indicates the desire of the community for preservation of agriculture and the provision of open space amenities. Increasing urban uses are appropriate if they are in compliance with population distribution policies and achieve other general plan policies, such as providing for affordable housing.

2. A discussion on the availability of water. In 1981 the Board of Land and Natural Resources designated the Makaha portion of the Makaha-Alewa water use district as a ground water control area. The Board of Water Supply has also classified the Makaha-Alewa Water System as a "limited additional" water supply area.

3. A discussion of the need for the proposed resort development on Oahu, relative to the projected future tourism growth, need for additional resort condominium units, and the existing and proposed supply of units.

4. A discussion of the employment created by the proposed development and the adequacy of support facilities such as employee housing in the area.

5. An identification of the various permit approvals that will be required for the development.

Mr. Barry R. Ohlde
Page 2
July 8, 1986

6. The proposed timeframe for the development of the project with a breakdown by phases, if appropriate.

7. A discussion of how the proposed development meets appropriate objectives, policies and priority directions of the Island State Plan, and the policies and implementing actions of applicable State Functional Plans.

8. A discussion of impacts on recreational resources in the area. The EIS should describe existing recreational activities in the area and any potential conflicts or curtailment of present uses. Plans for the provision of public shoreline accessways and related facilities should also be discussed, including their number and locations along the shoreline.

9. A discussion of coastal hazards. The EIS should also address the impacts relating to erosion along beaches in the area and any planned setbacks structures from the shoreline. Lastly, the EIS should describe the impacts of development on scenic and open spaces in the surrounding areas, including the effects on public vistas to and along the shoreline.

Thank you for the opportunity to review and comment on the subject document.

Very truly yours,

Kent M. Keith

cc: Office of Environmental Quality Control
February 17, 1987

Mr. Roger A. Ulrieling, Director
Department of Planning & Economic Development
250 South King Street
Honolulu, Hawaii 96814

Dear Mr. Ulrieling,

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of July 8, 1986, on the subject Prep Notice. We respond as follows:

1. Compliance with General Plan and Community Desires

   Compliance with General Plan: The Draft EIS will describe in detail how the proposed development complies with various State and County plans including the General Plan of the City and County of Honolulu.

   Consideration of Community Desires: As part of the planning process, the applicant commissioned a social impact study in order to better understand community concerns. In addition, the applicant has implemented a comprehensive communication program with groups and organizations as well as individuals in the North Shore area in order to include community concerns in the planning process. The communication program is ongoing and in order to comply with community concerns in mind.

2. Water Supply

   The Mokuleia area is a subzone of the Wai'anae-Hale'iwa ground water control area. The Mokuleia Aquifer has had a surplus of water while the other areas of the Wai'anae control area were estimated to be in use that is their maximum safe sustained yield. Surpluses in the Mokuleia Aquifer have for years been discharged into the ocean at the edges of the town. Any withdrawal from the Mokuleia Aquifers in excess of the property's existing "presumed use" will require DLNR approval which is the monitoring authority for Control Areas.

The Board of Water Supply's classification of the Wai'anae-Hale'iwa Water System as a limited additional water supply area is related to the area's existing system. The applicant will develop a new water system to serve the project and dedicate it to the Board of Water Supply. The area's ability to produce more water is recognized by the Board of Water Supply. In February of 1986, the Board prepared an Environmental Assessment for public comment on its proposal to develop additional water sources in the North Shore and to develop distribution capabilities that would allow the Board to export this excess water to the Wai'anae Coast.

There should be no shortage for this project and adequate controls on water in the area will ensure that the project will not adversely impact the area's water resources.

3. Need for Additional Resort Facilities

   The applicant commissioned a market study for the proposed development. The study by John Child and Company is summarized in the Draft EIS and the entire study is appended to the Draft EIS.

4. Employment Impacts and Adequacy of Support Facilities

   The EIS contains the results of an Economic Impact Study done by John Child and Company and a Social Impact Study prepared by Community Resources, Inc. These studies analyze in detail the economic impacts including employment created and the adequacy of support facilities.

5. Identification of Permits

   The EIS contains a listing of necessary permits for the project.

6. Development Timetable

   The market analysis for the project indicates project completion in 2005. Thus the project including the approval process is estimated to require approximately 20 years to complete. A more detailed analysis of the absorption rates for various types of product is contained in the market analysis.

7. Compliance with Hawaii State Plan

   See response to Comment # 1.

8. Recreational Resources and Shoreline Access

   Recreational activities and facilities are a major focus of the proposed Mokuleia Development. Recreational resources are discussed extensively in the Draft EIS. The location and number of beach and mountain access and related parking facilities are to be worked out with the appropriate State (DLNR) and County (Department of Parks) agencies with community input. The applicant will be
working closely with the government agencies and the public to assure that the best possible alternatives are considered. Existing recreational uses such as polo will be addressed in overall planning of the project.

9. Coastal Hazards

The applicant commissioned reports on the impacts of tsunami and hurricanes. Information on potential beach erosion and rising sea levels has been given to engineering and architectural consultants for recommendations of appropriate setbacks and other mitigative measures. These impacts as well as the scenic and visual impacts of the project are discussed in the Draft EIS.

Thank you for your comments.

Sincerely,

Barry R. Okuda
BBOcorp
011

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
INLAND WATERWAYS

June 10, 1986

Mr. Barry R. Okuda
BBOcorp
PO Box 1000
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

EIS Preparation Notice

Proposed Development at Koloa, Oahu

The traffic impact analysis report and noise study should be submitted to our department for review.

For your information, all work required within the State highway right-of-way must be reviewed and approved by our Highways Division. Further, commitment of providing highway improvements by the developer should not be limited to their property abutting Farrington Highway. Any additional improvements elsewhere, required as a direct result of the proposal's impact, should also require a similar commitment by the developer.

We appreciate this opportunity to provide comments.

Very truly yours,

[Signature]
Director of Transportation

[Date] 7/7
February 17, 1987

Mr. Wayne Yamasaki, Director
Department of Transportation
889 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Yamasaki:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of June 30, 1986, on the subject Prep Notice. We respond as follows:

A Traffic Analysis by Parsons Brinckerhoff, Quade and Douglas and the Noise Study by Darby and Associates have been prepared. These studies will be summarized in the Draft EIS and the complete studies appended to the EIS.

The applicant has noted and will comply with your comments regarding a permit being required for work to be done within the State Highway rights-of-way. Highway improvements such as those suggested in the traffic report will be coordinated with you and your staff.

Thank you for your comments.

Sincerely,

BARRY R. OKUDA

3 July 1986

Mr. Barry R. Okuda
P.O. Box Barry R. Okuda, Inc.
2101 Bishop Street
Honolulu, Hawaii 96813

SUBJECT: Environmental Impact Statement Preparation Notice for the Proposed Development at Mokuleia, Oahu, Hawaii, Mokuleia Development Corporation, June 1986

We have reviewed the subject EISN and offer the following comments:

1. If the development builds its own sewage treatment plant, serious consideration should be given to using the treated effluent for golf course irrigation.

2. Contrary to the statement on page 8, the Kaena dunes are not well suited for development. They have a high shrink-swell ratio which is not conducive to good bearing characteristics. In addition, on slopes the soil will tend to creep particularly when the profile has been cut for whatever reason, be it for street or lot grading. The upslope side will begin to creep downslope, probably because the compression has been released by the cut, and retaining walls generally cannot withstand the pressure.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

EDWIN T. MURASAWA
EIS Coordinator

AN EQUAL OPPORTUNITY EMPLOYER
February 17, 1987

Mr. Edwin T. Murabayashi, ES Coordinator
University of Hawaii at Manoa
Water Resources Research Center
Holmes Hall 283
2560 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

Subject: Response to Comments on the ES1 Preparation Notice for the Proposed Development at Makaha, Oahu

Thank you for your comments of July 3, 1986, regarding the subject Prep Notice. We respond as follows:

1. Re-use of Sewage Effluent for Golf Course Irrigation

The applicant notes your comment urging the use of treated sewage effluent for golf course irrigation. Currently the alternatives being studied for the sewage system do not include the re-use of effluent; however, your suggestions will be given due consideration.

2. Soil Suitability

The applicant has retained Engineers and Surveyors Hawaii, Inc. to make recommendations regarding soil types and engineering requirements. Preliminary recommendations will be included in the Draft ES1.

Thank you for your comments.

Sincerely,

Barry R. Okuda

BROHep

031
June 20, 1986

Mr. Barry R. Okuda
C/O Barry R. Okuda, Inc.
Fushiki Tower, Suite 1900
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

Subject: EIS Preparation Notice
Proposed Development at Makulea

Thank you for the opportunity to review and comment on the EIS Preparation Notice for the proposed development at Makulea.

We are concerned that the proposed development will affect the existing access road to the State's Makulea Radio site where the City's radio equipment are located. We request that an adequate access road to the radio site be provided and the road easement be granted to the State.

Very truly yours,

HERBERT E. MURAKA
Director and Building Superintendent

cc: J. Harada

BARRY R. OKUDA, INC.

February 17, 1987

Mr. Herbert K. Murakaka, Director
Building Department
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Murakaka:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Makulea, Oahu

Thank you for your comments of June 20, 1986, on the subject Prep Notice. We respond as follows:

The applicant will be working with the State Department of Land and Natural Resources to try to provide access to the mountains. At the present time the existing access road has experienced some stability problems. The applicant will work with the State on an acceptable access. The access may be dependent on the development plans finally approved by government agencies.

Thank you for your comments.

Sincerely,

Barry R. Okuda

BRRcp
037
10
July 9, 1986

Mr. Barry R. Chuda, President
Barry R. Chuda, Inc.
Pauahi Tower, Suite 1900
1101 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Chuda:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISP) FOR PROPOSED DEVELOPMENT AT WAIKIKI, OAHU, HAWAII

Thank you for the opportunity to review and comment on the subject EISP. Current fire protection is provided as follows:

<table>
<thead>
<tr>
<th>Station/Company</th>
<th>Distance</th>
<th>Response Time</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waialua, Engine 16</td>
<td>7.3 miles</td>
<td>10 minutes</td>
<td>5</td>
</tr>
<tr>
<td>Waialua, Engine 16</td>
<td>11.0 miles</td>
<td>17 minutes</td>
<td>5</td>
</tr>
<tr>
<td>Waialua, Ladder 12</td>
<td>21.0 miles</td>
<td>40 minutes</td>
<td>6</td>
</tr>
</tbody>
</table>

Two engines and one ladder is the standard dispatch for all reported structure fires outside the Waialua and metropolitan Honolulu area. Existing fire protection is considered inadequate for the proposed project in regards to distance and response time. Current insurance Services Office (ISO) guidelines recommend a standard response distance of not more than four miles for engine and ladder companies (a ladder company may not be required where there are less than five buildings of three or more stories). A response time of three to five minutes is acceptable.

As indicated, the current level of service is inadequate and we request a minimum of 25,000 square feet be set aside for a jointly funded (public-private) fire station, housing a minimum of one engine and 15 personnel.

Should you have any questions, please contact Battalion Chief Kenneth Word at 941-3838.

Very truly yours,

[Signature]

FRANK R. KAWANA
Fire Chief
February 17, 1987

Mr. Frank K. Kahookahakalolo, Chief
Honolulu Fire Department
1455 K. Beretania Street, Room 305
Honolulu, Hawaii 96814

Dear Chief Kahookahakalolo:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Makaha, Oahu

Thank you for your comments of July 9, 1986, on the subject Prep Notice. We respond as follows:

The information provided in your letter has been incorporated into the Draft EIS. Your request for a fire station in the project is noted by the applicant. As processing for approvals progresses, there will be a need for more detailed discussion by the applicant with you and your staff to ensure adequate fire protection for the proposed development.

We thank you for your comments.

Sincerely,

BARRY R. OKUDA

Mr. Barry R. Okuda

c/o Barry R. Okuda, Inc.

Fusashi Tower, Suite 1900

1001 Bishop Street

Honolulu, Hawaii 96813

July 1, 1986

Mr. Barry R. Okuda

c/o Barry R. Okuda, Inc.

Fusashi Tower, Suite 1900

1001 Bishop Street

Honolulu, Hawaii 96813

Dear Mr. Okuda:

Subject: Environmental Impact Statement - Preparation Notice

The proposed development of residential units in the agricultural district of the State Land Use District Map has been reviewed by the Department of Housing and Community Development. The Department is mandated to provide housing units for the low- and moderate-income families on Oahu. We note that a Development Plan and zoning change are needed, and in accordance with the current Departmental policy, we wish to request that at least 10 percent of all residential developments to be set aside for these groups. This request applies to all zone changes, clusters and planned development-housing applications. Establishing such a requirement is a reasonable means of recapturing the economic benefits conferred by favorable land use allocations and distributing that benefit for the general public benefit. We are
Mr. Barry R. Okuda
July 5, 1986
Page 2

Currently reviewing our policy relating to the 30 percent set aside and will inform you of any specific policy adjustments adopted.

We request that Makaha Development Company specify the location of the units, as well as the type of unit (1-bedroom, 2-bedroom, etc.) to be provided for the low- and moderate-income families.

If you have any questions, please contact Mr. James Miyagi of our Housing Division at 523-4264, who will assist the developer in formulating a program to provide these units.

[Signature]

February 17, 1987

BARRY R. OKUDA, INC.

Mr. Mike Moon, Director
Department of Housing and Community Development
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Subjects: Response to Comments on the EIS Preparation Notice for the Proposed Development at Makaha, Oahu

Thank you for your comments of July 1, 1986, on the subject Prep Notice. We respond as follows:

The applicant recognizes the need to provide an appropriate amount of housing for the low and moderate income market. At the present time, no specific provision has been made in the plan for such units; however, the applicant proposes to work with your department to develop a plan to meet the needs of the community and to be compatible with the development concept being proposed.

Thank you for your comments.

Sincerely,

[Signature]

Barry R. Okuda
BBP
026
Mr. Barry R. Ohuda

Page 2

beach changes at the specific beach segments proposed for
development. It should also analyze the potential effects of
rising sea levels on these beaches in the next 100 years.
These studies will provide a basis for recommending adequate
long-term building setbacks along the shoreline.

4. Portions of Parcels B and C fall within the A4 flood zone; a
portion of Parcel C also falls within the K2 Coastal High-
Hazard Zone. Parcels B and C have not been studied for vulner-
ability to flooding; a full study should be performed on these
areas, in order to determine flood elevations, hazard factors,
and general suitability for development.

If you have any questions, please contact Mr. Robin Foster of our
staff at 527-5027.

Very truly yours,

JOHN P. WHALEN
Director of Land Utilization

JWWW: 1
03/25/76
cc: OGP

Roed 7-11-76
BARRY R. OKUDA, INC.

February 17, 1987

Mr. John Whalen, Director
Department of Land Utilization
610 South King Street
Honolulu, Hawaii 96813

Re: Response to Comments on the EIS Preparation Notice for the
Proposed Development at Makaha, Oahu

Dear Mr. Whalen:

Thank you for your comments of July 11, 1986 regarding the subject Prep
Notice. We respond as follows:

(1) Impact on Adjacent Land Uses

The applicant believes that there will be relatively little impact on the land uses adjacent to the four non-contiguous oceanfront
parcels proposed for development.

At the present time these adjacent parcels contain a variety of
land uses including residential, recreational and guest-public
church camp. It is the applicant's intention to develop design
guidelines including architectural, building envelope, landscaping,
beach and various other design elements that would ensure a
harmonious relationship between new and existing land uses. It is
common to have resort, residential and recreational uses
co-existing as elements of a development.

The applicant intends to work with the Departments of General
Planning and Land Utilization as well as through continuing
dialogues with the community in order to develop an urban design
program which will ensure the development's compatibility with
existing uses.

(2) Market Study

The market study indicating the need for additional resort
development beyond that approved in the City and County's General
and Development Plans, will be included in the Draft EIS.

Mr. John Whalen, Director
February 17, 1987
Page 2

(3) Beach Erosion and Rising Sea Level

These topics will be covered in the Draft EIS.

(4) Flood Hazards

The applicant commissioned Dr. Charles Bretechaider to perform a
study of the tsunami and hurricanes impacts on the proposed
development. The results of this study will be included in the
Draft EIS as well as a complete copy of the study. The firm of
Engineers, Surveyors of Hawaii is developing the drainage plan for
the property and will incorporate information from the
Bretechaider study in its recommendations for mitigating measures.

Sincerely,

[Signature]

Barry R. Okuda

B01a00
Dear Mr. Okuda:

Subject: Environmental Impact Statement Preparation Notice
Haleiwa Development - Makaha
Tax Map Key B-6-02, 03, and 08

We have reviewed the Environmental Impact Statement Preparation Notice for the Haleiwa Development in Makaha and make the following comments and recommendations:

The size of the proposed Makaha project would have a significant impact on our public park facilities in the Makaha area. It is important that an adequate recreational system be planned to serve both the resort and residential needs of the project.

The report does not address the recreational impact and needs of the project. This should be included in future Environmental Impact Statement reports and all City applications.

We would also like to advise you that there are two City Ordinances which are significant and must be addressed in future assessments of the project. Compliance with these Ordinances are required in order for the project to receive City approval.

These Ordinances are:

1. Park Dedication Ordinance No. 6621. This law requires that parks be provided to serve the project. Based on the 2,000 condominiums and residential units proposed for development, approximately 15 acres of land will be required to be set aside for park purposes. These parklands must meet City standards and park dedication requirements.

2. Public Access Ordinance No. 6623. This law requires that adequate public access to shoreline and mountain areas be provided. Establishment of required access must be reviewed and approved by the City as a condition of approval of the project.

June 30, 1984

Tom Y. Negishi, Director

We recommend that contact be made with our department to discuss the Makaha project's recreational needs and park dedication requirements as soon as possible.

Should you have any questions, please contact Mr. Jason Teng at 527-4335.

TOM E. NEGISHI, Director
BARRY R. OKUDA, INC.

February 17, 1986

Mr. Hiroh Kamaka, Director
Department of Parks and Recreation
450 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kamaka:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of June 30, 1986, on the subject Prep Notice. We respond as follows:

With outdoor recreation being a major component of the proposed project, this development will include provisions for optimizing general public access to the project site as well as providing a wide range of recreational opportunities for both visitors and residents.

The applicant is aware of both the Park Dedication Ordinance No. 4631 and Public Access Ordinance No. 4331 and intends to comply with these ordinances. During the approval process the applicant will work with the City Department of Parks and Recreation and the State Department of Land and Natural Resources to achieve the results intended by these ordinances.

The Draft EIS will contain an assessment of public access and recreational opportunities.

Thank you for your comments.

Sincerely,

BARRY R. OKUDA
BARRY R. OKUDA
Turningcoat

Mr. Barry R. Okuda
C/o Barry R. Okuda, Inc.
Pauahi Tower, Suite 1900
3001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

The Honolulu Police Department desires to be consulted during the preparation of the Environmental Impact Statement for the proposed development at Mokuleia, Oahu. Our concerns are for public safety, in general, and the impact on the availability and delivery of police services.

Thank you for allowing us to become involved in the planning for this proposed development at this early stage.

Sincerely,

DOUGLAS G. GIBB
Chief of Police

By VERNALUNDA
Deputy Chief of Police
BARRY R. OKUDA, INC.

February 17, 1987

Mr. Douglas G. Gibb, Chief
Honolulu Police Department
1435 South Beretania Street
Honolulu, Hawaii 96814

Dear Chief Gibb:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of June 24, 1986, on the subject EIS Notice.

A member of the consulting team preparing the Draft EIS has contacted the police department for input and the information will be included in the Draft EIS.

Thank you for your comments.

Sincerely,

Barry R. Okuda

Mr. Barry R. Okuda
c/o Barry R. Okuda, Inc.
Pauahi Tower, Suite 1900
1001 Bishop Street
Honolulu, Hawaii 96813

June 27, 1986

Mr. Barry R. Okuda

I am responding to your letter, dated June 16, 1986, concerning the preparation of a draft EIS for the subject proposed developments at Mokuleia. We have the following comments:

1. Will the streets and right-of-way be developed according to City Standards? If so, will the infrastructures be dedicated to the City for maintenance or will they be privately maintained?

2. A drainage report as stated in the EISPM should be prepared and submitted to the Drainage Section, Division of Engineering, for review and approval.

3. A sewerage master plan for the proposed development should be prepared and submitted to the Division of Wastewater Management for review and approval.

4. Two options for the treatment and disposal of wastewater generated by the development are mentioned in the EISPM. These options should be fully discussed in the Draft EIS, including the location of the treatment plant site and effluent disposal alternatives.
Mr. Barry R. Okuda

June 27, 1986

5. The first wastewater treatment option suggested is to construct a system which will serve only the development. Under this option, the system will be constructed according to the City Standards. After the construction of the system, it will be dedicated to the City for operation and maintenance, or will it be retained by the developers and operated as a private sewage treatment plant (STP)?

6. The second wastewater treatment option suggested is to construct joint treatment and disposal facilities with the City and County. The costs will be shared by the City and the developers based on a formula which will be developed.

Since the Facilities Plan for the Wailuku-Maileina District will be finalized by June 1987, the selection of the recommended option should not be prolonged. For your information, the City's wastewater treatment plant site has not been finalized as of this date.

Very truly yours,

RUSSELL L. SMITH, JR.
Director of Sewer Chief Engineer

BARRY R. OKUDA, INC.

February 17, 1987

Mr. Albert Thiele,
Director
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Thiele:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Maunakea, Oahu

Thank you for your comments of June 27, 1986, on the subject Prep Notice. We respond as follows:

1. Dedication of Streets
   The applicant proposes to develop the major streets in accordance with City standards with probable dedication of these roads to the City.

2. Drainage Report
   A drainage report is being prepared by Engineers, Surveyors of Hawaii, Inc. and will be submitted to Public Works for review.

3. Sewerage Master Plan
   A sewerage master plan is being prepared and will be submitted to the Division of Wastewater Management for review and approval.

4. STP Options
   A full discussion of the various STP options will be included in the Draft EIS. At the present time, the applicant and consultants are still studying the options and no decision has been made.

5. It is likely that the system will be designed to City standards and dedicated to the City.

6. See # 4.
July 2, 1986

Mr. Barry R. Okuda

c/o Barry R. Okuda, Inc.

Kauai Tower, Suite 1900
1001 Bishop Street

Honolulu, Hawaii 96813

Dear Mr. Okuda:

Subject: Proposed Development at Wahiawa, Oahu

This is in response to your letter of June 16, 1986.

We have reviewed the EIS Preparation Notice for the subject project and recommend that the following items be included in the traffic portion of the document to facilitate our review:

1. An assessment of projected traffic demand along local interior streets to determine adequate roadway widths to accommodate the smooth flow of traffic;

2. The proposed layout of the internal roadway system;

3. The anticipated phasing of the entire development at ultimate build-out.

If you have any questions, please contact Kenneth Hirata of my staff at 527-5689.

Sincerely,

[Signature]

rec'd 7/9
February 17, 1987

Mr. John E. Hiten
Director
Department of Transportation Services
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Hiten:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of July 2, 1986, on the subject Prep Notice. We respond as follows:

1. Assessment of Interior Roads

The Mokuleia project is currently in the conceptual design stage and only schematic designs are available for the project. Major interior streets will be designed to be compatible with city and county of Honolulu standards with probable dedication to the City. Roadways will be designed to provide for smooth traffic flow.

2. Proposed Layout

See # 1.

3. Project Phasing

The project is expected to be completed in 2005 or approximately 10 years.

The traffic study prepared by Parsons, Brinckerhoff, Quade and Douglas concentrates on how the development can be integrated into existing traffic facilities in the area. Since the new interior roads will be built to serve the proposed development, their design will be in keeping with existing traffic patterns and city design standards. The traffic study will be summarized in the Draft EIS. Also the complete study will be appended to the EIS.
July 7, 1986

Mr. Barry R. Okuda
c/o Barry R. Okuda, Inc.
Parish Tower, Suite 1900
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

Subject: Your Letter of June 16, 1986 on the Proposed Development at Mokuleia, Waimalu, Oahu

Thank you for the opportunity to comment on the Environmental Impact Statement Preparation Notice for the proposed development at Mokuleia, Waimalu, Oahu. We offer the following comments:

1. A revised water master plan should be submitted for our review and approval.

2. Parcels A, C, D and E, as shown on Map 2, are located in the "Pass Zone." However, only portion of parcel A is located in the "Pass Zone." Shallow ground disposal of waste systems such as cesspools shall be permitted only in the "Pass Zone" where disposal shall be limited to a maximum depth of 30 feet. All sewage disposal plans shall be coordinated with the Sanitation Branch, State Department of Health.

3. The Mokuleia area is part of the Waimalu Ground Water Control Area which is controlled by the State Board of Land and Natural Resources (BLNR). Therefore, permission to withdraw water from the ground water basin must be obtained from BLNR.

If you have any questions, please contact Lawrence Wang at 327-6138.

Very truly yours,

KAIU HAYASHI
Manager and Chief Engineer

Parks Water — man's greatest need — use it wisely.

BARRY R. OKUDA, INC.

February 17, 1987

Mr. Kau Hayashi
Manager and Chief Engineer
Board of Water Supply
450 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashi:

Subject: Response to Comments on the EIS Preparation Notice for the Proposed Development at Mokuleia, Oahu

Thank you for your comments of July 7, 1986, re the subject Prep Notice. We respond as follows:

1. Water Master Plan
   A revised water master plan will be submitted for your review and approval.

2. Effluent Disposal
   Your comments on effluent disposal are noted and will be addressed in the Sewer Master Plan. Coordination and approval of the plan will be through the various governmental agencies with an interest in sewage disposal including the Board of Water Supply, Department of Public Works and the Department of Health.

3. Source Development/Increased Water Withdrawal
   The applicant is aware that the project is in the Waimalu Ground Water Control Area and the Board of Land and Natural Resources permission is required for increased withdrawal of water from the ground water basin.

Thank you for your comments.

Sincerely,

Barry R. Okuda

BROxp

011
June 19, 1986
86-1336

Mr. Barry R. Okuda
C/O Barry R. Okuda, Inc.
Puuahi Tower, Suite 1900
1003 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda:

I would appreciate a copy of the EIS Preparation Notice for Mokuleia Development Corporation's proposed development at Mokuleia (OECD Bulletin, June 8, 1986). Belt, Collins and Associates is currently reviewing the Waiula-Wai'ahau Wastewater Facility Plan EIS for the City and County of Honolulu, and the information contained in your report will be useful to us.

Sincerely,

Paula R. Goring

Belt, Collins & Associates

No written response required.
Copy of Prep Notice had delivered to Belt Collins 6/27/86.
Mr. Barry N. Okuda  
July 5, 1986  
Page 3

4. Ultimately, two 46 kv circuits from our Waialua Substation will be required to serve the new substation. These circuits will be overlapped on existing pole lines on Farrington Highway to the new substation from opposite directions. This will require State Department of Transportation Highways Division approval. Refer to the attached Map 4 for the location of our future substation.

5. Close coordination will be required between the developer and RECO in order to provide timely service.

Sincerely,

[Signature]

Attachment  
Re. 7-11-86
February 17, 1987

Mr. Deemer Hunger, Ph.D., P.E.
Manager
Hawaiian Electric Co.
P.O. Box 2750
Honolulu, Hawaii 96810

Re: Response to Comments on the EIS Preparation Notice for the Proposed Development at Kahaluu, Oahu

Dear Mr. Hunger:

Thank you for your comments of July 8, 1986. The additional information provided by your comments will be incorporated into the Draft EIS for the project.

Again, thank you for your comments.

Sincerely,

BARRY R. OKUDA
President

BARRY R. OKUDA, INC.

Dear Mr. Okuda:

Please consider the Kahaluu Coalition a concerned party in the preparation of the Environmental Impact Statement for the proposed development at Kahaluu, Oahu by the Hyundai Development Corporation, a subsidiary of the Northwestern Mutual Life Insurance Company.

Thank you.

James Jones
First Vice President
Kahaluu Coalition

JUN 23 1986

47-332 WAIHEE ROAD, KAHALUU, HAWAII 96734
August 13, 1986

Mr. Eddie Stevens
First Vice President
The Kahala Coalition
67-332 Helen Road
Kahala, Hawaii 96816

Re: Request to be a Consulted Party to the Mokuleia Development Proposal Environmental Impact Statement

Dear Mr. Stevens:

In response to your June 10, 1986 letter, enclosed please find a copy of the Preparation Notice for the Proposed Mokuleia Development. The Kahala Coalition is considered a consulted party. If you wish to make comments at this time on the environmental effects of the proposed action, we invite you to do so. We request your comments as soon as possible but in any event, by September 13, 1986.

The Office of Environmental Quality Control has been notified of your interest in the project and has included the Kahala Coalition on the distribution list for the Draft EIS. You will have an opportunity to comment on the project after distribution of the Draft EIS.

Thank you for your interest in the project.

Sincerely,

Barry R. Okuda

cc: Dept. of General Planning
Office of Environmental Quality Control

MOKULEIA COMMUNITY ASSOCIATION
P.O. Box 544, Waialua, Hawaii 96791

June 27, 1986

Mr. Barry R. Okuda
President
Barry R. Okuda, Inc.
P.O. Box 544, Waialua, Hawaii 96791

Re: Per your letter of June 10, 1986 regarding the EIS for the proposed development at Mokuleia, as a resident and property owner in the area, as well as President of the Mokuleia Community Association, I would like to make the following comments:

1. The proposed height and size of the hotel and condominium structures are out of character with the existing character of the area and the designation of the Mokuleia area as the North Shore Development Plan as a rural area - a green belt for Honolulu.

2. Altering the development plans and zoning for one landowner in the area without considering the other major landowners in the Mokuleia-Waialua area opens the door to "leap frogging", piecemeal, poorly planned development of the entire North Shore area. It is in the feeling of the community that before any changes to the North Shore Development Plan are granted to any single developer, that an area-wide planning forum be held to ensure the involvement of all parties concerned, i.e., Bishop Estate, Castle & Cooke, Northwestern Mutual, the various community associations, the Department of Land Utilization, the Land Use Commission, etc. It would be wise to hold this planning forum under the auspices of the City Council.

Yours sincerely,

Barry R. Okuda
The area from Kahului to Keana Point is in the green belt for urban Oahu and as such, its future development needs to be dealt with on a comprehensive, not piecemeal, basis.

3. The traffic congestion on Farrington Highway and in front of the Wailuku High School that will result from the addition of several thousand units of hotel and housing in the Kahului area needs to be taken into consideration as the State Transportation Department's plans do not provide for this magnitude of traffic increase in the area.

Other considerations, such as visual corridors, the airport, the proposed wilderness park at Keana Point, etc., are also important. However, I think the above three items need to be addressed first.

Sincerely,

Michael Delisy
President, Nokulea Community Association

cc: Mr. Leigh Miki
Mr. Marilyn Iwamoto
Mr. Kondo
North Shore Neighborhood Board
Department of Land Utilization

BARRY R. OKUDA, INC.

February 17, 1987

Mr. Michael Delisy
President
Nokulea Community Association
P.O. Box 545
Wailuku, Maui 96793

Re: Response to Comments on the EIS Preperation Notice for the Proposed Development at Nokulea, Oahu

Dear Mr. Delisy,

We are in receipt of your comments dated June 27, 1986 on the subject Pre Prep Notice and respond as follows:

1. Building Heights

The applicant shares your concern that the proposed development at Nokulea be suitable for the area. The Nokulea architects and design consultants are looking at various aspects of the proposal including building siting, landscaping and setbacks to achieve the visual impact compatible with the area.

2. Comprehensive vs. Piecemeal Planning

A comprehensive planning forum under the auspices of the City Council, as suggested by your comment, is currently under way. Council Chair Higashino has scheduled workshops while Planning Committee Chair Box and Chief Planning Officer Clewes and their respective staffs have been working to coordinate efforts at reviewing General Plan and Development Plan issues. Issues raised will have an opportunity to be canvassed by land owners, community groups, planning professionals and government agencies. It is the applicant's hope that the Nokulea Community Association, landowners and other interested parties will take an active role in the General Plan amendment process.

3. Traffic Impact

As part of the EIS process, the applicant commissioned a traffic study by the firm of Parsons, Becheroff, Haas & Douglas to examine the adequacy of existing facilities in the area to handle the traffic...
generated by the proposed development. The study found that traffic could be adequately handled by the proposed project at full development. A complete copy of that study will be included in the Draft EIS.

4. Other Considerations

a. View Corridors

The applicant agrees that the visual impacts, including the view corridors, are important.

b. Dillingham Field

A discussion of the potential noise impacts of Dillingham Field on the project is included in the Barry and Associates noise impact study for the proposed development. A copy of the study will be appended to the Draft EIS.

c. Proposed Kaena Point State Park

The EIS will discuss the various recreation amenities existing and proposed for the Mokuleia area, including the Kaena Point State Park.

Thank you for your comments. We look forward to comments after you have had an opportunity to review the Draft EIS.

Sincerely,

[Signature]

Barry B. Okuda

[Title]

June 26, 1986

Mr. Barry B. Okuda

Mr. Barry B. Okuda, Inc.

Pono Tower, Suite 1900

1001 Bishop Street

Honolulu, Hawaii 96813

Dear Mr. Okuda:

Thank you for transmitting a copy of the EIS Preparation Notice for the proposed development at Mokuleia.

Our company is interested in the economic and social impact of the proposed project and we look forward to reviewing these issues as the EIS is prepared.

May I also suggest that you include the State Department of Labor & Industrial Relations, Office of Employment & Training, on your list of consulting agencies.

[Signature]

Robert F. Comau

Executive Director
February 17, 1987

Mr. Robert F. Owens
Executive Director
North Shore Career Training Corp.
P.O. Box 455
Hibbert, Hawaii 96731

Re: Response to Comments on the EIS Preparatory Notice for
the Proposed Development at Nokulua, Oahu

Dear Mr. Owens:

We have received your comments dated June 26, 1986 on the
subject Prepara EIS and respond as follows:

Comment 1:
The economic and social impacts of the project will be
discussed in the Draft EIS. The Office of Environmental
Quality Control has been notified of your interest in the
project and has included the North Shore Career Training
Corp. in the distribution list for the Draft EIS.

Comment 2:
The State Department of Labor and Industrial Relations,
Office of Employment and Training, has been contacted for
comments at your request. Their comments will be incor-
porated in the Draft EIS.

Thank you for your interest in our project. We look forward
to your comments on the Draft EIS.

Sincerely,

BARRY R. OKUDA

August 13, 1986

Department of Labor and Industrial Relations
Office of Employment and Training
830 Punchbowl Street, Room 204
Honolulu, Hawaii 96813

Re: Information on the Nokulua Development Proposal

Gentlemen:

Enclosed please find a copy of the Prep Notice for the Nokulua
Development Project. We are forwarding the information to your
department at the request of the North Shore Career Training
Corporation, which is one of the consulted parties to the EIS
process.

If you wish to make comments at this time on the environmental
effects of the proposed action we invite you to do so. We
request your help in getting the comments as soon as possible
but in any event, by September 12, 1986. If you do not wish to
comment at this time you will have another opportunity to comment
on the Draft EIS.

Sincerely,

BARRY R. OKUDA

cc: Dept. of General Planning
Office of Environmental Quality Control

1201 Bishop Street, Palama Tower Suite 1200
Honolulu Hawaii 96813 250-6261

1201 Bishop Street, Palama Tower Suite 1200
Honolulu Hawaii 96813 250-6264
June 26, 1985

BARRY R. OKUDA, INC.

February 17, 1986

Mr. Meryl H. Andersen, Chairman
North Shore Neighborhood Board #77
P. O. Box 607
Kailua, Hawaii 96734

Dear Mr. Andersen:

Thank you for your comments on the subject of the EIS. We respond as follows:

Comment 1: Use of Private Archaeological Consultant

Selection of consultants for preparation of environmental impact statements is usually based on a number of factors: the availability of the consultant; previous experience; and, cost. Archaeological Consultants of Hawaii, Inc., headed by Mr. Joseph Kennedy, was selected to perform the study based on a number of criteria as discussed above. It should be noted that there are a number of archaeological consultants who normally provide services for EIS's and other research, the Bishop Museum being only one of the providers.

Comment 2: Keeping the Board Informed

The applicant intends to keep the Board informed during the EIS process. At the applicant's request, the Office of Environmental Quality Control has included the Board in the distribution list for the Draft EIS. The Board will have an opportunity to comment on the Draft EIS once it is distributed.

Subsequent Comments

After publishing of the Draft EIS, the Board considered the comments of the following individuals and organizations: Archaeological Consultants of Hawaii, Inc.; City and County of Honolulu; and the Office of Environmental Quality Control. The Board adopted the Draft EIS on June 13, 1984.

The Board also considered the comments of the following individuals and organizations: Archaeological Consultants of Hawaii, Inc.; City and County of Honolulu; and the Office of Environmental Quality Control. The Board adopted the Draft EIS on June 13, 1984.

Sincerely,

Meryl M. Andersen
Chairman

cc: Neighborhood Commission
ten comments. With the publishing shortly of the Draft EIS for the proposed
Development Plan amendment (regarding the specific project at Mokuleia),
these remaining concerns will be covered. The following is a list of the
concerns and the specific studies and their location in the Draft EIS:

Draft EIS Appendix

1. Economic Study
2. Archaeological
3. Traffic
4. Housing
5. Lifestyle
6. Redevelopment
7. Airfield
8. Building Heights
9. Employment

A
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C
E
F
G
H
I

Thank you for your comments. We look forward to your comments on the
Draft EIS.

Sincerely,

Tony R. Okada
Barry R. Okada

June 18, 1986
Barry R. Okada
c/o Barry R. Okada, Inc.
Pauahi Tower, Suite 1000
1001 Bishop Street
Honolulu, Hawaii 96813

Re: EIS for Proposed Development at Mokuleia, Oahu

I would like to be a consulted party on this project. Please put me on the
list to receive a copy of the draft EIS.

Sincerely Yours,

J. A. Parnell

J. A. Parnell
August 13, 1986

Mr. J. A. Parsons
P.O. Box 27500
Honolulu, Hawaii 96827

Re: Request to be a Consultant Party to the Mokuleia Development
Proposal Environmental Impact Statement

Dear Mr. Parsons:

In response to your June 18, 1986 letter, enclosed please find a copy of the preparation notice for the proposed Mokuleia Develop-
ment. If you are interested, you may wish to make comments at this time on the environmental affects of the project. You should do so.

The Office of Environmental Quality Control has been notified of
your interest in the project and has included you on the distribution list for the Draft EIS. You will have an opportunity to comment on
the project after distribution of the Draft EIS.

Thank you for your interest in the project.

Sincerely,

Barry R. Okuda

cc: Dept. of General Planning
Office of Environmental Quality Control

10 July 1986

Mr. Barry R. Okuda
REGARDING NORTHWEST/MOKELEIA PROJECT

Gail, Tower Suite 1900
1000 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Okuda,

The Honolulu Group Conservation Committee did not have a
chance to meet before the July 8, 1986 deadline. At our meeting this evening it was decided that we would most
earnestly seek to be considered an interested party.

Therefore I am asking that you send to our office the
Environmental Impact Statement for the NorthWest/Mokuleia
project.

With best wishes,

yours truly

Gary Anderson, Conservation Chair
Honolulu Executive Committee

Gail

Mr. Hawaii's Chapter

RICH!

GARY ANDERSON, Conservation Chair
Honolulu Executive Committee
February 27, 1987

Mr. Gary Anderson
Conservation Chair
Sierra Club, Hawaii Chapter
Honolulu Group
P.O. Box 31570
Honolulu, Hawaii 96828

Re: Response to Comments on the EIS Preparation Notice for
the Proposed Development at Makaha, Oahu

Dear Mr. Anderson:

Thank you for your letter of July 15, 1986 regarding the
subject of your interest in the project and has enclosed the Sierra
Club on the distribution list for the Draft EIS.

Thank you for your letter. We look forward to your comments
on the Draft EIS.

Sincerely,

Barry R. Okuda

Mr. Barry R. Okuda
Honolulu Tower Suite 1900
1001 Bishop Street
Honolulu, Hawaii 96813

Mr. Okuda:

SUBJECT: Environmental Impact Statement Preparation Notice
Development of Makaha, Oahu, Hawaii

Thank you for your letter of June 28, 1986 regarding the
development of Makaha, Oahu, Hawaii preparation notice of
the environmental impact statement. We appreciate being
informed.

We have no comments at this time other than, we hope care
will be taken to preserve the rural character of Makaha.

Thank you for the opportunity to review the EIS preparation
notice.

Sincerely,

Barry R. Okuda

Mr. Okuda

Ms. Smith

Master Plan Chairperson

Read 7-28-86
February 27, 1987

Mr. Eric Tanouchi, President
Hawaii Community & Business Ass'n, Inc.
2375 California Avenue
Honolulu, Hawaii 96814

Ref: Response to Comments on the EIR Preparation Notice for the Proposed Development at Hikalapa, Oahu

Dear Mr. Tanouchi,

Thank you for your letter of July 23, 1986 regarding the subject EIR Notice.

The applicant shares your concern that the proposed development at Hikalapa be suitable for the area. The Hikalapa architects and design consultants are looking at various aspects of the proposal including building siting, landscaping and setback to achieve the visual impacts compatible with the area.

Thank you for your letter. We look forward to your comments in the future.

Sincerely,

Barry R. Okuda
BARRY R. OKUDA, INC.

1591-5888

1987-02-27

1987-02-27
PART XIII

AGENCIES, ORGANIZATIONS AND PERSONS
WHO WERE SENT A COPY OF THE DEIS;
WRITTEN COMMENTS RECEIVED DURING
THE PUBLIC REVIEW PERIOD; AND RESPONSES

The Draft EIS was officially received by the Office of Environmental
Quality Control on February 20, 1987 and was published in the
February 23, 1987 OEQC Bulletin. Sixty-seven (67) copies of the DEIS
were provided to OEQC; distribution is shown in Exhibit 26. A total
of 37 letters were received; 5 after the deadline for comments. Of
this total, 27 responses were sent, 25 to comments received within
the public review period and 2 to comments received after the public
review period.
Summary of Letters Received and Responses Sent

Agency Organization

Federal
U.S. Department of Agriculture – Soil Conservation Service (*)
U.S. Department of Army – Corps of Engineers (**)
U.S. Department of the Army – Directorate of Facilities Engineering (1)
U.S. Department of Interior – Geological Survey (*)
U.S. Department of Interior – Fish & Wildlife (**) 
U.S. Department of the Navy – Naval Base, Pearl Harbor (*)
U.S. Department of Transportation – Federal Aviation Administration (**) 

State
Department of Accounting and General Services (*)
Department of Agriculture (**)
Department of Defense – Air National Guard (*)
Department of Education (**)
Department of Health (1)
Department of Land & Natural Resources (**) 
Office of Hawaiian Affairs (**) 
Department of Planning and Economic Development (**) 
Department of Transportation (1)
University of Hawaii – Environmental Center (**) 
University of Hawaii – Water Resources Center (**) 

City & County
Board of Water Supply (*)
Building Department (**)
Fire Department (1)
Department of General Planning (**)
Department of Housing & Community Development (**)
Department of Land Utilization (**) 
Department of Parks & Recreation (**)
Police Department (**) 
Department of Public Works (**) 
Department of Transportation Services (**)
Private Organizations and Individuals

Hawaiian Electric (*)
Life of the Land (**)  
Mr. Jim Richardson (**)  
The Salvation Army (**)  
Mr. William Ramos Saunders (**)  
Sierra Club (**)  
Mr. Ed Stevens (**)  
North Shore Career Training Center (1)  
North Shore Neighborhood Board (**)  

(1) DATED AFTER 3/25/87 DEADLINE FOR COMMENTS

NOTE: Comments dated after March 31, 1987 and corrections to responses are included at the end of Part XIII
DISTRIBUTION LIST

EXHIBIT 26

Title: Mokuleia Development Proposal

Location: Mokuleia, Oahu

Proposing Agency/Applicant: Northwestern Mutual Life Insurance Co.

Accepting Authority/Approving Agency: City and County of Honolulu, Dept. of General Planning

Deadline for Comments: March 25, 1987

Date Sent/By: FEB 24 1987

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UNIVERSITY OF HAWAII

Environmental Center | 4 |

Marine Programs (a)* | 1 |

Water Resources Research Center | 1 |

FEDERAL

Army-DAFE (Facilities Eng., USASCH) | 1 |

Environmental Protection Agency (a)* | 1 |

Navy | 1 |

Soil Conservation Service | 1 |

U.S. Army Corps of Engineers | 1 |

U.S. Coast Guard | 1 |

U.S. Fish and Wildlife Service | 1 |

U.S. Geological Survey (a)* | 1 |

Library Copy: 1

Total Received: 67

Copy of Distribution List Sent to: Barry R. Okuda, Inc.; DGP

Total Distributed: 66

Date: FEB 26 1987

File Copy: 1

(a)* Copy desired only if project involves the agency's responsibilities.
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**CITY AND COUNTY OF HONOLULU (b)**

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Mr. Henry A. Sumida  
Airports District Office  
Federal Aviation Administration  
U.S. Dept. of Transportation  
Box 50244  
Honolulu, HI  96850-0001

Mr. Edwin Stevens, First Vice Pres.  
The Kahalu‘u Coalition  
47-232 Waihee Road  
Kahalu‘u, HI  96744

Mr. Michael Dailey, President  
Mokuleia Community Association  
P.O. Box 686  
Waialua, HI  96791

Mr. Robert F. Comeau,  
Executive Director  
North Shore Career Training Corp.  
P.O. Box 465  
Kahuku, HI  96731

Ms. Meryl M. Anderson, Chairperson  
North Shore Neighborhood Board #27  
P.O. Box 607  
Haleiwa, HI  96712

Ms. J. A. Parnell  
P.O.Box 27506  
Honolulu, HI  96827

Mr. Gary Anderson  
Conservation Chair  
Sierra Club, Hawaii Chapter  
Honolulu Group  
P.O. Box 11070  
Honolulu, HI  96828
Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City & County of Honolulu
650 S. King Street
Honolulu, HI 96813

March 9, 1987

Dear Mr. Clegg:

Subject: DEIS - Mokuleia Development Proposal, Mokuleia, Oahu

We reviewed the draft environmental impact statement for the subject project and have no comments to make.

Thank you for the opportunity to review the document.

Sincerely,

[Signature]

RICHARD H. BOURNE
State Conservationist

CC: Mr. Barry R. Quido
Harry P. Okuda, Inc.
Paseki Tower, Suite 1900
1021 Bishop Street
Honolulu, HI 96813

FAX 3-14-77

NO RESPONSE REQUIRED

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
GUARDIAN BUILDING
64-300 OHEAHI STREET
HONOLULU, HAWAII 96813

Mr. Donald A. Clegg, Director
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

March 9, 1987

Dear Mr. Clegg:

Thank you for the opportunity to review and comment on the draft EIS for Mokuleia Development Proposal, Mokuleia, Oahu. The following comments are offered:

a. The project description is still on the conceptual/schematic level; it is difficult to tell permit requirements as details are not available at this point.

b. A brief review indicates that there may be work along headwaters stream (Mokuleia) for drainage, possible filling of pond/wetland areas which may be under Corps jurisdiction (zone non-man), and work along the shoreline for drainage and creation of inland waterways. When plans are available, the applicant should coordinate with Operations Branch (telephone: (808)438-3528).

c. Page 11-1. Contrary to the applicant's 17 February 1987 response, the Operations Branch has not been consulted to date.

THK 6-7-2:10.14 & 6-8-8:23. The parcels identified by these tax maps are shown on the area map for Waimanalo. According to the Flood Insurance Study for the City and County of Honolulu, the parcels are within an area designated Zone C and D. Zone C (Zone D) are areas of minimal flooding. These zones are not considered flood plain areas. Zone D represents unstudied areas under the Federal Insurance Administration study since no information on potential flood hazards have been identified for these areas. These areas have undetermined, but possible flood hazard occurrence.

d. THK 6-8-2:1. The parcel identified by this tax map is shown on the tax map for the area of Waimanalo. According to the Flood Insurance Study for the City and
County of Honolulu, the parcel is located in designated Zones A, AM, and V12. Zone A are special flood hazard areas inundated by the 100-year flood determined by approximate methods; no base flood elevations are shown or flood hazard factors determined. Zone AM are special flood hazard areas inundated by the 100-year flood, determined by detailed methods; the base flood elevation for this parcel is 10 to 12 feet mean sea level. Zone V12 are special flood hazard areas along coasts inundated by the 100-year flood as determined by detailed methods and that have additional hazards due to wave action. The base flood elevation for this project is 10 to 12 feet mean sea level.

f. THK 6-8-3:17.14.30.19. These parcels are designated Zones A4 and X (Formerly Zone C). The zones have been described in the previous paragraphs.

g. THK 6-8-1:19.30.31. The parcels are within Zones X and D which have been previously described.

h. THK 6-8-1:15.6 & 6-8-2:1.6. The parcels are designated Zone D.

i. THK 6-8-3:19. The parcels are designated Zones A and X and have been described in the previous paragraphs.

j. THK 6-8-3:20.30.33.34.35. The parcels are within Zone X, area of minimal flooding.

Sincerely,

[Signature]

Enclosures

Xieku Phoon
Chief, Engineering Division
April 8, 1987

Mr. Kinuk Cheung, Chief
Engineering Division
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96852-5440

Re: Responses to Comments on the DEIS for the Proposed Development at Kukuiheia, Oahu

Dear Mr. Cheung:

Thank you for your comments of March 9, 1987 regarding the subject DEIS. We respond as follows:

a. Conceptual Nature of Proposal. You are correct in your assessment of the design stage of the project. At this point the project is at the conceptual/schematic level and it is difficult to determine what permits may be required.

b. Potential Permit Requirements. We concur with your assessment that permits may be required from the Corps for certain improvements and will contact the Corps Operations Branch when plans are available. Part XI of the EIS indicates that Corps of Engineers Permits may be necessary for the project.

c. Resonable Response. The applicant's response to the Corps comments on the Preparation Notice were in error when they indicated that contact with the Operations Branch had already been made.

Sincerely,

Wm. E. Hanley

cc: Department of General Planning
United States Department of the Interior
Geological Survey
Water Resources Division
P.O. Box 50184
Honolulu, Hawaii 96850
March 13, 1987

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Draft Environmental Impact Statement for the Mahalea Development Proposal, Mahalea, Oahu

The Hawaii District office of the U.S. Geological Survey, Water Resources Division has reviewed the subject DEIS and has no comments.

As requested, we are returning the Draft EIS to the State Office of Environmental Quality Control, and thank you for the opportunity to review it.

Sincerely,

[Signature]
District Chief

Copy to: Mr. Barry K. Okada
Barry K. Okada, Inc.
Pandil Tower, Suite 1900
1001 Bishop Street
Honolulu, Hawaii 96813

No response required.

United States Department of the Interior
Fish and Wildlife Service
360 Kamehameha Boulevard
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement, Mahalea Development Proposal, Mahalea, Oahu

Dear Mr. Clegg:

We have reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Development Plan, Land Use, and Public Facilities amendment to the North Shore Development Plan and offer the following comments for your consideration.

General Comments:

Our August 19, 1986 letter to Mr. K. Tsh-Woo; or September 18, 1986 letter to Mr. Barry Okada; or December 22, 1985 and March 13, 1987 letters to your office; and our September 4, 1986 meeting with Mr. Barry Okada, Mr. William W. Van Veen, and Mr. Andy Yuen focused on the location of wetlands and their use by endangered Hawaiian waterbirds within the project area. We remain concerned about the long term maintenance of wetlands, protection of endangered waterbirds from commercial and recreational contamination and development within the project area.

In addition to these wetland resources, we are concerned about potential secondary impacts to native dry land forest and candidate endangered plants in the Mahalea, Nahu He'e, and Kauhoolo Forest Reserves from proposed development. We are also concerned about potential impacts to nearshore water quality and fishery resources from changes in local stream drainage, increased urban runoff, and construction of a large inland lagoon and shoreline protection structures.

Specific Comments:

1. Exhibit 32: Mahalea Conceptual Plan. The proposed conceptual plan includes a large inland lagoon directly connected to the ocean. This lagoon also encompasses the ponds at Crowder

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Ranch and wetlands at the mouths of Makahana and Kapala'au streams. This lagoon design would eliminate endangered waterbird habitat and use at these ponds and wetlands. This design is not acceptable to the Service. We support the recommendation in the DEIS (pages 49-50) that design, planning, and modification of these wetlands be done in consultation with our office. We recommend the State Division of Forestry and Wildlife also be consulted on potential wetland modification.

b. Pages 11-14, 15-16, 19-20, 20-21, and 21-22. camping and hiking trails. The DEIS states that additional trails and campgrounds may be developed in the dry upland areas to provide "natural/educational" sites available to the general public. The location of potential campsites and trails within the upland areas should be specified in the Final EIS.

We are concerned about potential secondary impacts to native dry land forest and candidate endangered plants found in the Mahole'ia, Mahana, and Kamehame Forest Reserves from increased camping and hiking activities in the upland areas. Several candidate endangered plants including Pupukea koa, Schiedes' haelew, and Phoebea oblongifolia, and Potspoa dura and Potspoa bicolor are found within the Mahana Forest Reserve. Of these, Pupukea koa is one of the forest and is presently under review by the U.S. Army Corps of Engineers for permit requirements.

Increased camping and hiking activities in the dry upland areas of the Mahana Forest Reserve may substantially increase the potential for accidental wildfires spreading into the forest reserves and destroying these candidate endangered plants. Fires spreading into these forest reserves may be difficult to control because of the topography, isolation, and abundance of invasive grasses and other vegetation. In addition to fire threat, camping and hiking activity may increase the potential for introduction of exotic plant competitors into the forest reserves and improved access roads and trails may encourage off-road vehicle activity causing erosion and habitat degradation. The Final EIS should discuss potential secondary impacts to the native dry land forest and candidate endangered species and mitigation measures such as fire control.

c. Page IV-6. Nearshore Marine Environment. This section states the major impact to nearshore waters would be the rerouting of Kapala'au Stream to Makahana Stream. However, the construction of a large inland lagoon directly connected to the ocean would be an additional major impact to water quality and nearshore fishery resources at Kapalama Bay. The lagoon may intercept the groundwater table and concentrates the release of low salinity water at the mouth of the lagoon. This may lower the salinity immediately within Kapalama Bay. The lagoon may also be enriched with nutrients from groundwater inputs, and depending on the lagoon's flushing characteristics, may cause algal blooms within the lagoon. These nutrient levels and algal blooms may affect water quality within Kapalama Bay. These impacts should be discussed in the Final EIS.

In addition, potential impacts to threatened green sea turtles (Chelonia mydas), endangered humpback whales (Megaptera novaeangliae), and nearshore fishery resources should be discussed with the National Marine Fisheries Service and the State Division of Aquatic Resources, and addressed in the Final EIS.

d. Page IV-8. Coastal Erosion. This section states that coastal erosion may be artificially stabilized by constructing seawalls or other barriers. These barriers should be discussed in the Final EIS. If construction work to coastal waters is planned, we recommend the applicant contact the U.S. Army Corps of Engineers for permit requirements.

e. Page IV-13. The Federally listed endangered Hawaiian monk seal (Monachus schauinslandi) has been observed in the wetland areas near Kapala'au and Makahana streams. The effect of rerouting Kapalama Stream to Makahana Stream on endangered waterbirds and their wetland habitats should be discussed in the Final EIS. It is not clear if the terrestrial food source (Appendix 1) included these wetlands.

f. Page IV-S5-S6. Sewage Disposal. The DEIS states that a sewage disposal system would be needed to accommodate the proposed development. The Final EIS should discuss whether an ocean outfall would be used for effluent disposal.

g. Page IV-57-58. Drainage. This section states that runoff would be contained within a retention basin on the mountainside of Farrington Highway. The effectiveness of the proposed retention basin to contain runoff and limit sediment input into nearshore waters should be discussed in the DEIS. In addition, the discharge of stormwater runoff containing waste petroleum products from streets and parking areas may render the retention basin unsuitable for an endangered waterbird habitat. We support the use of retention basins, and recommend parklands, open spaces, and dry wells be used to prevent stormwater runoff from entering coastal waters.
Summary Comments

Native dry land forest, candidate endangered plants, wetlands, endangered waterbirds, nearshore fishery resources, and water quality may be affected by proposed resort developments at Mokule‘ia. We are available to work with the developer to further identify candidate endangered plant species within the Mokule‘ia, Haena Kaa‘au, and Eukahela Forest Reserves and mitigation measures to protect these resources; on the design, protection, and management of wetlands and endangered waterbird habitats; and on protection of nearshore fishery resources and water quality affected by the proposed project. For further information, please contact Mr. John Ford (541-2307) or Mr. Andy Tusa (541-2761).

We appreciate the opportunity to comment.

Sincerely,

[Signature]

Enrerto Tusa
Project Leader
Office of Environmental Services

Enclosure

cc: DLNR
    DMES - WPPO
    CEN, Hana‘i
    CEN, Portlnd
    EPA, San Francisco
    CE, Operations Branch
    Mr. William Waikey
    OHA
    OSEC

Mr. Donald A. Clagg  
Chief Planning Officer  
Department of General Planning  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813

Re: 1987 Development Plans Annual Amendment Review, Oahu

Dear Mr. Clagg:

We have reviewed the 1987 Development Plans Annual Amendment Review for Oahu and offer the following comments for your consideration:

a. Wetlands and buffer zones within the proposed development at Mokuleia (ROP Reference No. R7/RS-1) should be zoned preservation to protect their habitat values for Federally listed endangered Hawaiian waterbirds (enclosure 1). The Hawaiian coot (Fulica pacifica fulica), Hawaiian moorhen (Gallinula chloropus waiopepehane), and the Hawaiian stilts (Dolichopipe waiopehu nanekealii) have been observed using the wetlands at Mokuleia.

b. Details of the proposed Mokuleia Resort Water Wells (ROP Reference No. R7/RS-1007) should be reviewed by the appropriate natural resource agencies to ensure that groundwater withdrawal will not adversely affect wetlands in the project area.

c. Our office is working with Campbell Estate to eliminate runoff and drainage from the proposed industrial site (ROP Reference No. R7/RS-1) from affecting the Service's James Campbell National Wildlife Refuge, Kikoi Unit (enclosure 2). We request that this drainage problem be resolved prior to the proposed land use designation change from Agriculture to Industrial.

d. The proposed development of 1,260 residential units (ROP Reference No. R7/RS-2) adjacent to the Service's Pearl Harbor National Wildlife Refuge, Honolulu Unit, may be incompatible with Refuge goals and mandate (enclosure 3). A large residential development may create adverse secondary impacts to

our Refuge from increased predation of endangered waterbirds by pet and feral dogs and cats, increased disturbance to endangered waterbirds from trespassers and increased human activity near the Refuge, and changes in runoff patterns and water quality. At this time, we recommend further study and discussion of the potential impacts to our Refuge from the proposed housing development before amending the land use designation for this site.

We appreciate this opportunity to comment. If you have further questions, please contact Mr. John Ford (541-3757) for further coordination.

Sincerely,

[Signature]  
Ernest Rosato  
Project Leader  
Office of Environmental Services

Enclosures

cc: BMR  
DLNR

Save Energy and You Serve America!
April 8, 1987

Mr. Ernest Kozaka
Office of Environmental Services
United States Department of the Interior
Fish & Wildlife Service
360 Ala Moana Boulevard
P.O. Box 50167
Honolulu, Hawaii 96850

Re: Responses to Comments on the DEIS for the Proposed Development at Makulea, Oahu

Dear Mr. Kozaka:

Thank you for your comments of March 23, 1987 regarding the subject EIS. We respond as follows:

General Comments

The general comments included concerns focused on the location of wetlands, their use by endangered Hawaiian Waterbirds, and the long-term maintenance and protection of these habitats. In addition, concerns include endangered plants in the dry land forest as well as impacts on near-shore water quality, fisheries resources, urban runoff construction of an inland lagoon and shoreline protection structure.

Response

We share your concern for the general issues raised. The plan which has been developed in conceptual at this time and therefore cannot contain design details which demonstrate final solutions to numerous issues raised by a project of this scope and scale. We believe that the approach taken in the DEIS to identify and discuss areas of concern as well as to indicate potential mitigating measures is the intent of the EIS process. We intend to expand the discussion in the Final EIS on the issues raised in the comments to the DEIS by agencies and others commenting.

Responses to Specific Comments

a. Inland Lagoon: The conceptual plan and choice of the word "lagoon" as the impression of an inland body of water with some sort of connection to the ocean is unfortunate. Perhaps a better description would be water feature or open space/water feature. No ocean connection via stream is intended or planned. The large pond area could actually consist of a number of independent ponds separated by landscaped buffer zones.

The applicant notes that you support the DEIS recommendation that the applicant work with your office in the design, planning and modification of the wetlands and areas. In addition, your suggestion of coordinating and consulting with State Division of Forestry and Wildlife on potential wetland modification will be incorporated into the Final EIS.

The fact that there have been communications on a number of occasions between your office and the applicant indicate a willingness to work together on both sides.

b. Mountain Access

The question of mountain access has been the subject of a number of comments on the DEIS and in discussions that the applicant has had with community groups and area residents. Comments from the Department of Land and Natural Resources and Department of Planning and Economic Development underscore a keen State interest. It should also be noted that State and County Law and ordinances also require that mountain access be provided in the case of future developments such as the proposed Makulea development. It should also be pointed out that the information provided by Fish & Wildlife indicates that the area where the endangered plants are located are owned and under the control of the Board of Land and Natural Resources and its Forestry Department which currently maintains trails and camping areas in the Peacock Place area. The
applicant has proposed access via the existing Mike Road to the mountain areas.

The intent of the development proposal is to re-establish public access to the forest reserve and Peacock Flats area under a controlled management program. The program would include supervised use of this wilderness area for recreational/educational purposes, thereby minimizing the danger to endangered plant species and increasing the public’s awareness of the unique flora to the area. A resource management program will be developed to control access and activity relative to the maintenance and management of this sensitive ecosystem.

Camp and Hiking

The DEIS states that additional trails and campgrounds may be developed in the upland areas which would be available to the general public. The U.S. Fish and Wildlife Service is concerned about the secondary impacts to the native dryland forest and candidate endangered plant species found on the adjacent Mokuleia Forest Reserve and the Punalu'u Natural Area Reserve by the increased human activity.

A number of mitigating measures are available, including:

1. Keep upland areas in present use. These upland areas have been used for grazing cattle. Grazing cattle and, perhaps, horses could be continued. Guided activities such as horseback riding and nature walks could be allowed.

2. Limited use. The upland areas could be opened for day hiking only, no camping. Picnic shelters with appropriate facilities for open fires for cooking would be established.

3. Camping and hiking allowed. Increased activity in the upland areas will require an active management and control system. The following suggestions are offered:

Upland Resource Management Program. This program (manager and staff) would be involved in issuing camping permits, monitoring and policing visitors and campers, trail maintenance, etc.

This office would be responsible for making sure Mokuleia hikers and campers do not go onto State forest reserve lands without appropriate permits from DOFAW. The office would also work closely with DOFAW and the Division of Conservation and Resources Enforcement (DCARE) as well as the U.S. Fish and Wildlife Service.

Fire Control System. Camping allowed only on designated areas with facilities for open fires—fire pits, barbecue grills, etc. Or open fires could be banned: gas stoves, et cetera, etc. used for cooking. Water tanks should be located near each campground. A system of firebreak roads and a fire fighting plan should be set up in coordination with DOFAW.

In the options presented above, all vehicular traffic would be restricted to paved or gravel-lined roads (for service vehicles). No off-road vehicle (ORV) activity, dirt-bikes, etc., would be allowed.

A Resource Management Program would be developed in consultation with the Fish and Wildlife Service, the Board of Land and Natural Resources Forestry Division, and other concerned and interested parties. The applicant believes that this would be the most appropriate forum for developing a mountain access program which addresses the many concerns.

c. Lagoon/ocean connection. As discussed in our reply to Comment (a), no connection is planned or envisioned between the "Lagoon" and the ocean. As indicated, the plan is conceptual and suggests an area set aside to provide for maintenance of wildlife as well as to provide for drainage improvements. Discharge into the ocean would be limited to intermittent drainage requirements caused by heavy rains which exist today and cause intermittent discharge into the bay. Through the construction of drainage improvements such as settling basins and holding ponds it is possible to maintain discharge at current levels or less and to maintain or improve the quality of the water being discharged. Green sea turtles and humpback whales will be discussed in the Final EIS.
d. Seawalls/artificial barriers. The EIS stated that construction of seawalls was a potential mitigating measure. It is not the applicant's intent to propose the use of seawalls or artificial barriers. The mention of seawalls in the EIS was simply to disclose that they are available as an option, although an undesirable one. The Final EIS will clarify this point. The applicant prefers the use of setbacks in order to mitigate against erosion potential.

e. Draining streams. As indicated in the responses to Comments (a) and (c), the concept plan showed a single stream. This would potentially reduce the stream-associated wetlands area. The fauna survey did consider this area, however, concentrated on the pond areas where higher concentrations of endangered birds were thought to be present. This point will be clarified in the Final EIS.

f. Sewage. The DEIS states that disposal of effluent would be in injection wells. The Final EIS will contain an expanded discussion of sewage.

g. Drainage. The Drainage section of the EIS will be modified to include the suggestions made in this comment.

Comments made by your Department on March 13, 1987 regarding the subject project on the 1987 Development Plan Annual Review will be included in the Final EIS.

Again, thank you for your comments.

Sincerely,

William E. Wackett

[Signature]

DEPARTMENT OF THE NAVY

Mr. Ernest Ronska
April 3, 1987
Page 5

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
HONOLEA DEVELOPMENT PROPOSAL

The Draft EIS for the Honolea Development Proposal has been reviewed and we have no comments to offer. Since we have no further use for the EIS, it is being returned to the Office of Environmental Quality Control.

Thank you for the opportunity to review the Draft.

Sincerely,

1 C. C. Crane
Deputy, CEC, U.S. Navy

[Signature]

Enclosure

Copy to:
Mr. Barry B. Udono
Barry B. Udono, Inc.
Pacific Tower, Suite 1000
1001 Bishop Street
Honolulu, HI 96813

Office of Environmental Quality Control

NO RESPONSE REQUIRED
March 25, 1987

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

We have reviewed the Draft EIS for the Makuleka Development Proposal, Makuleka, Oahu, transmitted on February 24, 1987.

Based upon the noise study by Darby and Associates which noted that aircraft noise levels would be approximately 53 dbA and never exceed 55 dbA on the residential and resort parcels, we have no negative comments toward the proposal.

We appreciate the opportunity to review this Draft EIS which is returned per request. Please send us one copy of the final EIS for our use and files.

Sincerely,

David J. Wellhouse
Airport Engineer/Planner

Henry A. Sumida
Airport District Office Manager

CC:

Walter R. Chuda

April 8, 1987

Mr. Henry A. Sumida
Airport District Office Manager
Airport District Office
Federal Aviation Administration
P.O. Box 30244
Honolulu, Hawaii 96850-0001

Re: Responses to Comments on the DEIS for the Proposed Development at Makuleka, Oahu

Dear Mr. Sumida:

Thank you for your comments of March 25, 1987 regarding the subject EIS. We respond as follows:

As a matter of clarification, the Darby study (Appendix K of the DEIS) indicates on page 8 that Report Parcel 6, 7, and 8 (as identified in the Darby study) might be subject to 60 dbA noise levels and that sporadic military operations might generate special sound impacts.

In addition, we have received comments from the Department of General Planning indicating that aircraft noise impacts might impact a larger area of the proposed project due to information they have on an AICS for Billingham Field.

Military officials have been contacted for further information. Information made available by the military will be included in the final EIS.
Mr. Henry A. Sumida  
April 8, 1987  
Page 2

Darby and Associates, our acoustical consultant, has been retained to review and assess the additional information received and their input will be included in an expanded noise section of the Final EIS.

Sincerely,

William E. Waskett  
VPP

cc: Department of General Planning
MEMORANDUM

To: Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu

Subject: Draft Environmental Impact Statement (DEIS) for Hokule'a Development Proposal (Secondary Resort Area)
Hokule'a, Oahu
THK: 6-8-02: 1, 6, 10, 14
6-8-03: 5, 6, 11, 15, 16, 17, 19, 20, 22, 23, 24, 25, 26, 30, 34, 38, 39, 40
Area: 2,887.2

The Department of Agriculture has reviewed the subject DEIS and offers the following comments.

The DEIS addresses many of the concerns we expressed in our July 8, 1986, comments on the Environmental Impact Statement Preparation Notice, as well as our December 22, 1986, comments on the earlier DEIS. However, there remain several issues that need further elaboration.

Exhibit 10 of the subject DEIS is a copy of the Land Study Bureau (LSB) Detailed Land Classification map for the area, including the proposed resort development. There should be a textual description of the LSB soil classification system similar to that done for the Soil Conservation Service (SCS) Soil Survey and the Agricultural Lands of Importance to the State of Hawaii (ALISH) maps.

We requested information on "(t)he effect of the proposed development on the ongoing cultivation of sugarcane in fields adjacent to the portion of the project on the mauka side of Farrington Highway" (memorandum to Mr. Barry R. Okuda, dated July 8, 1986). We note that the DEIS describes the potential noise from sugarcane operations (DEIS, page IV-25). There may also be adverse impacts associated with the burning of
canefields prior to harvesting. The Hawaii Right-to-Farm Act (Chapter 165, Hawaii Revised Statutes) limits the circumstances under which existing farming operations may be deemed a nuisance.

The DEIS contains a rather pessimistic view of agriculture in Hawaii (DEIS, page IV-16 to IV-21, and Appendix G). The Department of Agriculture takes a more optimistic and broader view of the future of agriculture in Hawaii. In the determination and protection of "important agricultural lands", it is the State's duty to assure the availability of agriculturally suitable lands. Therefore, it is appropriate that the State maintain what appears to be a surplus of productive lands as a resource in their own right. Incremental losses of a resource like prime arable land, if left uncontrolled, will have a devastating and irreversible cumulative affect on the viability of agriculture. Once agricultural lands are urbanized there is no return. This cannot be overemphasized.

There is no reference in the DEIS to Priority Guidelines 226-104(b)(2) and 226-104(1) which direct development into marginal or non-essential agricultural lands to meet housing needs, and "...maintain agricultural lands of importance in the agricultural district".

Thank you for the opportunity to comment.

[Signature]

Suzanne D. Peterson
Chairperson, Board of Agriculture

CC: Barry R. Okuda
      OGC
      DOE
      DPED
      DIS

April 8, 1987

Ms. Suzanne D. Peterson, Chairperson
Board of Agriculture
Department of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96822-0159

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Ms. Peterson:

Thank you for your comments of March 24, 1987 on the subject DEIS. We respond as follows:

Comment, page 1, Paragraph 3: "There should be a text description of the LSB soil classification system similar to that done for the Soil Conservation Service (SCS) Soil Survey and the Agricultural Lands of Importance to the State of Hawaii (ALISH) maps.

Response: A legend on the LSB map will be included in the Final EIS. As noted in the LESA report, the LSB of the University of Hawaii (UH) prepared an inventory and evaluation of the State's land resources during the 1960s and 1970s. The Bureau grouped all lands in the State, except those in the urban district, into homogeneous units or land types; described their condition and environments; rated the land on its overall quality in terms of agricultural productivity; appraised its performance for selected alternative crops; and delineated the various land types and groupings on aerial photographs. Lands were segregated into land types or groupings based on soil properties and productive capabilities. These properties included: texture (sand, silt, clay); structure (size, shape and amount of clumps); depth;
drainage; parent (geological) material; stoniness; topology (slope and surface configuration); climate; and rain. A five-
class productivity rating system was developed with "A" repre-
senting the class of highest productivity and "E" the lowest.

An evaluation of the subject lands based on the LSB soil
classification would lead to the same conclusions as given in the
DEIS based on the SCS and ALISH classifications regarding the
suitability of the lands for agriculture.

Comment, Page 1, Paragraph 4: "We requested information on
the effect of the proposed development on the ongoing cultiva-
tion of sugar cane in fields adjacent to the portion of the
project on the makua side of Farrington Highway."

Response: Cane burning in preparation for harvesting may pose a
nuisance to tourist and residential development in the proposed
project; however, as pointed out in your comment, the Hawaii
Right to Farm Act (Chapter 140, H.R.S.) limits the circumstances
under which existing farm operations may be deemed a nuisance.
In essence, responsibility for taking mitigating measures would
rest with the tourist and residential development.

A number of mitigating measures could be undertaken to minimize
the impact of the burning on the proposed development:

1. **Setbacks.** Setbacks from sugar growing areas could provide
   for some protection against the heaviest smoke, allowing the
   smoke to dissipate somewhat before reaching developed areas.

2. **Landscape barriers.** Landscape barriers could provide some
   measure of shielding the smoke, thus allowing it to disperse in
   other areas.

3. **Notification.** Notification of the potential smoke problem
   would allow especially sensitive residents or guests to take
   appropriate action such as staying indoors and keeping
   windows and doors shut while burning takes place.

4. **Coordination.** Establishing a close working relationship with
   the sugar company would allow for coordination of resort/
   residential activities to minimize conflicts with cane
   burning operations.

Within the State of Hawaii there are many examples of Resort and
Agricultural enterprises which exist in close proximity to each
other, i.e., Kauai and Kapolei resorts on Oahu. We believe
that these impacts can be minimized through planning and coopera-
tion.

Comment, Page 3, Paragraph 1: "The DEIS contains a rather
pessimistic view of agriculture in Hawaii. The Department of
Agriculture takes a more optimistic and broader view of the
future of agriculture in Hawaii. In the determination and
protection of 'important agricultural lands,' it is the State's
duty to assure the availability of agriculturally suitable
lands. Therefore, it is appropriate that the State maintain what
appears to be a surplus of productive lands as a resource in
their own right. Incremental losses of a resource like prime
arable land, if left uncontrolled, will have a devastating and
irreversible cumulative effect on the visibility of agriculture.
Once agriculture lands are urbanized there is no return. This
cannot be overemphasized."

Response: The agricultural analysis contained in the DEIS is
based on assumptions which are optimistic in terms of crops which
can be grown profitably in Hawaii and at achievable levels of
self-sufficiency. However, the projected demand and land
requirements are more conservative than those contained in the
State's analysis for LEA because the assumptions are more
realistic. Nevertheless, a careful reading of the LEA report
supports the conclusions contained in the DEIS: comparatively
little prime agricultural land will be required for diversified
agriculture—less than 9,000 acres statewide, and about 2,240
acres for Oahu. This is a small fraction of the supply of land
available to profitable diversified agriculture. This supply
comprises: (1) lands which have already been released from sugar
and pineapple, (2) lands which are likely to be released from
agriculture, in view of the marginal profitability of the industry, and
(3) sugar lands which are in holding while awaiting the discovery
of profitable crops. Even if extensive urbanization is assumed,
the limiting factor for Hawaii's diversified agriculture industry
is the market demand, and not the availability of land.

It is agreed that the State should assure the availability of
agriculturally suitable land, and that a surplus of productive
lands should be maintained. However, it is extremely unlikely
that uncontrolled incremental losses of prime arable land would
lead to a devastating cumulative effect on the viability of
agriculture—the supply of land is too large compared to the con-
bined demand of land for diversified agriculture and urbaniza-
tion. This is true not only for Hawaii, but for nearly all of
the world's developed countries; for the U.S., the excess
capacity of agricultural land has been estimated at about 45 million acres (Michael T. Belandza, "The Farmlands," Reserve Bank of St. Louis, November 1985). From the viewpoint of feeding the world's population, this is a very optimistic situation which disproves Thomas Malthus' theory. Technology advances have resulted in yields increasing faster than population, with the result that ample food is produced while valuable land and other resources are freed for other uses within the economy. Asparagus alone has the potential of freeing sufficient prime agriculture land to cover all of Pennsylvania.

Finally, efforts to preserve prime agricultural land can indeed be overemphasized. Excessive preservation of prime agricultural land in the hopes of future agriculture may be at the expense of normal and proper urban development, substantially higher housing costs, and the prevention of far more non-agricultural jobs than could ever be generated by agriculture.

Comment, page 2, paragraph 2: "There is no reference in the DEIS to Priority Guidelines 226-104(b)(2) and 226-104(1) which direct the development of marginal or non-essential agricultural lands to meet housing needs, and 'maintain' agricultural lands of importance to the agricultural district.'"

Response: The guidelines are as follows:

226-104(b)(2): "Allow available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district."

226-104(1): "Seek to use marginal or non-essential agricultural lands and public land to meet housing needs of low and moderate-income and single-family households."

The second of these guidelines concerns affordable housing, not a secondary resort.

Regarding Guideline 226-104(b)(2), it should be noted that it is a "guideline." As such, deviations from it should occur where warranted. If this were not the case, and all urban development were forced to locate only on lands which are already zoned urban or which are regarded as "marginal or non-essential agricultural lands," then the impact on Oahu's economy and housing market would be devastating. This is because the supply of lands that..."
Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Makulea Development Proposal
Makulea, Oahu

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,

[Signature]

Jerry M. Matsuda
Major, Hawaii Air National Guard
Chief Engr Officer

cc: Barry A. Okuda, Inc.

cc: Mr. Barry A. Okuda
Mr. Chris Ito, CBS
Mr. Liberato Nigro, Central Dist.

STATE OF HAWAII
DEPARTMENT OF EDUCATION

March 3, 1987

Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

SUBJECT: Makulea Development Proposal

Our review of your proposed development indicates that it will have the following enrollment impact on our area schools:

School                  Grade       Students
Makalua Elementary     K-6          50-100
Makalua High-Intermediate 7-12       40-80

Schools at all levels in this service area are operating at capacity. Additional classrooms will need to be budgeted to accommodate the projected enrollment increase.

Please keep me informed of any changes to the project plans.

Sincerely,

Charles I. Ito
Superintendent
April 8, 1987

Mr. Charles Toguchi, Superintendent
Department of Education
P.O. Box 3360
Honolulu, Hawaii 96804

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Toguchi:

Thank you for your comments of March 3, 1987 regarding the subject DEIS. We respond as follows:

The enrollment information contained in your comment was included in the DEIS on page IV-04 under the heading "II. Schools." The applicant will keep the Department informed as to the progress of the approval process in order to be included in the Department's planning and budgeting process.

Again, thank you for your comments.

Sincerely,

[Signature]

William E. Wankel

---

Honororable Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

SUBJECT: Draft Environmental Impact Statement (EIS), Mokuleia Development Proposal, Mokuleia, Oahu

Thank you for the opportunity to review the Draft EIS. Our concerns are as follows:

Aquatic Resources Concerns:

There is no convenient public access to any part of the beach west of Kahuku Bay. Fishing activity along this section of coast is moderate, limited mainly by lack of access. Pole fishing is most popular, with ulua, papio, goatfish, moro, oio and other species caught from shore. Throw netting is common. Spearfishing occurs around the channels offshore of Mokuleia Bay Beach and some net fishing takes place in sand channels offshore.

The Final EIS should detail specific provisions for improving public access to the shore. Detailed information should be provided on access points, public beach facilities and parking to accommodate the public.

Although some information has been provided by the applicant's consultant on the proposed rerouting of drainage from Kapehua to Mokuleia Stream, the Final EIS should define the measures planned to prevent or mitigate impacts of siltation and sedimentation. Along with the associated turbidity, on nearshore resources. Discussion is also needed on the suggested no increase or decrease in runoff if the development; the increase in impermeable area (roads, buildings, and so forth) to reduce natural seepage.
The projected sewage treatment facility should be designed to be "fail-safe" and approved by the Department of Health, to prevent effluent from contaminating coastal waters.

Precautions should be taken during construction so that eroded soils, petroleum products, fertilizers, pesticides and other potential contaminants associated with this development do not blow, leak or flow into the streams, wetland areas, or coastal waters.

Finally, any proposed shoreline modifications such as grading, sea walls, and so forth should be described fully and submitted to the Department for review.

Forestry and Wildlife Concerns:
This draft EIS is incomplete in addressing our concerns in the following areas:

1. Existing Wetland Areas (IV-14)
   The impacts and mitigating measures are not yet defined. The EIS does, however, mention that an assessment of the flora and fauna which exist in the wetland area will be available for use in more detailed planning and altering of structures. Design and planning of the area will be done in consultation with the U.S. Fish and Wildlife Service.
   The Flora and Fauna Study (Appendix I) does not mention that the Hawaiian stilt and Hawaiian gallinule have been sighted within the proposed development area. At this stage it is not clear if another assessment of the flora and fauna will be conducted.

2. Public Access to the Forest Reserve (IV-51)
   Under the heading "Anticipated Impacts and Mitigative Measures" it is mentioned that the current intent is to improve the Jeep access road to Peacock Flat by possible general public access. This is the only section of the EIS where public access to the forest reserve is mentioned. A higher priority should be given to this anticipated improvement.

3. Wildfire Contingency Plan
   No mention is made of a wildfire contingency plan that addresses fires starting from the development area and moving into the forest reserve (such as the need for fire suppression activity, access, firebreaks, etc.)

The final EIS should discuss these areas in more detail.

Historic Sites Concerns:
We concur with the conclusions of the consulting archaeologist, which state that intensive archaeological survey and testing needs to be conducted prior to development of these parcels.

We note that on page IV-14 of the EIS, that only the four known sites are noted as of potential significance, and desiring additional study. This is not quite what the consulting archaeologist had in mind, as he points out that the 2,800 acres involved in this development have never had systematic archaeological surveys. The entire Mokuleia area almost certainly has supported a fairly large precontact population, and almost nothing is known of archaeological remains there.

Under the heading of Mitigative Measures, the statement is made that the developer will work with the State Historic Preservation officer, and follow procedures compatible with state law, and follow procedures compatible with state law, and follow procedures compatible with state law. If there are any questions arising from this review, please call Dr. Joyce Wath, Historic Sites Section (548-7460).

Recreational Concerns:
The subject draft EIS, has identified the Kaena Point area as being part of Kaena Point State Park. However, it has failed to identify Peacock Flats as being a part of the 1978 Kaena Point State Park Conceptual Plans, which discussed this park.

Water and Land Development Concerns:

Water Resources
The developer intends to install pumps and appurtenances on three existing wells and drill and develop a fourth well to supply 2.0 mgd of potable water and an additional 1.5 to 2.0 mgd for irrigation purposes.

The developer has clearly indicated that the project is located within the Mokuleia Sub-Area of the Wai'anae Ground Water Control Area and that results from the Department of Land and Natural Resources are required for development of ground water under the following resources are required for development of ground water under the following resources are required for development of ground water under the following resources are required for development of ground water under the following resources are required for development of ground water under Title 13. Statements on page 177, HRS, and Chapter 166 of Title 13.
Wastewater Treatment

We note the intention to dispose of treated wastewater effluent in injection wells. Serious consideration should be given to using the treated effluent for irrigation of the two golf courses and all landscaped areas.

Drainage Improvements

In addition to the on-site drainage improvements, the project includes a proposal to divert the flow of Kapaalina Stream to Nahalena (Makalihi Stream (pp. III-6, IV-6/7, IV-5B, and Appendix F). References to the proposed diversion are found throughout the DEIS; however, the actual reason for the rerouting of the stream has not been stated. The document should provide additional pertinent information on characteristics and flow of both streams, including instream and wetland habitat values. A map showing the proposed point of diversion and route to the Nahalena Stream outlet should also be included. Ultimately, a drainage master plan that includes the proposed stream diversion should be prepared.

We note one inconsistency in the description of potential impacts to the nearshore marine environment (pp. IV-71 and project site drainage (pp. IV-5B). In discussing the nearshore impacts, runoff is not expected to increase; however, in discussing the development of a drainage system on pg. IV-5B, it appears an increase in runoff is anticipated.

Coastal Erosion

Adequate shoreline setback should be provided to ensure that all coastal development is protected from coastal erosion.

Thank you for your consideration of our concerns.

Very truly yours,

WILLIAM E. PATTY
Chairperson
Board of Land and Natural Resources

cc: Barry R. Okuda

April 8, 1986

Mr. William Paty, Chairman
Department of Land and Natural Resources
P.O. Box 221
Honolulu, Hawaii 96809

Re: Responses to Comments on the DEIS for the Proposed Development at Wahiawa, Oahu

Dear Mr. Paty:

Aquatic Resources Concerns:

Although the project proposes the deletion of two proposed public parks, it also offer opportunities for increased recreational uses of the beach and mountain areas, perhaps equal to or greater than the potential of the two deleted parks, one of which is site undetermined and planned for seven years and beyond (since 1983). Although specific site locations and plans are not illustrated, it is the applicant's stated intent in the DEIS that beach accessways and parks are an integral component of the development and that they will be provided to meet recreational needs. These recreational needs will be developed and determined through discussions with the community, Departments of Land and Natural Resources and Parks and Recreation, as well as with the City Council, throughout the entire planning process. The exact location, scope and design, and the type and number of beach accessways and parks will reflect the results of these discussions.

The existence of public park sites on the development plans in no way ensure the implementation of these sites as park
areas. In the five years that the two sites have been
designated on the North Shore Public Facilities Map neither
site has been selected for funding, and therefore remain no
closer to reality than they were in 1983 when the North Shore
Public Facilities Map was first adopted. Recent experience
(kutile and West Beach) suggests that the approval process
generally provides the public and government agencies with
ample opportunities to improve and enhance public recrea-
tional amenities as part of the overall political approval
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March 19, 1987

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement, Proposed Development at Mokuleia, Waialua, Oahu

Dear Mr. Clegg:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (EIS) for the proposed development at Mokuleia, Waialua, Oahu.

The Office of Hawaiian Affairs' Land and Culture Divisions have reviewed the EIS for the proposed project and wish to offer the following comments:

Waterbird Habitat

Two endangered endemic waterbirds, the Koloa and the Hawaiian Coot reside within ponds located in the project area. The EIS indicates that only limited information on the use of these wetlands by endangered waterbirds is available. It acknowledges however that construction or increased human activity in the area may impact upon the wetland habitat areas.

The EIS does not discuss what the nature of these impacts may be. Moreover, the EIS does not provide any basis from which others may ascertain the nature of these impacts.

In order to facilitate an adequate assessment of the impact of the proposed action upon these unique environmental resources the following information should be added to this EIS:

1. A map which clearly indicates which ponds are located within the project area. This map should also indicate how the populations of the Koloa and Hawaiian Coot are distributed throughout this habitat area. Exhibit 14A does neither.

2. Indicate clearly what the developer plans to do within the affected habitat areas. Exhibit 11 clearly identifies neither the location of the affected ponds nor what construction or activities are planned for those areas.

3. State what the probable consequences of the proposed development would be upon these species.

Historic Sites

An adequate archaeological investigation of the Mokuleia area has never been conducted. However, as Mr. Kennedy notes, Mokuleia holds much promise for future archaeological study. Preliminary survey work within the project area has revealed the existence of a number of potentially significant sites. Clearly more archaeological research in this project area needs to be done.

OHA supports Mr. Kennedy's recommendations that large-scale systematic archaeological testing of the entire project area, including subsurface testing, be conducted prior to any alterations to the site area. We also support his recommendation that a final report, which conforms to the standards as issued by the Society for Hawaiian Archaeology for intensive or Phase II surveys, be prepared. Please send us a copy of any such final report.

Based on these concerns, the Office of Hawaiian Affairs finds this Draft EIS to be deficient in significant areas of interest to our beneficiaries. Left unaddressed, this proposed project could be subject to OHA's opposition. Please feel free to contact Mr. Leslie Pynn or Mr. Earl Keller at 946-2642 if you should have any questions.

Sincerely yours,

James A. Kanahale
Administrator

cc: Barry Okuda
Ernest Kosako (USFWS)
Office of Environmental Quality Control
April 8, 1987

Mr. Kamaki A. Kanahele, III
Administrator
Office of Hawaiian Affairs
1600 Kapiolani Boulevard, Suite 1500
Honolulu, Hawaii 96814

Re: Responses to Comments on the DEIS for the Proposed Development at Waiulusa, Oahu

Dear Mr. Kanahele:

Thank you for your comments of March 19, 1987 regarding the subject DEIS. We respond as follows:

Waterbird Habitats

Specific items requested in your comments and responses are:

1. Provide a better map of ponds and endangered bird distribution.
   A map will be included in the Final EIS.

2. Specific plans.
   The map shown on Exhibit 12 was only meant to illustrate a conceptual drawing of the proposed development; it was not meant to represent exactly the specific development. The actual design, location, improvement and construction details are specifics not called for in the development plan process, but more appropriately addressed in subsequent permit approval processes. To ensure that these details give proper consideration to the ponds and the bird population, the applicant has proposed working with the Federal Fish and Wildlife Division of the Department of the Interior and the State Department of Land and Natural Resources to develop a wildlife management plan for the development.

3. Probable Impacts

   Increased human occupation in the areas surrounding the ponds is expected to have some impact on the waterbirds which utilize the ponds. Human disturbance and activity near the ponds will increase. This may affect breeding activity and the recovery of the endangered waterbirds. There may be increased predation of waterbirds by pet and feral cats and dogs; rodent populations may increase. In addition, there may be changes in drainage and run-off patterns as well as water quality due to construction in nearby areas.

   The U.S. Fish and Wildlife Service has identified ponds around the 'Crowbar Ranch as an important habitat for the recovery of endangered Hawaiian waterbirds. The U.S. Fish and Wildlife Service has recommended that the design, planning, and modification of the wetlands (ponds and streams) on the project site be done in coordination with their office and the State Division of Forestry and Wildlife.

   The consultant has recommended that buffer zones be established around the pond areas. Existing trees and shrubs should remain intact; additional plantings should be made in those areas without shrub cover.

   The developer, the U.S. Fish and Wildlife Service, and the State Division of Forestry and Wildlife should develop a long-term maintenance program for the wetlands and a protection plan for the endangered waterbirds. Fencing of the pond areas would reduce disturbance from humans and the larger predators. In addition, an active trapping program for rodents and feral cats should be considered.

Historic Sites

This concern indicates that DHA supports the implementation of the recommendations of the Archaeological Report prepared for the applicant by Mr. Kennedy.
Section IV-J, page IV-14 of the DEIS states that the applicant will follow the recommendations of the archaeological report and will work with the State Historic Preservation Officer in following procedures for development in compliance with State law.

We feel that the potential impacts and mitigating measures for both Waterbird and Historic Sites have been adequately addressed at this time in the development process. In both cases the applicant has identified a program of working with the responsible and concerned state and federal agencies to develop a program and plan over time and prior to development which will address the concerns outlined in your letter.

Again, thank you for your comments.

Sincerely,

[Signature]

Ref. No. P-6165

March 24, 1987

The Honorable Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
415 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: DEIS for Nokulele Development Proposal, Nokulele, Oahu

We have reviewed the subject draft environmental impact statement (DEIS) and offer the following comments.

1. The discussion of the relationship of the proposed development to the County General Plan and Development Plan raises some questions which should be addressed further in the final EIS.

   For example, page XI-1 of the DEIS indicates that the City Department of General Planning (DGP) projects a housing need in the year 2000 of 6,000 units for the North Shore area in support of a 15,400 population. Page 40 of Appendix C supports this figure. The population target units will be required to meet the year 1980 population of 19,100 for the combined Kualoa/North Shore Development Plan area. The estimated population within this area is already 16,000 persons in 1984. Even if the higher North Shore population target figure of 17,000 is considered, it seems obvious that the 1,100 hotel rooms will generate a population (see Exhibit 17) which dramatically exceeds this guideline.

2. The final EIS should clearly identify whether or not a percentage of dwelling units will be made available for low income and family group housing. Page 12-7 states that the priority guidelines for group housing do not apply directly to the proposed Nokulele development, yet the same paragraph does state that developers and hotel operators have a vested interest in assuring that their employees will be suitably housed.
3. The final EIS should provide a specific site plan of the beach access facilities such as parking, restrooms, buffer landscaping adjacent to Mokuleia Beach Park, and location of walkways. The number and location of these facilities should be provided. Mitigating measures related to the provision of public access should be detailed.

4. It is a Coastal Zone Management (CZM) Program policy to protect areas uniquely suited for recreational activity. The proposed deletion of two public parks from the City and County Development Plan Public Facilities Map and the developer's proposal to charge "user fees" for maintaining access will both reduce opportunities for public recreational access.

As stated in the DEIS, swimming conditions at the existing Mokuleia Beach Park are risky and hazardous. It should be noted that safer swimming may be found at Waialua, one of the sites proposed for deletion as a public beach park.

A site plan illustrating the interrelationship and linkages between parcels "B", "C", "D", and "E" is especially important in light of the higher density six- or seven-story hotel(s) planned for the beachfront area in close proximity to Mokuleia Beach Park. A cross sectional view illustrating the height of the proposed hotel relative to the beach and adjacent view corridors would also be helpful.

It is CZM policy to assure that new developments are designed and located to minimize alteration of natural landscapes and views to and along the shoreline. The final EIS should discuss the impact of six- and seven-story beachfront hotels on coastal views from the North Shore toward Kailua Point, and on ocean views from Farrington Highway.

5. The final EIS should provide more information on easements or other arrangements relative to the existing hiking trails and jeep access trail referred to on pages IV-50 and IV-51. We note that the Mokuleia Forest Reserve may be contained in sensitive areas if user fees are imposed. The Department of Land and Natural Resources currently maintains a trail and small camping area within the Reserve in the Peacock Flats area. The DEIS did not indicate that this area is within the Mokuleia Forest Reserve.

6. The final EIS should review the design of the Mokuleia Conceptual Plan (Exhibit 12) as it relates to the SMA/Flood Designations (Exhibit 7). A cursory review of the Conceptual Plan provided in the DEIS appears to indicate that most of the high density developments, (i.e., resort condos and hotels) are located in low-lying areas of greatest flooding potential (zones A, A4, and V12), while the lower density golf course and residential lots are located primarily in the higher elevations of Zone C. In light of the potential for flooding and tsunami damage, this aspect is of special concern and should be addressed in greater detail in the final EIS.

We note that page IV-6 of the DEIS states that "the proposed development will have no impact on the sea level rise." This statement should be clarified since it is doubtful that any normal development would have an appreciable effect on the level of the surrounding ocean.

Exhibit 12 also illustrates a series of lakes or pools near the mouth entrance of the project running parallel to Farrington Highway. These features are described on page III-5 as habitats for waterbirds. The final EIS should expand further on how these ponds will be integrated into the development proposal, whether construction or development activities will endanger the waterbird habitat, and if constituent discharge (sediment, fertilizers, etc.) resulting from development could impact shoreline water quality.

The final EIS should discuss in more detail plans for diversion of Kapalua Stream discharge into "Kanahena Stream" and why, as stated on page IV-7, less runoff into the ocean is anticipated after project bulldoze. Impermeable surfaces established within urban areas are usually associated with an increase in surface runoff. We note at this point that "Kanahena Stream," as it is referred to in the DEIS, should be Mokuleia Stream. According to historical records, this is the CORRECT name, despite the engraving on the Farrington Highway bridge.

The purpose and necessity of the proposed diversion of Kapalua Stream and construction of retention and infiltration basins should be discussed in the final EIS. The importance of the proposed inland waterways to the project design is unclear. An assessment of the impacts of these modifications on water quality and circulation patterns should be provided, as well as detailed maps of the area, the depth, and an analysis of the flow patterns of these proposed modifications.
Hydrographic data and nutrient/suspended solid data, as well as information regarding storm duration, total volume of discharge, and the effective time of loading of the discharge stream should be obtained for the proposed diversions. We note that the EIS uses data from the West Beach and Sullivan areas, which may not be appropriate for estimating the impacts of this diversion at Kailua Bay.

7. The final EIS should give further consideration to plans for sewage treatment and disposal. More specifically, we note that a development plan amendment is pending before the City and County of Honolulu which would provide for establishment of a sewage treatment plant (STP) near the western end of Dillingham Airfield. The elevation of this area is less than 20 feet above sea level and approximately 1,000 to 1,500 feet from the shoreline. Viable alternatives may be available to mitigate this potential STP flooding hazard and should be explored. Additional information on the quality and quantity of treated effluent discharge should be provided. Based on expected water usage, effluent discharge into the injection wells and the Pacific Ocean could approach two million gallons per day.

Another CMB policy is to promote water quantity and quality management practices and prohibit land and water uses which violate State water quality standards. Fecal coliform counts are reported in the marine study as being very low or undetectable. While the ocean waters in the project area are rated Class A by the State Department of Health, we note that waters within one-half mile of the proposed sewage treatment plant are rated as Class A. The impacts on water quality of the proposed plant, its pumping stations, and sewer lines should be discussed in terms of their potential effects on the shoreline, near-shore, and estuarine environments in and near the project area. The potential effects of water withdrawal for the project on the hydrologic balance of the aquifer underlying the area, including its interaction with the proposed sewage treatment plant injection wells, should be discussed in the final EIS.

Although the proposed sewage treatment plant is in an area of undetermined flood risk, it is in close proximity to the ocean, and is at similar elevation to nearby areas that have experienced tsunami and storm wave inundation up to five hundred feet inland in the recent past. The potential for inundation of and/or damage to the sewage treatment plant or its appurtenances should be discussed in the final EIS.

8. The final EIS should provide more information on the cumulative noise impacts for parcels 5, 7, and 8 as identified in Appendix B. We note from Figure 2, that the noise levels for these parcels generated by air traffic at Dillingham Airfield are between 55 and 60 dBA. When considering cumulative noise levels of the surf, wind, increased traffic on Farrington Highway, harvesting operations in sugar cane fields, stationary equipment, the existing 55 dBA levels from Dillingham Airfield, plus a potential increase in air traffic after project build-up, a cumulative noise level greater than the 60 dBA recommended limit, referred to on page IV-24, may be generated.

9. The final EIS should explore additional mitigation measures to lessen impact from the anticipated increased traffic levels along Farrington Highway between the proposed project and Thompson Corner. We note with special concern that the Traffic Study predicts current levels of service along this portion of highway (Table 3, page 21) will decline from a Monday PM Peak Hour level of "A" to a "E" rating after the project is completed. In fact, only during weekend mornings can a level of service as high as "D" be expected during the peak hour. All other peak hour estimates are rated as "E" after project development.

The final EIS should identify other impacts associated with the proposed construction of Thompson Corner and traffic flow leading into Haleiwa from Honolulu. The anticipated trips generated between the proposed project and Honolulu should also be included.

10. We concur with the findings of the Archaeological report which recommend that (1) a complete survey should be conducted on the subject parcel to locate and map all sites and intensively survey representative areas, (2) conduct a systematic sub-surface examination of representative areas to assess the extent of underground archeological sites, (3) examine archival material, and (4) prepare a final report to present the results of the aforementioned activities. If available, the findings of the aforementioned study should be provided in the final EIS.

CMB policy supports State goals for protection, restoration, interpretation, and display of historic resources. The final EIS should provide a description and maps of archaeological sites to be retained or otherwise preserved or protected, in consultation with the State Historic Preservation Office.
11. The market study in the final EIS should provide an estimate of unit cost for the proposed residential units and condominiums. We note the market study in Appendix A is considered absorption and sales history for other projects, but did not compare pricing of similar residential projects with the proposed development. Unit pricing is an obvious factor in creating market acceptance. Pricing is also essential in evaluating the availability of units for low and middle income residents. A comparison chart illustrating the pricing structure of similar products with the anticipated pricing of the proposed residential units would be especially helpful.

12. The final EIS should indicate whether the sugar cane haul road which traverses the project site will be closed after project build-up. If access from this road is removed, the viability of sugar production and the integrity of Dillingham Airfield may be jeopardized.

13. Appendix C states that the proposed Mokules is development will require converting about 1,000 acres of land—now used primarily for grazing—to resort, housing, and recreational uses. About 440 acres are classified as Prime Agricultural Land. The grazing operation and other existing agricultural activities, if any, should be discussed in more detail.

14. The EIS should fully discuss the impact of the proposed Mokules development on the four, already-designated Secondary Resort Areas (West Beach, Kahuku/Urban, Makaha, and Laihe). West Beach has not started construction and the remaining three have not achieved full buildout.

15. An objective of the CDH Program is to protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems. According to the National Marine Fisheries Service, the endangered green sea turtle, the endangered humpback whale, the monk seal, and the hawaiian monk seal have all been sighted in the project area. The final EIS should discuss potential impacts of the project on all of these Fauna. The common and the Hawaiian names of all species of flora and fauna should be provided.

There should be a discussion of pesticide use on the proposed golf courses, its potential impacts on water quality and on the flora and fauna in the project area, and mitigation measures as may be appropriate.

16. The organization of the subject DEIS should be improved. Many of the pages numbers in the Table of Contents should be rechecked, and several of the appendices are mislabeled, making cross-reference difficult. Several of the maps are not well reproduced, and the graphics in general do not facilitate analysis of the potential impacts of the project. Appendix D, "Development Plan Public Facilities Amendment," is also mislabeled as "Preliminary Engineering Study," and is not focused on those aspects of the CDP and policies which the proposed project complements. Since the purpose of the Hawaii CDH Program is to balance competing interests by their relation to coastal development, both the positive and negative consequences of development should be addressed.

17. Finally, a CDH objective is to improve the development review process, communication, and public participation in the management of coastal resources and hazards. Short- and long-term impacts of proposed significant developments should be communicated early in their lifecycle and in terms understandable to the general public, to facilitate public participation in the planning and review process.

Appendix D, "Development Plan Public Facilities Amendment," which details the amendments applications for the proposed project, is dated June 1985. This is not consistent with the applicant's contention that no site-specific details for this project were available at the time that the EIS for the General Plan Secondary Resort Designation Amendment was prepared in January 1987.

Thank you for the opportunity to review and comment on this document. We appreciate receiving a copy of the final EIS.

Sincerely,

Harry F. Tavalin

cc: Mr. Barry K. Okuda

Barry K. Okuda, Inc.
Office of Environmental Quality Control
April 8, 1987

Mr. Roger A. Ulveling, Director
Department of Planning and
Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Ulveling:

Thank you for your comments of March 24, 1987 regarding the subject DEIS. We respond as follows:

Prior to responding to the specific comments contained in your letter we would like to discuss generally what we believe to be the process for determining mitigation measures within the EIS process.

Determination of Mitigation Measures

Environmental Impact Statements (EIS's) typically make preliminary suggestions for mitigations. Actual requirements, however, are imposed through the political and regulatory process, which may involve negotiations between government decision makers and private landowners or developers.

Public input during the EIS and/or subsequent hearing process can affect the outcome of these negotiations. In recent years, new requirements have been made on a standardized basis. For example, for projects containing residential units, an "inclusionary zoning" requirement of ten percent for low-to-moderate income units is often executed. These types of mitigation requirements are sometimes unrelated to EIS impact findings or mitigation recommendations.

At the City level, "unilateral conditions", or one-sided voluntary agreements by the project proponent, have normally been attached to Development Plan approvals but to final zoning approvals. Presumably the latter stage in the point in time closest to project implementation and thus the best time for government decision makers to assess true needs. Also, zoning is a more detailed level of government control than Development Plan approvals—hence, the more appropriate level for imposing conditions.

Because there have been questions about the legality and equity of unilateral conditions, the City and County of Honolulu is now considering several new measures which would revise the present system:

1. "Development Agreements", a bilateral agreement process which would vest rights to develop at an early stage in return for firm detailed commitments by the developer to provide socio-economic and other mitigation measures and:

2. A "Community Benefit Assessment" (CBA) ordinance, which would set the total dollar amount for such mitigations according to formulas which consider such factors as location, extent of up-zoning, etc. The current CBA concept would rely on the EIS to recommend priorities for allocating assessed dollars (or other in-kind measures) among the various potential mitigation measures.

As of this writing (April 1, 1987), it is uncertain whether either of these measures will actually be adopted or, if so, in what exact form.

It is our contention that a number of the comments in your letter contain requests for a level of planning which is inappropriate at this time.

1. Population

The first point of the letter refers to the City Department of General Planning's year 2000 North Shore population guideline, then suggests the on-site resort structures "will generate a population (see Exhibit 17) which dramatically exceeds this guideline." However, Exhibit 17 actually projects the on-site resort resident...
population as 1,200 in the year 2005, a figure which can easily be accommodated within the current guidelines. (IDP guidelines are based on resident population, not visitors.)

The initial paragraph also suggests a possible contradiction between page 56-57 of the Draft EIS and page 40 of Appendix C, in regard to number of additional housing units which can be accommodated under the IDP guidelines. However, I find that the two views are totally consistent, in that both discuss the fact that only 100 additional housing units would be required for a proposed year 2005 North Shore population. As your letter acknowledges, this figure would be lower than the upper limit of the population guidelines for 2005—i.e., the current projection falls below the maximum figure to be permitted. It is the guideline, not the projection, which represents City policy.

2. Housing (low income and gap group)

The section of housing will be expanded to identify more specifically the range of options available to meet the low and moderate income housing needs. The EIS will not identify a percentage of housing units to be made available for low, moderate, or gap group housing. As discussed in our general comments and as indicated in communication that we have received from the City Department of Housing and Community Development, the policy on housing is under review.

3. Beach Access/Parks

Although the project proposes the deletion of two proposed public parks, it also offers opportunities for increased recreational uses of the beach and mountain areas. Perhaps equal to or greater than the potential of the two deleted parks, one of which is undetermined and planned for seven years and beyond (since 1983). Although specific site locations and plans are not illustrated, it is the applicant's stated intent in the DEIS that beach accessways and parks are an integral component of the development and that they will be provided to meet recreational needs. These recreational needs will be developed and determined through discussions with the community, Departments of Land and Natural Resources and Parks and Recreation, as well as with the City Council.

4. CPW

Regarding Specific Site Plans: The Molokai development proposal does not contain a request for a zone change, nor is it a request for a shoreline management area permit where site plan details, to the extent being suggested, are normally available. However, in the Final EIS we will include a visual analysis prepared by Michael S. Chu.

Regarding User Fees and Mountain Access: This access to the mauka portions of the site is contained within the recreational aspects of the project, concerns over accessibility, possible impacts on endangered plant species, capacity of the ecosystem, and human safety must be considered. Controlled access, supervision and a resource management plan should be considered over unrestricted access. User fees are but one method of controlling/managing access.

5. Mountain Access

The applicant is proposing to develop an upland resource management plan in consultation with the Department of Interior, Division of Fish and Wildlife, and the State
6. Various Comments

SMA/Flood: DPED notes that more intense development is located in flood and tsunami areas than in areas of higher elevations. The rationale for location of resort facilities is the applicant's belief that as a general rule, the economic value of resort property is higher the closer it is to the ocean. The applicant believes that the cost of mitigating measures is exceeded by the increase in value.

Impact of Development on Sea Level: Statement will be deleted from final EIS.

Waterbird Habitats, Waterways, etc.: The applicant has proposed to develop a plan for the wetland areas and the proposed drainage system in consultation with the Department of Interior, Division of Fish & Wildlife, and the State DLNR. The concept plan basically presents an opportunity to accommodate both uses in this area.

Drainage/Waikena Stream: As proposed the plan is only conceptual, the inland waterway is most likely the product of artistic license. The area shown on the plan as an inland waterway is an area which is to accommodate the existing pond ecosystems as well as the necessity to accommodate the drainage requirements of the project. While it is true that buildings and pavement prevent the absorption of water in the soil, drainage improvements such as settling ponds and building areas increase an area's capacity to absorb water over time and thus can result in smaller flows into the ocean under storm conditions. During design development, large open spaces such as the golf course can be graded to mitigate drainage impacts. As indicated in our earlier general comments, we believe that the purpose of the EIS is to identify general mitigating measures rather than specific engineering solutions.

7. Sewage

The DEIS described two sewage treatment alternatives, participation in a regional sewer system now under consideration by the City and County of Honolulu or development of treatment plant to City standards for dedication to the City and County of Honolulu for operation and maintenance. No location for the developer built sewer treatment plant has been discussed. If the project participates in the regional system, its sewer treatment facility will be subject to an EIS process. Environmental impacts of sewage disposal will be discussed in the EIS.

The site shown in the proposal located west of Dillingham Airfield is a location under consideration by the City for location of its regional plant. Based on information provided by the Department of Public Works, the City is now considering a site located approximately a mile east of the project site and in the area of Farrington Highway. Impacts of such a plan would be considered when the City prepares the EIS for its regional system.

If a developer built plant were to be developed, the following scenario could be expected.

Although the location of the plant has not been identified specifically, it would most likely be located on the applicant's property south of Farrington Highway. It would be developed to City standards for dedication to the City and County of Honolulu for operation and maintenance. Estimated capacity of the plant would be 1.5 million gallons per day. Location of the plant would consider the locations of flood zones on the property.

Concerning the question of water quality, it is our understanding that treated effluent (to City standards) contains low to undetectable levels of fecal coliform counts. The selection of the effluent disposal method would be subject to the review of the State Department of Health and the Board of Water Supply which are charged with the protection of water quality throughout the State and which, through administrative rules, ordinances, and laws, have strict rules and regulatory powers in matters. These procedures are designed to protect both the purity of the aquifer and the downstream impacts of disposal.
An expanded discussion of the impacts of the proposed sewer system will be included in the Final EIS.

8. Cumulative Noise Impacts

Cumulative noise impacts for Parcels 6, 7 and 8 is of concern, but the following considerations should be taken into account.

Figure 3 in Appendix K presents aircraft noise contours predicted for the year 1985, not for the existing condition as inferred in the comment. The potential increase in air traffic after project buildup was taken into account by assuming that the number of civilian power aircraft operations would approximately double in 1995 as compared to 1983 to 1985. Thus the contours in Figure 3 are based upon 120,000 civilian power operations in 1995 compared to 60,000 operations in 1985.

On page IV-24, the reference to "Ldn 60 not being exceeded for residential and resort areas" applies only to aircraft noise and to cumulative noise impact. For example, in the "Summary Report, HIA and Environ Master Plan Study" of June 1981, the aircraft noise exposure category of Ldn 60 to 65 is described thusly:

Areas of noise effects where the noise may be disturbing to some activities because of the outdoor Hawaii lifestyle. In some locations, the ambient noise level (background noise from vehicular traffic and other sources) may be equal to or greater than the contribution of aircraft noise.

Motor vehicular traffic noise is usually treated separately from aircraft noise because (a) noise barriers or other buildings can often provide effective shielding from traffic noise, but are not effective in mitigating aircraft fly-over noise; and (b) many people accept higher levels of traffic noise as compared to aircraft noise. In the islands, traffic noise is normally evaluated using mainland criteria of 67 dB for FHWA or 65 dB for HUD.

If the Ldn's from aircraft and traffic noise are combined, it should be understood that logarithmic summation of the dB levels would be used. For example, if a worst-case condition existed at Parcel 7 where the aircraft noise caused 59 Ldn (from Figure 3) and traffic noise caused 61.7 Ldn (from Table 2), the combined total would be 63.4 Ldn. This level would still be considered acceptable by HUD for residential housing. If stationary equipment caused an additional 55 Ldn, then 64.2 dB would be reached.

As mentioned on page 7 of Appendix K, the structures on the shore parcels should be designed to provide shielding from aircraft from the runway. Such designs would also mitigate traffic noise from Farrington Highway so the worst-case situation considered above would not exist.

Sounds from surf and wind in the trees are usually considered beneficial masking sounds that tend to cover up less desirable noise from aircraft, highway traffic, and stationary equipment. Such natural sounds should not be combined with other noises for comparisons to a standard criterion.

9. Traffic

The Traffic section of the Final EIS will be expanded to include a discussion of your comments, including additional mitigating measures.

10. Archaeological

The applicant has proposed to follow the recommendations in the Archaeological Report. These recommendations would be undertaken during the design development stage of the project. These studies are not available at this time.

11. Market Study

Estimate Unit Pricing

The Waiulani Development Plan is currently in a schematic phase. The physical characteristics of the residential and condominium units are not available. However, the pricing would be expected to be competitive with comparable properties in the State.
12. Cane Haul Road

The cane haul road would remain after completion of the project and therefore there should be no impact on the visibility of the existing sugar operation on land southeast of the project. The EIS includes ways of mitigating noise impacts from the sugar operation on the resort development through use of buffers, setbacks, etc. at no cost to the sugar operation.

13. Previous Agricultural Operations on the Property

The grazing operation was terminated in February 1987. The operation had been subsidized by the landowner for a number of years due to low cattle prices and high expenses. Over the years, a number of agricultural enterprises had been conducted on the land, including alfalfa, truck farming and macadamia nuts. Grazing of horses continues on portions of the property.

14. Impact of Wohelo on Existing Secondary Resort Areas

A secondary resort at Wohelo would be complementary to the four secondary resort areas already designated on Oahu, and would provide a wider variety of accommodations and recreational activities to be enjoyed by local residents and visitors.

In addition, sufficient demand is projected to support continued development of resort facilities on Oahu. Based on our projections, the visitor industry on Oahu could be expected to require about 18,500 to 22,700 additional rooms by 2005. Because only 9,300 to 9,400 rooms are currently planned for development, an additional 9,500 to 13,300 rooms are needed on Oahu.

15. Endangered Marine Life

The national marine fisheries will be contacted and a discussion of this issue will be contained in the Final EIS.

Flora and Fauna Names

Common and Hawaiian names of flora and fauna are contained on pages 18-20 of Appendix 1, the flora and fauna study. Note: Not all plants have Hawaiian names.

Golf Course/Pesticide Usage

Golf course pesticide use will be discussed in the Final EIS.

16. Organization and Labeling

The errors pointed out in this comment will be corrected in the Final EIS. In addition, the applicant will review the entire EIS document to check for other organization and labeling problems.

17. Improved Communication

The applicant concurs with the first comment. The second comment is the subject of an Environmental Council hearing scheduled for April 8, 1987.

Again, thank you for your comments.

Sincerely,

[Signature]

[Name]

[Title]
March 30, 1987

Mr. Ronald Clegg  
Chief Planning Officer  
Department of General Planning  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Draft EIS - Nokulea Development Proposal  
Nokulea, Oahu

The following comments are offered for your consideration on the subject proposal.

Traffic

Traffic conditions along Farrington Highway (Exhibit 26) are projected to increase anywhere from 3 to 10 times over current levels thereby causing a deterioration of traffic service from level of service A to level of service E. This represents a significant change in operating conditions and is considered an unacceptable level of service for rural highways. Therefore, we find that the proposed mitigation measures address only localized impacts and do not fully address the impact of the development on Farrington Highway.

The developer should bear all cost of improvements necessitated by his proposal.

Aircraft Noise

A composite military and civilian noise contour map should be generated for Dillingham Field based on existing and projected operations. Using this map, we recommend that resort/residential developments be not allowed within the 60Ldn and greater
April 8, 1987

Mr. Edward Y. Hirata, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Kolekole, Oahu

Dear Mr. Hirata:

Thank you for your comments of March 30, 1987 regarding the subject EIS. We respond as follows:

Traffic

The traffic impacts identified could be mitigated by reducing the travel demand or by increasing roadway capacities. Travel demands can be reduced in various ways, ranging from a decrease in project scale to the implementation of a ridesharing program. Reductions in travel demands, however, were not considered in the EIS because the traffic analyses were prepared to identify and disclose potential impacts.

Widening of the existing highway would be necessary to increase capacities. Improvements to the two-lane highway such as removing roadside obstructions and widening travel lanes to 12 feet could increase capacity by about 30 percent; the condition during the weekend peak hour, however, would remain at Level of Service E (LSE). Since LSE on two-lane highways describe probable delays due to the inability to pass slowmoving vehicles, a passing lane or pull-off area could be provided to minimize delays. Widening to a four-lane facility would increase capacity to approximately four times the peak traffic demand, which does not appear to be appropriate in light of existing conditions elsewhere.

The low level of service may not translate to unacceptable operational conditions. The procedure to calculate capacity and determine the levels of service on a two-lane highway from the Highway Capacity Manual also estimates that the average speed on the highway, if not otherwise restricted, would exceed the posted 25 mile per hour speed limit. The calculation also assumes extended (longer than the four miles of Farrington Highway involved here) segments of the highway, whereby delays due to speed differences would be significant.

Note: Traffic will be more fully discussed in the Final EIS.

Aircraft Noise

Cumulative noise impacts for Parcels 6, 7 and 8 are of concern, but the following considerations should be taken into account.

Figure 3 in Appendix D presents aircraft noise contours predicted for the year 1992, not for the existing condition as inferred in the comment. The potential increase in air traffic after project buildup was taken into account by assuming that the number of civilian power aircraft operations would approximately double in 1995 as compared to 1985 to 1995. Thus the contours in Figure 3 are based on 120,000 civilian power operations in 1995 compared to 60,404 operations in 1985. On page 11-24, the reference to 'Ldn 60 not being exceeded for residential and resort areas' applies only to aircraft noise and to cumulative noise impact. For example, in the "Summary Report, HII and Environ Master Plan Study" of June 1981, the aircraft noise exposure category of Ldn 60 to 85 is described as follows:

Areas of noise effects where the noise may be disturbing to some activities because of the outdoor HII lifestyle, in some locations, the ambient noise level (background noise from vehicular traffic and other sources) may be equal to or greater than the contribution of aircraft noise.

Mr. Edward Y. Hirata, Director
April 8, 1987
Page 2
Motor vehicular traffic noise is usually treated separately from aircraft noise because (a) noise barriers or other buildings can often provide effective shielding from traffic noise, but not effective in mitigating aircraft fly-over noise; and (b) many people accept higher levels of traffic noise as compared to aircraft noise. In the islands, traffic noise is normally evaluated using mainland criteria of 87 dB for THA or 65 dB for HDO.

If the $L_{10}$'s from aircraft and traffic noise are combined, it should be understood that logarithmic summation of the dB levels would be used. For example, if a worst-case condition existed at Parcel 7 where the aircraft noise caused 60 $L_{10}$ (from Figure 5) and traffic noise caused 61.7 $L_{10}$ (from Table 3), the combined total would be 62.6 $L_{10}$. This level would still be considered acceptable by HDO for residential housing. If stationary equipment caused an additional 55 $L_{10}$, then 64.2 dB would be reached.

As mentioned on page 7 of Appendix E, the structures on the shore parcels should be designed to provide shielding from aircraft from the runway. Such designs would also mitigate traffic noise from Farrington Highway so the worst-case situation considered above would not exist.

Sounds from surf and wind in the trees are usually considered beneficial masking sounds that tend to cover up less desirable noise from aircraft, highway traffic, and stationary equipment. Such natural sounds should not be combined with other noises for comparisons to a standard or criterion."

Note: New information provided by the military is being analyzed by our acoustical consultant. The results of this analysis will be included in the Final EIS. Mitigation measures will also be reviewed.

Sincerely,

[Signature]

W. T. Wiecek

[Date]
Mr. Donald A. Clegg
March 25, 1987

Traffic noise is expected to peak at 63 dBA, whereas the current weekday peak is at 56 dBA. While this increase in noise level is not particularly large in absolute terms, it is nonetheless a consideration. Moreover, these noise levels will be maintained only as long as drivers observe the speed limit.

Traffic pollutants attributable to development are "well within allowable standards." While this is true, pollution will still be at more than the current, negligible levels. Considering that the area will inevitably be put to some use, however, the proposed resort will have less harmful effects in terms of air quality, than other, alternative uses.

The DEIS does not seem to include consideration of the visual impacts of the development on the environment.

Socio-economic Considerations

The lifestyle of the few residents living on the proposed site will obviously be altered. There is little mention as to what will happen to these residents. There is no mention as to whether or not amenities and facilities such as a sports center would be open to the public. It is important to ensure that the local community will not be excluded from any of the amenities included in the development.

Reach access for the general public needs to be better established. The "reasonable user fee" for camping or hiking in the mountains also needs clarification. While additional camping sites are needed for this area, their compatibility with other proposed uses is not evident.

Residential development as an alternative to this project is rejected, in part, because it would require residents to travel long distances to their place of employment. However, employees who work at the proposed resort would likewise have to travel long distances, as would tourists.

We find that housing problems in the DRAFT RIS have been addressed thoroughly, housing prices would be expected to increase as a result of the project, especially if people are hired from the area. The report suggests that part of this problem would be alleviated if workers are drawn and commute from Central Oahu. In this instance, we believe the problem of housing will simply be replaced with a commuting problem.

Employment issues may prove rather large. If workers are drawn from the North Shore, long run impacts are difficult to assess. As mentioned in the report, this population is not highly educated and has a low female participation rate. The major question is whether the population will actively seek employment at the resort and whether the population base is large enough to provide workers for both this project and the proposed Turtle Bay expansion.
No mention is made of any training programs that would give potential workers from the area the necessary skills to qualify for employment. Do the developers plan to work with the community to develop competitive job skills? The report points out that labor can always be imported from Central Oahu. If all proposed projects are developed, a number of these will be drawing labor from the Central Oahu districts whose population is limited. The state has already recognized a labor shortage in the service trades, particularly at the skill level required for the proposed resort.

Crime rates in the area are currently low, with the major problem stemming from isolation of the parcels people using the area for illegal target practice and growing marijuana. Although it may be true that this type of crime will decrease, other types of crimes will most assuredly follow tourist development, a point not acknowledged in the report.

Schools in the North Shore are currently at capacity. Adding a population of 4,680 will strain these (and other) facilities. The social impact report points out that the residents of the resort will have few children in the public schools. Does this imply that resort residents' children will not attend private schools? If so the effects on private school facilities should be considered.

Fire protection upgrading should be a priority in the development of the project, but this is not apparent in the proposal.

A major error is made when applying the multiplier methodology to estimated visitor expenditures generated by the resort. The multiplier analysis deals with income or employment multiplier effects. In this regard, the $106,000,000 inflated visitor expenditures in 1983 result in $78,440,000 of income (using the Drez multiplier figure of .74 which includes direct, indirect, and induced income effects). The report makes a false assumption that expenditures are the same as direct income and consequently projects the $106,000,000 will result in over $200,000,000 in expenditures (p. 17-23).

Climate

The climatic setting of the area is an important factor that will affect the proposed development and has not been thoroughly addressed in this document. We suggest the Final EIS look into these factors:

1. Wind direction: Will there be problems with loose sand and dust blowing in the area? Therefore, could there be a need for shelter belts in building design? It is likely that the on-shore blowing winds will carry salt spray from the ocean which will affect the type of building materials used as well as the vegetation grown in the area. A source of reference for this information can be found in Wind Energy Resource Atlas Volume II.

Sewage

There is no definite decision as to whether the development will be using their own treatment plant or the City's. The Final EIS should address this issue for both systems as well as give the overall impact both systems will have on the environment such as any effects they may have on coastal waters. Information should also be given on the volume and quality of wastewater that will be discharged from the development.

Solid Waste

More information should be provided regarding solid waste disposal. Where are the disposal sites? What are the capacities of these sites and what is the forecasted volume and quality of the waste that will be generated from the development? This data would be very helpful in the Final EIS.

Mr. Donald A. Clagg
March 25, 1987

Kawailoa and Pacific Islands Region Feb. 1985 Pages 48-49, and in Journal of Ecological Geography 1979, 97161-629, Figure 3.

3. If the area is lacking in sufficient rainfall, the resulting dry land will be more susceptible to soil loss through wind erosion. The preparation of the EIS might refer to Predicting Rainfall Erosion Losses: A Guide to Conservation Planning, USDA Dec. 1978 and to Rainfall Atlas of Hawaii Report R-76, Dept. of Land and Natural Resources, June 1984, for further information. Likewise, we suggest that information on evaporation and its effect on the development site be included, the report by Paul A. Eckert and Jean-Ho Chang entitled Man Production Status of Hawaii, 1981-1983 Report R-76, Dept. of Land and Natural Resources, Aug. 1985, might be useful.


We suggest that information on curvets in the area and their effect on coastal erosion as well as on beach activities should be fully addressed. There are several reference sources that can be looked into such as Hawaii's Shoreline 1982, Shoreline Plan, Oahu, and a report by Ralph Roberts, Jr. and Theodore Chamberlain entitled Hawaii Beach Systems May 1964, HIG-64-2 also Coastal Currents and Swage Disposal in the Malaekahana Islands June 1964, HIG-64-1 a report due by Dr. Lewetaw, Don K. Avery, and Don C. Cox and Beach Changes on Oahu as Revealed by Aerial Photographs by Dennis Hwang, July 1984, Tech. Suppl. No. 21 Malaekahana Coastal Management Program.

Water Supply

To make a more thorough assessment of the effects the development will have on the water supply we feel that a comparison needs to be made between the existing amount of water used and what will be used when the development is finished will be helpful. In addition, a discussion should be included about ground water recharge.
Tsunami Hazards

The section regarding tsunami (IV-B) seems to be rather complete. However, it might be noted that the 100-year tsunami inundation zone and even the 150-year zone proposed by Bredehoeft (Appendix B) probably are not broad enough for adequate protection to persons, and an tsunami-warning occasion, evacuation of the broader Civil Defense evacuation zone will be required.

We appreciate the opportunity to comment on this draft EIS and hope you will find our comments useful in the preparation of the final document.

Sincerely,

Jacquelin H. Miller
Acting Associate Environmental Coordinator

cc: OEQC
Stephan Lau
Kevin Babary
Frederick Collins
Deak Cox
Paul Elborn
Peter Flashabart
Chuck Gei
Michael Graves
Juanita Liu
Kee Lurry
Pauline Sheldon
Reginald Young
Paula Bahneman
Sonya Myers

April 8, 1987

Ms. Jacqueline H. Miller
Acting Associate Environmental Coordinator
University of Hawaii at Manoa
Environmental Center
2525 Campus Road, Cranford 317
Honolulu, Hawaii 96822

Re: Responses to Comments on the EIS for the Proposed Development at Nobukea, Oahu

Dear Ms. Miller:

Thank you for your comments of March 25, 1987 on the subject EIS. We respond as follows:

General Comments

Environmental impact statements (EIS's) typically make preliminary suggestions for mitigations. Actual requirements, however, are imposed through the political and regulatory process, which may involve negotiations between government decision makers and private landowners or developers. Public input during the EIS and/or subsequent hearing process can affect the outcome of these negotiations. In recent years, some requirements have been made on a standardized basis. For example, for projects containing residential units, an "inclusionary zoning" requirement of ten percent for low-to-moderate income units is often executed. These types of mitigation requirements are sometimes unrelated to EIS impact findings or mitigation recommendations.
At the City level, "unilateral conditions", or one-sided voluntary agreements by the project proponent, have normally been attached not to Development Plan approvals but to final zoning approvals. Presumably the latter stage is the point in time closest to project implementation and the best time for government decision makers to assess true needs. Also, zoning is a more detailed level of government control than Development Plan approvals—hence, the more appropriate level for imposing conditions.

Because there have been questions about the legality and equity of unilateral conditions, the City and County of Honolulu is now considering several new measures which would revise the present system:

1. "Development Agreements", a bilateral agreement process which would vest rights to develop at an early stage in return for firm detailed commitments by the developer to provide socio-economic and other mitigation measures; and

2. A "Community Benefit Assessment" (CBA) ordinance, which would set the total dollar amount for such mitigations according to formulas which consider such factors as location, extent of up-zoning, etc. The current CBA concept would rely on the EIS to recommend priorities for allocating assessed dollars (or other in-kind measures) among the various potential mitigation measures.

As of this writing (April 1, 1987), it is uncertain whether either of these measures will actually be adopted or, if so, in what exact form.

Specific Comments

Archaeology

The applicant has agreed to the recommendations of the archaeological report and will conduct the studies in conformance with the guidelines as set forth by the Society for Hawaiian Archaeology. In addition, the applicant will work with the State Historic Preservation Officer in order to comply with state law and policy in these matters. Further design development is necessary in determining sites which would merit more intensive study.

Marketability

Demand would not be created by building a resort. The market study found that a demand does exist for rooms throughout Oahu.

Waikiki will continue to dominate the Oahu visitor unit market; however, its market share is expected to decline from its current level of 52% to about 75% by 2005. Reasons for this decline in market share are a result of:

- Limited amount and availability of suitable development sites in Waikiki.
- Anticipated development and maturation of resort destinations outside Waikiki.
- Trend in visitor preference for recreation-oriented vacations in integrated resort communities.

Alternative destination areas are expected to occur on lands elsewhere on Oahu which are:

- suitable for development
- close to the ocean
- in unique environmental settings.

Lands which meet these criteria are typically outside the primary urban center of Oahu along the coastline and include:

- West Beach
- Kahala
- Lai/Lahaina
- Hokuulea.

Considering the market orientation and development plans of the destination areas on Oahu which are presently planned or proposed, the market share distribution of Oahu visitor units by 2005 is projected as follows:

<table>
<thead>
<tr>
<th>Destination Area</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waikiki/Kahala</td>
<td>75.0%</td>
</tr>
<tr>
<td>West Beach/Southward</td>
<td>18.0%</td>
</tr>
<tr>
<td>North Shore/Koolau</td>
<td>12.5%</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Total                         | 100.0%
Based on these factors, visitors would probably want to stay on the North Shore and as a result, a resort could be developed.

Conference Center Hotel

The conference center hotel is not intended to replace a convention center in Honolulu. Rather, it would complement our convention market by catering to small to medium-sized post- or pre-convention meetings and corporate incentive groups. The facilities provide different alternatives to our visitors.

"Loss of Ruralness"

There is no question that the development of the resort proposed would result in the reduction of "ruralness." The loss of ruralness was identified as an adverse impact in Part V.F of the DEIS under the heading "Lifestyle Changes".

Traffic/Environmental Concerns

The proposed improvements recommended at the mauna project access road would accommodate the higher volumes expected there. Observations at an existing, similar highway, where mid-afternoon (non-peak) volumes are 1600 to 1800 vehicles per hour (Kaneohe Bay Drive between Wahiawa and Kailua Drives) indicate that traffic conditions on Farrington Highway would allow sufficient gaps for low volumes of traffic to enter the highway from driveways or cross streets.

Traffic volumes between Honolulu and Haleiwa are expected to be affected more by factors other than the proposed project, such as increases in island-wide population, tourism activity, and development elsewhere. Construction of a proposed Haleiwa bypass highway would ease the expected increases in traffic at Neel Circle.

Visual Impacts

The applicant has contracted Michael Chu, Land Architect, to perform a visual analysis for the proposed project. The results of his study will be included in the Final EIS.
The multiplier relating visitor expenditures to total visitor-related expenditures in the State has declined from about 2.40 in 1974 to about 1.91 in 1981, as shown in Exhibit A. Based on the data, each dollar of direct visitor expenditure resulting from development at Mokuleia is projected to result in $1.93 of total direct, indirect, and induced visitor-related expenditures in the State. Therefore, expenditures in the State attributable to Mokuleia’s visitors are projected to increase from $35.3 million in 1980 to $505.1 million by 2005, in 1980 dollars, as shown in Exhibit 19-6 of the study.

Climate
The Mokuleia area is not noted for unusual climatic conditions; however, the Final EIS will include a discussion of the conditions at the site.

Water Supply
Existing water usage at the site is unknown due to the lack of metering facilities on the well currently operating on the site. In recent years water usage for agricultural operations has fluctuated due to weather conditions and the size and component mix of the grazing operation. Note: The component mix of the grazing operation consisted of a cow-calf operation and a grazing operation raising dairy beefers with supplemental pasturing operation raising dairy beefers with supplemental feed. Economic returns from the barley operation allowed for irrigating portions of the property while returns from the cow-calf operation did permit irrigation. Changes in the mix of the operation therefore impacted irrigation over time.

Wastewater
An expanded discussion of Wastewater alternatives will be included in the Final EIS.

Solid Waste
At the present level of planning, data on the forecasted volume and quality of the waste that will be generated from the proposed development was determined. This information will become available and analyzed in more detailed levels of planning, such as in the application for a Shoreline Management Area permit under City and County Ordinance 84-4, which Planning Guidelines require provisions to be made for solid waste, disposition, and management that minimize adverse effects upon special management area resources. We also note by the time the project is operational, it is anticipated that the City’s Garbage to Energy Facility in Kea’au will be completed.

Tsunami Hazards
As indicated in our general comments at the beginning of this response, we believe that specific details and progress should be developed at a later date in the approval process. This appears to be one of those areas.

Again, thank you for your comments.

Sincerely,
[Signature]
[Name]
[Title]
### Exhibit A

**Relationship Between Direct Visitor Expenditures and Total Visitor-Related Expenditures (in millions) 1974 - 1984**

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Visitor Spending</th>
<th>Total Sales or Output</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>51.725.0</td>
<td>52.592.7</td>
<td>2.33</td>
</tr>
<tr>
<td>1975</td>
<td>1,280.0</td>
<td>2,815.2</td>
<td>2.07</td>
</tr>
<tr>
<td>1976</td>
<td>1,040.0</td>
<td>3,332.9</td>
<td>3.03</td>
</tr>
<tr>
<td>1977</td>
<td>1,845.0</td>
<td>3,699.7</td>
<td>2.01</td>
</tr>
<tr>
<td>1978</td>
<td>2,146.0</td>
<td>4,332.3</td>
<td>2.03</td>
</tr>
<tr>
<td>1979</td>
<td>2,537.0</td>
<td>5,465.8</td>
<td>2.04</td>
</tr>
<tr>
<td>1980</td>
<td>2,875.0</td>
<td>5,880.4</td>
<td>2.04</td>
</tr>
<tr>
<td>1981</td>
<td>3,200.0</td>
<td>6,050.6</td>
<td>2.02</td>
</tr>
<tr>
<td>1982</td>
<td>3,700.0</td>
<td>7,298.7</td>
<td>1.97</td>
</tr>
<tr>
<td>1983</td>
<td>3,971.0</td>
<td>7,770.5</td>
<td>1.94</td>
</tr>
<tr>
<td>1984</td>
<td>4,592.0</td>
<td>8,767.8</td>
<td>1.91</td>
</tr>
</tbody>
</table>

1/ Excludes direct expenditures by airline and ship crews and overseas airlines.
2/ Total direct, indirect and induced sales or output generated by visitor-related expenditures.


---

**24 March 1987**

Mr. Donald A. Cinga
Chief Planning Officer
Department of General Planning
City and County of Honolulu
850 S. King St.
Honolulu, Hawai’i 96813

Dear Sir:

We have reviewed the Environmental Impact Statement, "Mokuleia Development Proposal, Mokuleia, Oahu," and have the following comment: Figure 1 showing the project boundary map should include a small scale map of Oahu and indicate the relative location of Mokuleia.

Thank you for the opportunity to review and comment on this EIS.

Sincerely,

[Signature]

Henry K. Cee
ED Coordinator, WRRC

---

1/ An Equal Opportunity Employer
April 8, 1987

Mr. Edwin T. Murabayashi, EIS Coordinator
Water Resources Research Center
University of Hawaii
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Re: Responses to Comments on the DEIS for the Proposed
Development at Kukuiola, Oahu

Dear Mr. Murabayashi:

Thank you for your comment dated March 24, 1987 regarding the subject EIS.

The requested change in Figure 1 will be made in the Final EIS.

Again, thank you for your comment.

Sincerely,

William E. Kaneki
WIK:ACP
March 12, 1987

MEMO TO: MR. DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: HERBERT K. MURAKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
HOKULEA DEVELOPMENT PROJECT

We would like to repeat our previous comment made on
the proposed HOKULEA development project that an adequate access
to the State's HOKULEA Radio Site, where City's radio equipment
are located, be provided.

Thank you for the opportunity to review the draft EIS
for the subject project.

HERBERT K. MURAKA
Director and Building Superintendent

| Re: | J. Nakaya
| Inc. | 3-16-87 |

April 8, 1987

Mr. Herbert K. Murakaa
Building Department
250 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed
Development at HOKULEA, Oahu

Dear Mr. Murakaa:

Thank you for your comments dated March 12, 1987 regarding the
subject EIS. We respond as follows:

As indicated in our February 17, 1987 response to your earlier
comments, the applicant will be working with the State Depart-
ment of Land and Natural Resources to provide access to the
mountain. As indicated in our earlier response, the existing access
road has experienced some stability problems. The
access road will work with the State to provide an acceptable
access.

Again, thank you for your comments.

Sincerely,

WILLIAM E. WANKET

| Re: | J. Nakaya
| Inc. | 3-16-87 |
March 4, 1987

TO: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR MOKULEIA
DEVELOPMENT PROPOSAL. TUII: 6-8-92, 7, 8, 10 AND 14 (TWO: 6-8-92, 5, 6, 10, 15, 16, 17, 18, 20, 30, 31, 33, 34, 35, 36, 38 AND 40) THUR: 6-8-92, 7

We have no additional comments. All of our concerns are already incorporated in the Environmental document.

If you have any questions, please contact Lawrence Whang at 527-6138.

KAZU HAYASHIDA
Manager and Chief Engineer

[Signature]

DATE: 3-6-87

IN RESPONSE REQUIRED

March 25, 1987

Mr. William E. Wanker
William E. Wanker, Inc.
Pacific Tower, Suite 1010
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Wanker:

We have the following comments on the subject Draft Environmental Impact Statement.

1. The Draft EIS should include a discussion of the relationship of this project and Section 4.6, Rural Areas, of the DP Common Provisions.

2. The Draft EIS should include a discussion of the environmental impacts of developing inland lagoons.

3. The discussion on water resources should address the hydrology of the Mokuleia area including how the project will affect groundwater recharge.

4. What are the urbanizing effects of this resort development? What other services and facilities will be needed to serve this project, such as housing, industrial and commercial services?

5. The EIS should address the potential loss of nearby sugar cane lands which may affect the operations of the Mokuleia Sugar Company. Conversely, how will current sugar cane operations, including the planting, growing, and harvesting of cane, affect this project?

6. Discussion involving the Dillingham Airfield should include the potential for aircraft accidents, the designation of accident potential zones, and the land use compatibility of the project.
Mr. William E. Manket
William E. Manket, Inc.
March 25, 1987

The draft EIS should contain a summary of unresolved issues and either a discussion of how such issues will be resolved prior to commencement of the action or what overriding reasons there are for proceeding without resolving the problem.

Thank you for giving us an opportunity to comment on this project. Should you have any questions, please contact Randy Hara of my staff at 523-4403.

Sincerely,

DONALD A. CLEG
Chief Planning Officer

April 8, 1987

Mr. Donald Clegg, Director
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Nukolokia, Oahu

Dear Mr. Clegg:

Thank you for your comments on the subject DEIS. We respond as follows:

General Comments

Environmental Impact Statements (EIS's) typically make preliminary suggestions for mitigations. Actual requirements, however, are imposed through the political and regulatory process, which may involve negotiations between government decision makers and private landowners or developers.

Public input during the EIS and/or subsequent hearing process can affect the outcome of these negotiations. In recent years, some requirements have been made on a standardized basis. For example, for projects containing residential units, an "inclusionary zoning" requirement of ten percent for low-to-moderate income units is often executed. These types of mitigation requirements are sometimes unrelated to EIS impact findings or mitigation recommendations.
At the City level, "unilateral conditions", or one-sided voluntary agreements by the project proponent, have normally been attached not to Development Plan approvals but to final zoning approvals. Presumably the latter stage is the point closest to project implementation and thus the best time for controlling drainage within the project site. Specific drainage solutions for the development have not been adopted but are currently in the range of alternative status. As indicated in the conceptual plan, there are large areas of the property immediately south of Farrington Highway that are available for recreation use such as polo fields and golf course areas which could be incorporated into the drainage improvements for the project, i.e., designed to flood under storm conditions.

The impression created by the concept plan that there is an ocean connection to the inland water feature is also unfortunate. The streams which currently exist on the property flow seasonally and only intermittently into the ocean under storm conditions. Wave and wind action currently provide a seed bank that is washed out with the runoff caused by impermeable surfaces necessitated by the development will be mitigated by the development of drainage improvements.

3. Impact on Aquifer

The development of the project should have little impact on the hydrology of the Mokuleia Aquifer for the following reasons. As indicated on the Concept Plan, Exhibit 10, only a small portion of the site would have buildings and roads. Intensive development would be concentrated on the shoreline. As indicated on Exhibit 10, shoreline parcels and property close to Farrington Highway are below the Board of Water Supply No-Pass Line, indicating no connection between surface water and the aquifer. Beyond the No-Pass Line development proposed by the concept plan indicates a predominance of low-density house lots, golf course and recreational amenities which should have little or no impact on soil permeability.

Other mitigating factors include that the subject area proposed for development makes up only a minor portion of the Mokuleia aquifer. In addition, rainfall gradients

Specific Concepts

1. UP Common Provisions

Section IX of the Final EIS will be expanded to include a discussion of the relationship of this project and Section 3.6, Rural Areas, of the Development Plan Common Provisions.

2. Inland Lagoons

At the present time there are no specific plans to develop inland lagoons. The water features shown on the concept plan are the product of artistic license of the individual preparing the conceptual drawing of the project. The area shown on the concept plan as inland water amenities is an area which has been identified for providing a habitat for endangered species and for controlling drainage within the project site.
Indicate that annual rainfall is greater in mountain areas than in the area proposed for development, thus making the area's contribution to recharge even smaller.

4. Other Impacts (Services)

Part IV of the DEIS and Appendix C (Social Impact Assessment) identify impacts on other services in detail.

Housing impacts are discussed and based on assumptions contained in the Department of General Planning's "Residential Implications of the Development Plans" August 1985, residential population can be accommodated within the North Shore Population Guidelines.

Appendix A, the Market Assessment, describes in detail the estimated commercial demand generated by the project and provide recommended square footage for inclusion within the project area. In addition, based on information provided by the Planning and Information Branch of the Department of General Planning, the North Shore Development Plan Area included 4.7 acres of commercially designated land which was available for development.

While no study has been made of the industrial demand generated by the development, the project site is within easy driving distance of Williman High Tech Park,ometry Business Park and Campbell Industrial Park. In addition, according to information provided by the Planning and Information Branch of the Department of General Planning, the North Shore Development Plan Area contains 10.7 acres of industrial land which is currently underdeveloped. Resort activities are expected to contribute only minimally to the demand for industrial development.

5. Loss of Sugar Lands/Impact of Cultivation of Resort Use

No loss of sugar land will be caused by resort development.

Appendix K (Noise Study) describes impact of agricultural noise on resort development and mitigating measures.

Our response to the Department of Agriculture concerns about impact of cane burning on the resort and residential development cites potential mitigating measures. Resort and agricultural enterprises have coexisted successfully in Hawaii over the past years. Note: Kauai Plantation and Kapalua Maui Pineapple experience.

6. Dillingham Airfield Impact

Information received from Directorate of Facilities Engineering indicates that Dillingham Field is under civilian control and that there should be no attempt by the FAA and DOT personnel to establish flight strips. The Final EIS will contain an additional discussion of airport noise and safety considerations.

7. Unresolved Issues

The Final EIS will contain a section on discussing unresolved issues and how they will be resolved prior to commencement of the action or what overriding reasons there are for proceeding without resolving the issue.

Again, thank you for your comments.

Sincerely,

W.T. Kauai

E17.23pp
MEMORANDUM

TO: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: JOHN P. WHALEN, DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR MOKULEIA DEVELOPMENT PROPOSAL, MOKULEIA, OAHU
TAX MAP KEYS 6-6-07, 607-086 VARIOUS

March 24, 1987

The Department of Land Utilization has reviewed the Draft EIS and offers the following comments:

1. Coastal Erosion

   Our response to the EIS Preparation Notice dated July 11, 1986 noted that the EIS should examine the history of beach changes at specific segments proposed for development. The Draft EIS, in analyzing the existing conditions, demonstrates that the various segments have had net losses of land due to erosion. As mitigation for these losses, the Draft EIS suggests three alternatives to minimize erosion:
   a. Construction of seawalls or other barriers;
   b. Using adequate setbacks for shoreline structures; and
   c. Beach replenishment by hauling in material.

   The EIS should examine these and other alternatives in greater detail in order to determine their feasibility. Please be advised that the placement of seawalls and other erosion control structures require a shoreline setback variance from this Department.

2. Wetlands

   Exhibit 144, which shows the existing wetlands on the subject property, is difficult to read at the current scale. The EIS should provide a revised wetland map which more accurately depicts the wetland locations as well as the size of each area.

   The biological survey prepared by U. & Associates states that the pond areas around the Squaw Ranch provide habitat for and are utilized by two endangered waterbird species, the holo (Anas wwelli) and the Hawaiian gallinule (Podiceps nigricollis). The EIS should discuss in greater detail how these pond areas will be incorporated into the design of the development and managed to preserve existing habitat.

3. Parks and Public Beach Access

   The Draft EIS states that public access to the shoreline will be increased as a result of the project, but does not provide specifics as to how or where this will be accomplished. The EIS should at least provide alternative plans and sites for parks and public access to beaches.

4. Traffic

   The proposed project will increase traffic volumes on Farrington Highway from the existing peak hour Level of Service (LOS) B and C to LOS C at weekday and weekend P.M. peak hours with completion of the project. The EIS should describe possible mitigation alternatives to reduce adverse traffic impacts related to the project.

5. Drainage

   Two streams flow through the site, Makalena and Kapalau Streams, with the latter providing discharge into Kali'aua Bay. Proposed plans call for rerouting the discharge outlet to Makalena Stream.

   The EIS should more fully discuss why moving the discharge outlet to Makalena Stream is expected to have no significant impact on the nearshore marine water quality or environment.

   The Draft EIS, through a study prepared by Oceanic Laboratories...
6. **Housing**

The EIS should specifically address how the project will provide at least ten percent of the proposed housing units for low- and moderate-income families. Such a discussion should include alternative methods for housing provision, feasibility of each alternative, recommended housing types and associated impacts.

7. **Sewage Disposal**

The Draft EIS states that the applicant intends to provide sewage disposal through two optional methods:

a. Independent development of a sewer treatment plant; or

b. Participation in the City's plan to develop a regional North Shore system.

The EIS should include a more detailed discussion of these two options, particularly addressing the feasibility of creating a regional system.

8. **Tsunami/Flood Hazards**

Exhibit 1, SMA/Flood Designations, is difficult to read because of the small scale and difficulty of distinguishing SMA and flood district lines. This information should be mapped in a more readable format.

The wakai portion of this project is located within areas subject to tsunami and storm flooding. The EIS should provide a more detailed study of flood hazard impacts and methods for a more detailed tsunami mitigation. Because of the historical frequency of tsunami events at Hahului, the EIS should focus on site specific mitigation alternatives.

9. **Urban Design/Coastal Views**

The project is described as a low-density project, with structures not exceeding six to seven stories in height. It is questionable if six- to seven-story structures will be compatible with the land forms and rural character of the area. The EIS should include visual analyses which depict the potential height and bulk of the proposed structures in relation to landforms and existing structures. These analyses should also contain a study of coastal views looking north and east from Farrington Highway.

We hope these comments will be helpful to you in the preparation of the Final EIS. If you have any questions, please contact Art Challacombe of our staff at 523-4608.

Very truly yours,

[Signature]

JOHN D. WHALEN
Director of Land Utilization

[Date: 08/21/86]
April 8, 1987

Mr. John Whalen, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed
Development at Mokuleia, Oahu

Dear Mr. Whalen:

Thank you for your comments of March 24, 1987 on the subject
EIS. We respond as follows:

General Comments

Environmental Impact Statements (EIS's) typically make prelimi-
nary suggestions for mitigations. Actual requirements, however,
are imposed through the political and regulatory process, which
may involve negotiations between government decision makers and
private landowners or developers.

Public input during the EIS and/or subsequent hearing process can
effect the outcome of these negotiations. In recent years, some
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ple, for projects containing residential units, an “inclusionary
zoning” requirement of ten percent for low-to-moderate income
units is often executed. These types of mitigation requirements
are sometimes unrelated to EIS impact findings or mitigation
recommendations.

Mr. John Whalen, Director
April 8, 1987
Page 2

At the City level, "unilateral conditions", or one-sided
voluntary agreements by the project proponent, have been normally
attached not to Development Plan approvals but to final zoning
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government decision makers to assess true needs. Also, zoning is
a more detailed level of government control than Development Plan
approvals—hence, the more appropriate level for imposing
conditions.

Because there have been questions about the legality and equity
of unilateral conditions, the City and County of Honolulu is now
considering several new measures which would revise the present
system:

1. "Development Agreements”, a bilateral agreement process
which would vest rights to develop at an early stage to
return for firm detailed commitments by the developer to
provide socio-economic and other mitigation measures; and

2. A “Community Benefit Assessment” (CBA) ordinance, which
would put the total dollar amount for such mitigations
according to formulas which consider such factors as
location, extent of up-zoning, etc. The current CBA
concept would rely on the EIS to recommend priorities for
allocating assessed dollars (or other in-kind measures)
among the various potential mitigation measures.

As of this writing (April 3, 1987), it is uncertain whether
either of these measures will actually be adopted or, if so, in
what exact form.

Specific Comments

1. Coastal Erosion

The applicant will expand the Coastal Erosion section of
the Final EIS to include a more detailed analysis of the
mitigation alternatives. The applicant agrees with the
DLU comment that the most preferable alternative would be
the establishment of adequate setbacks.

2. Wetlands

A revised Wetlands Map will be provided in the Final EIS.

time and thus can result in smaller flows into the ocean under storm conditions. During design development, large open spaces such as the golf course can be graded to mitigate drainage impacts. As indicated in our earlier general comments, we believe that the purpose of the EIS is to identify general mitigating measures rather than specific engineering solutions.

6. Housing

The Final EIS will provide an expanded discussion on the potential mitigating measures which are available for the issue of Low/Moderate Housing. Provision for providing 10% of the units for low/moderate housing is but one alternative mitigating measure. We believe this is an area where our initial comments on the purpose of the EIS are applicable to comments from DLU.

7. Sewage Disposal

The EIS will be expanded to include a more thorough discussion of the sewage issue. The Feasibility of Creating a Regional North Shore System is beyond the scope of this EIS and is the subject of a City Funded Study being undertaken by Belt, Collins and Associates for the City's Department of Public Works. If a regional facility is feasible it would be the applicant's preference to participate in that system.

8. Tsunami/Flood Designations

Exhibit 7 will be redrawn to improve readability.

We believe that this is another area where our general comments apply. The DEIS identified a number of alternatives for mitigating against Tsunami/Flooding Conditions. Details relating to the most appropriate design are more appropriately addressed at the time of the SMA Permit or the Zoning level where specific information about building locations, building design and actual development are normally addressed in detail.

9. Urban Design and Coastal View

The applicant has commissioned Michael Chu - Land Architect to conduct a view analysis of the proposed development. The results of this study will be included in the final EIS.

Again, thank you for your comments.

Sincerely,

William E. Vankei
March 16, 1987

Mr. Moon

TO:    Donald A. Clegh, Chief Planning Officer
       Department of General Planning

FROM:  Mike Moon

SUBJECT: Environmental Impact Statement - Mokuleia Development Proposal

We have no objections to the proposed development but would like to reiterate the following concerns:

1. The creation of additional jobs will stimulate job opportunities for Oahu residents. In this regard, the potential employees will require housing and the EIS should address this need.

2. We note that the proposed project will require an eventual rezoning action in addition to the Development Plan amendment presently being requested. Current city policy has been to impose a set-aside of affordable housing units in residential projects for which rezoning actions are requested. Whereas this policy has up to now only affected residential projects, all developments requesting rezoning actions would be subject to some kind of requirement under a bill for a Community Benefit Assessment ordinance currently before the City Council. Therefore, the proposed Mokuleia Development Proposal could be affected by the change in policy. The Department will inform the developer of any requirements should the Community Benefit Assessment bill be enacted.

We would welcome the opportunity to assist the applicant in formulating a program to provide these units.

We will retain the report for our files.

cc: Barry B. Ohuda, Inc.

April 8, 1987

Mr. Michael Moon, Director
Dept. of Housing & Community Development
630 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Moon:

Thank you for your comments of March 16, 1987 regarding the subject DEIS. We respond as follows:

1. Employee Housing: The Final EIS will contain an expanded section dealing with housing needs including a more detailed look at possible mitigation alternatives.

2. Proposed Policy Changes relating to affordable housing:
   Thank you for informing us of the review of policy in these areas. While we have been aware of potential changes, we appreciate your department’s courtesy in providing this information. It is the applicant’s intention to work with the Department of Housing and Community Development in developing the optimum program for meeting these needs during the approval process.

Again, thank you for your comments.

Sincerely,

William F. Wanket

NEW:EXP
TO:        DONALD A. CLEGG, CHIEF PLANNING OFFICER  
DEPARTMENT OF GENERAL PLANNING
FROM:      HERAN K. KAMAKA, DIRECTOR
SUBJECT:  DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)  
MOKULEIA DEVELOPMENT - MAIALUA  
TAX MAP KEY 6-8-02, 6-8-03 AND 6-8-08

We have reviewed the Draft EIS for the Mokuleia Development and make the  
following comments and recommendations.

Proposed Beach Parks
Two parcels, the 6-8-02:1 and 6-8-03:16, are identified on the City  
Development Plan Public Facility Map for planned acquisition for beach  
park expansion. The proposed amendments to delete these designations have  
been submitted by the developer and will require City Council action.

Park Dedication and Public Access
Guidelines of our department's park and facility standards are attached for  
the applicant's information and use in the development of any recreational  
plan. Compliance to these standards and also the Park Dedication and Public  
Access Ordinances will facilitate the applicant in obtaining City approvals  
required in the planning process of land developments.

We would like to apprise the applicant that under the Park Dedication  
Ordinance, all lands to be dedicated to the City for park purposes will be  
grazed, grassed, provided with all off-site improvements and an irrigation  
system at no cost to the City.

Thank you for the opportunity to review and comment on the Draft EIS.

HERAN K. KAMAKA, Director

March 25, 1987

April 8, 1987

Mr. Hiram Kamaka, Director  
Department of Parks and Recreation  
650 South King Street  
Honolulu, Hawai'i 96813

Re: Responses to Comments on the DEIS for the Proposed  
Development at Mokuleia, Oahu

Dear Mr. Kamaka:

Thank you for your comments of March 25, 1987 regarding the  
subject EIS. We respond as follows:

Deletion of Proposed Beach Parks from Public Facilities Map: We  
are aware that City Council action will be necessary in order to  
remove the park designations from the Development Plan Public  
Facilities Map.

Park Dedication and Public Access: The applicant understands the  
requirements for parks and access within the development approval  
process. The applicant also understands the requirements  
necessary to comply with park dedication requirements.

The applicant will work with the Department of Parks and  
Recreation to develop a park program for the development which  
best meets the City's, community's and developer's needs.

The applicant has commissioned Michael Chu, Land Architect, to  
review relevant material to assess park needs in the area. The  
results of his study will be included in the Final EIS.

Again, thank you for your comments.

Sincerely,

William E. Wankel  
WEA: Inc.
March 5, 1987

TO: DONALD CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: DOUGLAS G. GIBB, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE MOULEAIA
DEVELOPMENT PROPOSAL AT MOULEAIA, OAHU

With the development of 1,000 acres of land for 2,100 hotel rooms,
1,200 condominium units, 700 residential units with additional
commercial and recreational areas by the year 2000, we anticipate a
large increase in demands for police services in the area. The
additional increase of another 800-900 residents by the year 2015,
will further affect police services. Our present budget does not
contain provisions for the necessary increase in manpower and
equipment.

We are concerned that the present two lane roadway will not be
adequate to accommodate the projected visitor and resident popu-
lation needing access to and from the area. This in itself may
affect the provision of police services because of excessive
traffic congestion and possible accidents. We concur with the
recommendations of the Traffic Impact Report.

Thank you for the opportunity to review and comment on the subject
document.

Douglas G. Gibb
Chief of Police

CC: Mr. Barry N. Kida

April 8, 1987

Chief Douglas G. Gibb
Honolulu Police Department
1455 South Deretania Street
Honolulu, Hawaii 96814

Re: Responses to Comments on the DEIS for the Proposed
Development at Mokuleia, Oahu

Dear Chief Gibb:

Thank you for your comments of March 5, 1987 regarding the
subject EIS. We respond as follows:

Increased Manpower Requirements

The DEIS indicates that Part IV, page IV-62) increased
manpower requirements due to population and economic growth.
The budgeting process generally requires that actual development is imminent or
underway before funding is provided.

Traffic

The applicant concurs with your recommendation that traffic
report recommendations be followed. The Traffic section of
the Final EIS will be expanded to include some additional
mitigation measures.

Again, thank you for your comments.

Sincerely,

William E. Wanket

WILLIAM E. WANKET
INC.
MEMORANDUM

TO:  MR. DONALD A. CLEGG, CHIEF PLANNING OFFICER
     DEPARTMENT OF GENERAL PLANNING

FROM:  ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT:  DRAFT EIS FOR MO'OKU'EA DEVELOPMENT PROPOSAL
           (THEL. A-8-02, A-8-03, A-8-04, VARIOUS PARCELS)

March 9, 1987

We have reviewed the Draft EIS for the proposed development and have the following comments.

1. A drainage report should be prepared and submitted to the Drainage Section, Division of Engineering for review and approval.

2. Two treatment and disposal systems are being considered. One treatment and disposal option suggested is a single City built and operated wastewater treatment plant (WTP) that will serve the Wai'anae-Oo'auوا sewage district as well as the proposed development. The developer will share in the cost of the WTP and disposal system. The tentative date when the City's WTP will be completed is 1992.

The other treatment and disposal option suggested is a two-plant system: a City built plant and a separate treatment plant constructed by the developers according to City standards and dedicated to the City for operation and maintenance. A developer's built plant would have the flexibility of scheduling, e.g., the plant would be built in time to serve the 500 hotel units, whereas a City built plant would not be ready.

Mr. Donald A. Clegg

March 9, 1987

ALFRED J. THIEDE
Director and Chief Engineer

cc: Barry H. Okuda, Inc.
April 8, 1987

Mr. Alfred J. Thiede
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Thiede:

Thank you for your comments of March 9, 1987 regarding the subject EIS. We respond as follows:

1. Drainage
The level of planning for the proposed development is not adequate to allow for the preparation and submittal of a complete drainage report. A drainage report will be submitted as plans for the development advance to an appropriate level.

2. Sewer Treatment
The section in the Final EIS relating to sewage will be expanded to discuss more fully the ramifications of participation in the regional plant versus development of a separate plant for dedication to the City. Included in the discussion will be the issues of timing and cost of operation included in your comments. Included in the mitigation measures will be a discussion of your suggestion to locate the developer built plant at the proposed site for a City plant and coordination of design.

Again, thank you for your comments.

Sincerely,

William E. Wanket

MEMORANDUM

TO: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: JOHN E. HERTEN, DIRECTOR

SUBJECT: MOKULEIA DEVELOPMENT PROPOSAL
ENVIRONMENTAL IMPACT STATEMENT REVIEW

This is in response to the Office of Environmental Quality Control's letter dated February 24, 1987.
We have reviewed the subject document and recommend that all internal roadways conform to the City's design and standards.
If there are any questions, please contact Kenneth Hirata of my staff at 5009.

cc: Mr. Barry R. Okuda
April 8, 1987

Mr. John K. Hirtz, Director
Department of Transportation Services
630 South King Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Makaha, Oahu

Dear Mr. Hirtz:

Thank you for your comments of March 17, 1987 regarding the subject DEIS. We respond as follows:

Conformance with City Design Standards - Internal Roadways

The applicant will comply with applicable design and standards for internal roadways.

Again, thank you for your comments.

Sincerely,

William E. Waight

[signature]
March 9, 1987

Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning
City and County of Honolulu
615 South King Street
Honolulu, HI 96813

Dear Mr. Clegg:

Subject: Draft Environmental Impact Statement (EIS) for Mokuleia Development Proposal

We have previously responded on July 8, 1986 to an Environmental Impact Statement Preparation Notice (EISPAN) on the Mokuleia Development Proposal. Our comments on that EISPAN have been adequately addressed in the subject draft EIS.

Sincerely,

[Signature]

March 20, 1987

Donald A. Clegg, Chief Planning Officer
Department of General Planning
City and County of Honolulu
615 South King Street, 6th Floor
Honolulu, Hawai‘i 96813

Mokuleia Development Proposal
Draft Environmental Impact Statement

Dear Mr. Clegg,

We are responding herewith to the Mokuleia Development Proposal Draft EIS. We have addressed the issue of this development in our letters dated 22 December and 28 December 1986. (Ref: Draft EIS for GF resort area and GT amendment application.)

We are somewhat surprised that the present EIS is being processed prior to a GT change. We are also aware that the site of the proposed resort development is now known. Precisely where the EIS for the GF could not be site specific.

We must reiterate that if the C'ahu GF and DP have any concern whatsoever the proposed resort violates their intent. Even though the present city administration and council aren't all that smitten with the notion of development, the GF and DP are the will of the people whether they like it or not and should command a certain degree of respect. The Mokuleia area was designated rural for good reason. Simply put the island of C'ahu has exceeded a reasonable carrying capacity. Any further development can only lead to more crime, more pollution, lower paying jobs, and fewer facilities for the residents. We must have rural areas on C'ahu where one can experience truly open spaces, free of infrastructure and surcharges.

Particularly disturbing is the aspect of recreational facilities and public access. In actuality the hotels in
Hawaii have systematically excluded local residents, all the while claiming to provide greater facilities and access. The Kalaeloa hotels have all sorts of right-of-ways yet only a handful of parking spaces along that entire coast. Turtle Bay now charges for parking. The Paunia Beach Hotel allows only ten parking places for the public beach at any one time for the local residents. Until recently the Kahala Hilton wouldn't allow local residents or state beach front property. The pattern is all too clear: sure the beach belongs to the people — just try to get there.

"Public Access & Parking" (page IV-30) contains no mention of you guessed it, Parking.

In summary, the country must remain country for all our sakes. Otherwise we all lose, visitors and residents alike.

Yours truly,

Arthur L. Fori, President
Life of the Land

Copy: Larry F. Okuda Inc., Consultant

April 8, 1987

Mr. Arthur L. Fori, President
Life of the Land
220 S. Hotel Street, Room 211
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Fori:

Thank you for your comments of March 20, 1987 regarding the subject EIS. We respond as follows:

Change to General Plan/Development Plan, paragraph 3, page 1

Your comments indicate that the proposed development violates the intent of the existing General Plan and Development Plan. We agree with you on this point and therefore are seeking an amendment to the General Plan/Development Plan in order to permit the proposed development. The purpose of the EIS is to disclose alternate viewpoints, impacts and mitigating measures. We believe that the EIS very clearly indicates that development of a resort in the Mokuleia area will have impacts and that while some can be mitigated, others involve a trade-off. It is our belief that the EIS has fulfilled its purpose and that officials elected through the democratic process should now decide if the benefits of the proposed projects outweigh the negatives. Through your letter you have expressed your opinion on the matter. It will be included in the Final EIS.
Recreational Activities/Public Access

Recreational activities and public access were discussed in the DEIS (Parts IV-9.2 and IV-9.8).

All of the waterfront resort developments discussed in your comments—Ea'ana'ali'i, Kuli'uma, Mauna Kea and the Kahala Hilton—were developed prior to the enactment of the Development Plans and the subsequent requirement of the EIS at the Development Plan level of planning. Situations similar to those described are unlikely in the future due to the General Plan/Development Plan process, ordinance requiring adequate public access and parking, SNA and CEN procedures and the existence of groups like Life of the Land, which, though their comments and participation in the approval process, keep issues such as recreational resources and public access before the politicians, press and public.

Again, thank you for your comments.

Sincerely,

[Signature]

William W. Wark

March 24, 1987

William Wark
Pacifica Tower Suite 1010
1001 Bishop St.
Honolulu, HI 96813

Dear Mr. Warkett,


General Comments:

The Mokuleia Development Corporation has proposed that the General Plan for the City and County of Honolulu and the Development Plan for the North Shore of Oahu be changed to allow them to construct hotels, condominiums, and residential units on what is presently designated as Preservation and Agriculture land in Mokuleia. Their argument for changing the designated land use from Preservation or Agriculture to Resort is a forecasted shortage of visitor rooms on Oahu to occur over the next seventeen years. The question I would like to raise is whether this is sufficient justification for converting Preservation Land to Resort land. As the Development Corporation states many times in its EIS, Mokuleia is a special area, unlike any other on Oahu. Indeed, the many people who participated in putting together the General Plan for Oahu and the Development Plan for the North Shore feel that the area is unique and special enough to be designated Preservation land. It seems extremely premature and unreasonable to allow this area to be developed as a resort solely on the basis of a speculative market study (see comments below) indicating that the owner and developer may be able to make a profit.

Even if we take the developer’s market study as an accurate forecast of demand for visitor rooms on Oahu, we still must ask whether the North Shore, in particular Mokuleia, is the appropriate place to develop further visitor room capacity. The developer has not argued that the North Shore is the only place on Oahu where additional resort development can occur. Nor has the developer presented any argument or evidence that the North Shore should be the preferred location of additional resort development on Oahu. Perhaps the Ewa area, or the West Shore would be preferable to both visitors and residents of Oahu. The developer makes no such arguments in favor of further resort development on the North Shore, much less in favor of resort development on Preservation land in Mokuleia. If visitors were clamoring for additional room capacity on Oahu and if no other locations were available, then we might want to consider whether converting Preservation land to resort land is justified and acceptable. But to do so at
the present time would be completely unjustified and counter to public
interest as it is expressed in the City and County Government's planning
documents. Indicative of this public interest, the City and County has
proposed funding for a park on the ocean front parcel adjacent to the
present Makulea Beach Park (Parcel C) in the EIS upon which the
developer would like to construct a hotel and resort condominiums. Park
development is consistent with the land use designation of Preservation and
should be pursued.

Comments on the Market Study

The developer's sole rationale for resort development at Makulea is that
additional visitor rooms will be required on Oahu to meet the forecasted
increase in demand over the next seventeen years. The forecasted demand
for visitor rooms is based on forecasts of visitor arrivals from the State
Department of Planning and Economic Development. These may be the
best forecasts available, but there are many factors which affect tourist
arrivals, none of which cannot be forecasted with much confidence. There
are no confidence intervals given for these visitor arrival forecasts. These
arrival forecasts are converted into forecasts of demand for visitor rooms by
assuming that the percentage of visitors using commercial accommodations
the average length of stay, the average number of persons per room and,
average occupancy levels will all stay roughly at current values or follow
current trends. Such factors may be less prone to forecast error than visitor
arrivals, but some error is inevitable. The effects of forecast errors in each
of these factors are compounded when they are multiplied to compute the
forecast of visitor room demand on Oahu. It would be useful to have some
information on confidence in these arrival forecasts to judge the merits of
the developer's argument.

The most speculative and the most critical part of the developer's market
study is their forecasted increase in the portion of Oahu visitors who will
stay on the North Shore. Presently, around 2% of visitor room nights on
Oahu are spent on the North Shore. The developer forecasts that this will
increase to 12.6% by the year 2005. Little explanation is given for this large
forecasted shift in visitor demand from Waikiki to the North Shore.
The developer simply suggests that if a resort exists on the North Shore
such as the one proposed, visitors will probably want to stay there. This
is highly speculative and the accuracy greatly affects the economic rationale
for the development. Based on the forecasted demand for visitor rooms on
Oahu and the 12.6% share for the North Shore, the number of hotel rooms at Makulea is calculated in the market study to be on the order of
2000 by the year 2005. The developer has proposed to build approximately
that much room capacity among 4 or 5 hotels. If the forecasts are, say, 25%
too high, will these hotels be profitable? If I were the developer, I would
consider this a highly speculative investment. And the City and County of
Honolulu should certainly consider this as too speculative an argument to
justify resort development on Preservation land.

April 8, 1987

Mr. Jim Richardson
68-523 Crozier Drive
Waialua, Hawaii 96791

Re: Responses to Comments on the DEIS for the Proposed
Development at Makulea, Oahu

Dear Mr. Richardson:

Thank you for your comments of March 24, 1987 regarding the
subject EIS. We respond as follows:

General Comments

Paragraph 1, In Potential Economic Growth Sufficient Justifica-
tion for Permitting the Development?

The purpose of the EIS process is to provide a forum for review-
ing the positive and adverse impacts of a proposed development.
Naturally, different individuals and groups place a different
value on the various impacts. Actual decision making is the
result of a political process in which various proponents and
opponents of a project decide on the overall benefit or negative
benefit of a given decision through the views of their elected
officials. We believe that the DEIS has discussed both the posi-
tive and adverse impacts of the proposed project.

Paragraph 2, Alternate Location for Resort Development and Funded
Park Sites?

The proposed Makulea resort development would accommodate only
a portion of the demand for tourist accommodations shown in the
market study. Assuming that the projections are correct,
additional locations will have to be found on Oahu for facilities
to accommodate this growth. Perhaps a portion of these accommodations should be placed at one or more of the existing resort areas; however, this would require the amendment of a Development Plan in the respective area. Presumably the size of the resort designations in those areas already existing was based on impacts and issues raised during the EIS and public review processes that each resort development underwent. Nominally, to compare alternatives, an EIS for each location would have to be undertaken. Such a task is outside the scope of the EIS for any individual resort proposal.

We are not aware of any proposed funding for the acquisition of Mokuleia lands for park sites. The park sites suggested for deletion are on the North Shore Development Plan Public Facilities Map for funding in future time frames. It should be noted that their position for funding, i.e., one to six-year timeframe and seven-plus-year timeframe has remained unchanged since the North Shore Development Plan was adopted in 1983. Hindsgart has shown that when the projects were first placed on the OPPF map, a more appropriate funding projection would be five to eleven and twelve years and beyond. It could well be that an individual looking back from the year 2005 could report that funding should actually have been projected a years 20 to 25 and 26 years and beyond.

Comments on the Market Study

Reliability of Visitor Arrival Projections

The Department of Planning and Economic Development develops its forecasts as a basis for developing future plans and policies. As a result, the confidence interval is judged to be highly reliable for private planning purposes. We believe the visitor arrival projections to be reasonable for estimating hotel room demand.

Market Share of Visitor Units

Demand would not be created by building a resort. The market study found that a demand does exist for rooms throughout Oahu. Waikiki will continue to dominate the Oahu visitor unit market; however, its market share is expected to decline from its current level of 68% to about 70% by 2005. Reasons for this decline in market share are a result of:

- Limited amount and availability of suitable development sites in Waikiki.

- Anticipated development and saturation of resort destinations outside Waikiki.

- Trend in visitor preference for recreation-oriented vacations in integrated resort communities.

Alternative destination areas are expected to occur on lands elsewhere on Oahu which are:

- suitable for development
- close to the ocean
- in unique environmental settings.

Lands which meet these criteria are typically outside the primary urban center of Oahu along the coastline and include:

- West Beach
- Makaha
- Lai/Laukoku
- Mokuleia.

Considering the market orientation and development plans of the destination areas on Oahu which are presently planned or proposed, the market share distribution of Oahu visitor units by 2005 is projected as follows:

<table>
<thead>
<tr>
<th>Destination Area</th>
<th>Market Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waikiki/Kahala</td>
<td>20.0</td>
</tr>
<tr>
<td>West Beach/Lawai</td>
<td>10.0</td>
</tr>
<tr>
<td>North Shore/Kailuaun</td>
<td>10.0</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Based on these factors, visitors would probably want to stay on the North Shore and as a result, a resort could be developed.

Again, thank you for your comments.

Sincerely,

William E. Market

WEH/AM
February 13, 1987

William E. Wanket
Wanket Inc.

March 14, 1987

Bill D. Luttrell, Major
Division Commander
The Salvation Army
P.O. Box 620
Honolulu, Hawaii 96806

Re: North Shore Development Plan

Dear Mr. Luttrell:

I have received information relating to the proposed amendments to the change of use of this land from agricultural to resort. As a long-time resident of this area, we must express our great concern regarding this change.

You would want to know that the Salvation Army conducts a year-round camping program on Crater Drive in the city of Wailuku. During the summer months, nearly 1,500 children and adults attend the camp and take part in this residential camping program. Many of these individuals are from low-income, inner city settings, and this is a very unique and special opportunity for them to experience the wonderful natural setting found on the north shore. You would know that very few untouched areas remain on the Island of Oahu.

We can't help but feel that the high-rise buildings, increased traffic, and growing population could do anything but harm this lovely area and detract from the camping program. We would appreciate very much your careful review and consideration of this change and its impact on the future of Hawaii.

Sincerely,

[Signature]

Bill D. Luttrell, Major
Divisional Commander

BDL/PW/510
cc: Wahiawa Community Association

April 8, 1987

Bill D. Luttrell, Major
Division Commander
The Salvation Army
P.O. Box 620
Honolulu, Hawaii 96806

Re: Responses to Comments on the DEIS for the Proposed Development at Wahiawa, Oahu

Dear Major Luttrell:

Although your comments of February 13, 1987 were not directed at the Draft EIS for the proposed project, the Department of General Planning asked that they be included in the Final EIS. We respond as follows:

The Draft EIS discussed that the North Shore area is the host to a number of recreational and camping programs sponsored by religious and non-profit groups. Loss of ruralness due to development is an adverse impact which has been identified. This adverse impact and others have to be weighed against the positive impacts which include increased economic activity and the creation of jobs to provide an alternate employment base for the Wahiawa community. The importance of these positive impacts have been highlighted by the recent disclosure of a planned shutdown of Wahiawa Sugar by Castle & Cooke.

Again, thank you for your comments.

Sincerely,

[Signature]

William E. Wanket
Wanket Inc.
March 25, 1987

William W. Raynor-Saunders
59-393 Alapio Road
Haleiwa, Hawaii 96712

Hand Delivered

William Wankett
Pacific Tower, Suite 1010
1061 Bishop Street
Honolulu, Hawaii 96813

Re: Development Plan Environmental Impact Statement on Proposed Resort at Mokuleia

Dear Mr. Wankett:

This letter will supplement my longer letter dated March 24, 1987 commenting on the Development Plan Environmental Impact Statement relating to the proposed resort at Mokuleia. I learned late yesterday afternoon that there have been two sightings of a Hawaiian Monk Seal in the Mokuleia area within the last two weeks. Both sightings have been reported to the National Marine Fisheries Services.

The first sighting occurred on Friday, March 13 in the area directly on or adjacent to the Kealia parcel of the proposed development, west of Mokuleia Beach Park. I understand photographs were taken at that time but I am unsure whether they depict the animal on the beach or in the near-shore waters.

At any rate, this is certainly a revelation which should be discussed in your final impact statement. The Hawaiian Monk Seal is one of the most endangered animals on earth and the significance of its sighting in the project area is monumental. Every effort should be made to assess the potential impact this planned project would have on this and other seals which may be using the area.

What sort of water sports and beach activities are envisioned for the hotel projects? Will there be motorboats, jet skis or other craft which may endanger not only the Monk Seals but also the other marine life? What will be the impact of increased human population and beach activity?

I believe these and other issues relating to the project's impact on the rare and unique marine life in the area should be fully addressed in the final impact statement. Thank you once again for this opportunity to comment.

Very truly yours,

William W. Raynor-Saunders

cc: Donald Clegh
March 24, 1987

HAND DELIVERED

William Wankett
Pacific Tower, Suite 1010
1001 Bishop Street
Honolulu, Hawaii 96813

Re: Development Plan Environmental Impact Statement on Proposed Resort At Makuaia

Dear Mr. Wankett:

I am a resident of the North Shore of Oahu and a frequent and long-time user of the mountain, coastal and ocean resources of the Makuaia area. My hobbies and interests include fishing, bird watching, surfing, endangered species, natural history and Hawaiian history.

I have reviewed the Environmental Impact Statement prepared in connection with Makuaia Development Corporation’s requested Development Plan amendments concerning the proposed resort at Makuaia. I understand that Barry Okuda is no longer working for the developer/applicant and that comments on the Statement should be sent to you. I have the following comments to offer and would appreciate a response on the points covered.

1. General Comments

The following are observations on the general approach taken with respect to the Impact Statement. More specific comments are included later in Section II below.

1. Procedure Followed, Failure to Address Specific Impacts.

As I understand it, the City and County of Honolulu’s Department of General Planning determined that an Environmental Impact Statement was required for the proposed development. Since the development required a number of governmental approval actions, that Department and the developer agreed that they would treat each application phase with a separate Impact Statement. The General Plan Impact Statement, which has already been accepted, was extremely vague and failed to address the specific impacts of the various components of the proposed resort. A number of commentators wrote challenging this. The developer’s answer was that this was not a “site specific” Impact Statement and it did not intend to address these details until later statements.

How the draft Development Plan Environmental Impact Statement has been submitted and it suffers from the same flaw. Despite the fact that the specific plans for the development are known (i.e. location of sewage
treatment plant and pumping stations, stream diversions, golf course location, etc.) the statement continues to treat the resort in a very general way. I believe this is in violation of Administrative Rule 11-200-7 and/or the Environmental Council's Declaratory Ruling #6-1.

Section 11-200-7 of the Environmental Council's Rules states as follows:

Multiple or Phased Applicant or Agency Actions. A group of actions proposed by an agency or an applicant shall be treated as a single action when:

(1) The component actions are phases or increments of a larger total undertaking;

(2) An individual project is a necessary precedent for a larger project;

(3) An individual project represents a commitment to a larger project;

(4) The actions and questions are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole.

Based on this rule, I believe the developer/applicant is required to submit just one statement which addresses all known details of the proposed development.

In Declaratory Ruling #6-1, the Environmental Council held that:

If all the specific details of a project are not available at the general plan or development plan amendment stage, then the Environmental Impact Statement, if required, need not be voluminous.

In this case, however, the specific details have long been available. The facilities of the proposed development were mapped out in 1966, yet the Development Plan Impact Statement fails to address specific impacts of each facility.

Since the statement is so broad and vague it also seems to violate Sections 11-200-16 and 11-200-17 of the Environmental Council's Rules which set forth the content requirements for draft impact statements.

Specifically, the Development Plan Environmental Impact Statement fails to comply with the following requirements:

The contents shall fully declare the environmental implications of the proposed action and shall discuss all relevant and feasible consequences of the action. In order that the public can be fully informed and that the agency can make a sound decision based upon the full range of responsible opinion on environmental affects, this statement must include responsible opposing views, if any, on significant environmental issues raised by the proposal.
2. Failure To Adequately Assess Impacts Beyond The Project Area.

The environment of the Nokulea area is not an isolated or enclosed capsule. It affects and is affected by activities in adjacent areas and even distant areas. To the extent the Impact Statement even mentions environmental impacts, it confines them to the boundaries of the project area. There is almost no discussion of the project's impact on the Kamehameha State Park. The discussion on traffic is limited almost entirely to roads in and out of the area. It does not discuss traffic going beyond the project toward Kamehameha Point and neither does it discuss traffic problems in Kailua and the North Shore in general.

This failure to address impacts beyond the project area pervades all aspects of the Impact Statement. I believe this is significant and violates the rules concerning EIS content requirements.

3. Failure to Discuss Cumulative and Secondary Impacts.

The Statement fails in almost every aspect to meet the requirement that it discuss the cumulative impact this and other similar projects will have. There is little discussion of the new Kawaihae Bay resort development or of other existing or potential resorts which may be inspired should the Nokulea project proceed. Impacts on the lifestyle of rural Oahu are mentioned only briefly, notwithstanding the fact that resort development will entirely change living conditions on the Whole North Shore. The "secondary effects" of a domino trend this project may stimulate should be addressed, as should the cumulative impact of loss of Oahu's remaining rural beach areas.

4. Failure to Present Responsible Local Views.

Under Environmental Council Rule 11-200-17, the Impact Statement must include a serious discussion of responsible opposing views. The Statement fails to do this on almost every substantive point.

For example, there is no serious discussion of park needs or of the consequences of deleting park sites from the existing development plan. Neither is there any discussion of the need for retaining coastal lands in preservation zoning.

There is little mention of the desirability of retaining a vestige of "country" on this island for those of us who do not relish the overcrowding in Honolulu and who need some room to breathe.

These omissions are just examples of the Statement's failure to present "responsible opposing views", more instances of which are discussed below.

5. Failure to Discuss Reasonable Alternatives.

The Statement does not discuss with any depth or credibility the possibilities of alternative uses of the
project lands for profitable activities which are more consistent with existing land use designations and the rural atmosphere. What about an agricultural park or subdivision? What about aquaculture? These and other alternatives should be fully evaluated in the final Statement.

6. Organization and Format

The Statement's Table of Contents is full of errors which makes cross-reference very difficult. The maps are poorly rendered and do not adequately or comprehensibly depict the project area. Some of the appendices are mislabeled. These deficiencies should all be corrected in the final Statement.

II. Specific Comments

1. Biological Studies

(a) Flora

The Impact Statement does a fairly complete inventory of plants species found on the project site but it fails to discuss the number of rare and endangered species at nearby Keana Point. Keana Point has one or more species which exist nowhere else in the world. These are primarily coastal species which are especially susceptible to impact from human activities. The Nature Conservancy has recently done a complete inventory of endangered plants in the area and that list is being made available to the public through a data bank system.

However, your biological consultants have failed to even mention this study or the project's potential impact on those plants.

There is no question that increasing the population of the Mokuleia area from roughly 500 to over 5,600 will significantly increase traffic in and out of the area, including traffic beyond the resort. No mention is made of how that increased traffic and human presence will impact on these rare and endangered species. This failure is a direct violation of Environmental Council Rule § 11-200-17(g) which states in relevant part that:

The draft EIS shall contain a description of environmental setting, including a description of the environment in the vicinity of the action; as it exists before commencement of the action, from both a local and regional perspective. Special emphasis shall be placed on environmental resources that are rare or unique to the region and the project site.

The terrestrial botanical survey conducted by Char & Associates (and the Impact Statement discussion based on it) was inadequate to accurately assess the project's impacts on the sensitive botanical areas nearby which contain very rare and unique specimens of endemic Hawaiian flora. This should be corrected prior to submission of the final Statement.
(b) Fauna

As with the botanical survey, the terrestrial faunal survey done by Char & Associates was inadequate with respect to identifying native species in the area as well as discussing the project's impact on them. The survey was conducted on May 24 and 25, 1985, a time of year when many of the migratory bird species are not present. In addition, the study was conducted from 9:30 a.m. to 5:00 p.m., omitting the critical hours around sunrise and sunset when feeding occurs.

Significantly missing from the study was any mention of the colony of Laysan Albatross, a protected native Hawaiian bird, which has been frequenting the project area for at least the last two winters. This winter there were over 15 adult individuals exhibiting breeding behavior on the Kealia parcel of the proposed development.

Also missing from the bird life discussion was mention of the probability that the rare and endangered Hawaiian Stilt uses the wetland areas around Crowbar Ranch. Your statement concludes that the officially "endangered" native Hawaiian coot and Hawaiian ducks found in the area were probably captive-bred birds. However, that is a conclusion unsupported by the Char & Associates study or other observation.

It is also notable that your report fails to disclose the existence of another large pond at the west end of Billingham Air Field where other rare birds including the Koloa and Hawaiian Coot have been sighted. This is right where the proposed sewage treatment plant is expected to be built but there is no assessment of its impact on these native birds.

While the report briefly mentions that the pond habitat should be incorporated into the design of the development, there is no discussion of the probable impact of increased activity in the area upon the endangered bird species. Just because the ponds are retained does not mean the birds will remain there if there is dense development nearby. The actual impact of increased human occupation of the area has not been analyzed in your study and should be addressed.

Missing from the discussion of reptiles and amphibians was the Hawaiian Green Sea Turtle which is an endangered species. While these turtles may not classify as "terrestrial vertebrates" since they spend most of their time in the ocean, they are known to be attempting to re-establish themselves at Kauai Dunes on Molokai and there is a distinct possibility that they may consider nesting on remote Molokia and Keana Point beaches as well. Significantly, those turtles are numerous in the area and I have seen them very close to shore. Unfortunately, they are not even mentioned in this or any other section of your impact study. This is a significant omission which must be corrected.
Sea Life

The near-shore marine environmental survey done by Oceanic Laboratories for the impact study is flawed and fails to identify several important ocean species inhabiting the Mokuleia area. First of all, the method used for spotting fish was incredibly naive. Apparently, divers swim through an area unrolling a "transect line" and then "waited approximately 10 minutes for frightened fish to return to the area" before counting them. Anyone remotely familiar with fishing, specifically fishing in Hawaiian coastal waters, knows that "frightened fish" will frequently not return for an area for hours. This is my experience in skin diving, gill netting and throw netting. Certainly a more effective method of inventorying fish could be followed.

Additionally, the study was admittedly conducted at a time when fish were active at night and during dawn and dusk were not present. These may be the species most sensitive to development and the increased light and nocturnal activity it will generate. The survey should attempt to identify those species and describe the project's impact on them.

Finally, the study was admittedly conducted when visibility in the area was very poor. This obviously resulted in an incomplete survey, yet there was no attempt to re-do the study when the water was clearer.

The marine study does not even mention sharks which have been known since prehistoric times to breed and congregate in the Mokuleia area. Hawaiian history is full of references to sharks and shark gods along this stretch of coast. Sam Fisk of Oahu (1978). I have often seen "packs" of sharks just offshore from the proposed project and swimmers are frequently warned to leave the area during the summer breeding months. The project's impact on the various species of sharks frequenting the area should be identified and discussed.

As discussed above, the endangered turtles were not even mentioned, although it is common knowledge that they frequent the area.

In addition, the National Marine Fisheries Services reports sightings of the endangered Humpback Whale, the melon-headed whale, and other sea mammals in the area. I believe there is also a resident school of dolphins which frequents the near-shore areas of Kaena and Mokuleia. Further information and documentation concerning this school, as well as other marine mammals in the area, can be obtained from Prof. Louis Hearst of the University of Hawaii. The project's impact on these cetaceans should be fully considered.

The marine life survey was inadequate and should be redone in a more responsible and professional manner.
2. The Marine Environment

The Oceanit Laboratories survey purportedly studied currents, water quality, erosion, and drainage in the project area. Significantly, the only observations were conducted on May 29 and June 10, 1986, both times when currents and rains are at their lowest annual point. The most significant erosion factors in this area are the large waves and heavy rains that occur between October and April. It is impossible to adequately assess these conditions and the project's impact on them from observations conducted in the summer. The conclusions of the study are therefore fatally flawed with respect to these issues.

The study concludes that "offshore currents are mainly tidal driven and are predominantly in the westerly direction most of the year." However, there is no discussion of the impact of large winter swells on these currents. The study also states that "large swells reach this area from the north and northeast approximately 2.0% of the time." There is no mention of even larger swells from the west and northwest, which actually occur closer to 10% of the time, and their impact on currents and beach configuration. The report admits that the current data it generated is "scant" and so it is hard to see how the study's conclusions concerning erosion and the effects of a proposed stream diversion can be valid.

Significantly, while a proposed re-routing of Kapalua Stream to Makaha Stream is discussed, there is no disclosure of the reason for or manner of the diversion. The proposed changes to the streams should be shown clearly at an appropriate scale, as should any planned artificial streams or ponds. There is no description of the proposed "improvements" to Makaha Stream. There is no discussion of maximum flows in these streams and no acknowledgment that both outlets may be needed in times of heavy rain.

Another fatal omission in the drainage discussion is the lack of mention of the increased run-off which occurs in a developed area when concrete streets, slabs, sidewalks and other non-porous earth coverings are introduced. There is no discussion of where this run-off will be diverted or how it will impact on the streams and stream outlets. This will be a significant problem during heavy winter rains. How will this storm drainage be handled?

In view of the study's lack of actual observation as to stream flow and winter currents, it is hard to conclude that questions of drainage and erosion have been adequately addressed. Depending on the nature of the "improvements" built in the coastal zone, the convergence of high waves and heavy rains could have a very significant impact on the area. The Impact Statement's failure to discuss these matters is significant and should be corrected.
3. Traffic Impact Report

The Traffic Impact Report is inadequate in its failure to address the substantial traffic impact this resort will have on the rest of the North Shore of Oahu. Traffic between Waialua and Haleiwa has already a serious problem. On weekends, especially when the surf is high and/or the weather is good, traffic slows to a crawl between Waialua and Sunset Beach. This situation will already be made worse by the on-going development at Kauai Bay.

It is axiomatic that tourists do not come to Hawaii to sit in their hotel rooms. Their most frequent activity is touring around the Island. It is hard to understand the study's failure to seriously discuss the existing and expected traffic problems on Kamehameha Highway and the steps necessary to mitigate them.

The study also fails to acknowledge that at least some of the development's thousands of inhabitants will work in metropolitan Honolulu. There is no discussion of the project's impact on rush hour traffic in and out of Honolulu on H-2, H-1 and their feeder roads.

The traffic study is myopic and fails to discuss impacts which will occur to other areas and impacts which may be cumulative in nature. It should be redone with a fuller disclosure of all traffic problems this and similar resorts will bring to the entire North Shore and the roads leading to it.

4. Market Study

It seems that the entire justification for the project is built around the scenario set forth in the Market Study. Significantly, however, that study fails to discuss a number of highly probable contingencies which will affect tourism and the State economy in general.

First and foremost, the Market Study does not seriously take into account energy shortages which are likely to occur toward the end of this century. As we saw in the 1970's, increases in energy costs significantly affect tourism in Hawaii. While recent OPEC solidarity problems have led to a decrease in fuel costs, the long term indication is that those costs will rise significantly in the future. We are already seeing this at the gas pump. Coupled with the finite supply of fossil fuels (which some experts feel will be exhausted within our generation), there is little question that energy availability will be a serious factor in Hawaii's future tourism market. The study's failure to discuss these facts is disturbing.

In addition, the study does not acknowledge any optimum or maximum population level for Oahu. It seems to assume population can continue to grow unchecked.

Also disturbing is the study's failure to discuss the finite supply of land and water on this Island and the fact that Oahu has a maximum carrying capacity which we are rapidly approaching. There is no discussion of the
cumulative impact of other similar projects, such as Waikiki Beach, Turtle Bay and Kauai Bay.

When the omissions concerning energy impacts and population realities are combined, it is clear that the study's assumption that Hawaii's tourism growth rate of the past 30 years will continue is a fairy tale. That assumption ignores conflicts with the law of diminishing returns and the fact of finite resources.

The Market Study touts the jobs which will be created but fails to disclose that many of those jobs will likely be part-time and/or minimum wage with little chance for advancement. The tourist industry consistently pays lower wages than agriculture and other activities, yet the study does not reveal these realities.

The balancing considerations of preserving lifestyle, quality of life, increasing self-sufficiency, preserving environmental values, etc. have hardly been touched upon. The Market Study seems to be a whitewash which fails to include the required "responsible opposing views" which exist concerning Hawaii's future needs for tourism. Were any other studies conducted at the request of Hokuia Development Corp. concerning these market conditions? If so, I believe Environmental Council Rule 11-100-17 requires their inclusion.

In any event, it is essential that the sources of data used to identify, qualify or evaluate any and all environmental consequences be expressly noted.

Accordingly, please disclose any other studies which were done with respect to the proposed resort relating to the tourist industry and/or market conditions.

5. Parks and Recreation

The Impact Statement does not contain any study or substantive discussion concerning the need for park space on Oahu, generally, or on the North Shore, specifically. This is despite the fact that the developer wants to delete proposed parks in the project area.

Especially significant is the fact that under the existing development plan those proposed parks are designated as preservation areas. There is no discussion of the rationales for wiping out preservation areas in favor of increased urbanization. This is a significant trade-off of high environmental import and the failure to discuss it is a significant omission.

As mentioned above, there is no discussion of the project's impact on the proposed park at Kamehameha. That park has been set aside in large part because of the unique environmental resources existing there. The statement in this respect fails to describe the "environmental setting" and the project's probable impact on it. How will the nature of that proposed park be affected?

In addition, the statement does not identify what the present and projected recreational needs of the area are. Neither does it discuss the considerable
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overcrowding and serious parking problems already existing at other North Shore parks such as Waimea Bay, Ehukai, Sunset Beach, etc. Your project proposes deleting parks and substituting "park-like" facilities, but the Impact Statement fails to fully describe the nature of those facilities or to assure that they will prove a satisfactory substitute for much needed North Shore beach parks.

Neither has there been a discussion of the need for camping space on Oahu. During the camping season, Mokuleia Beach Park is usually filled to capacity, as are virtually all of the other coastal camp sites on Oahu. There is clearly a need for more of this type of recreational opportunity on the North Shore, yet the proposed resort would eliminate proposed beach parks which are perfectly suited for camping.

In addition, the resort atmosphere would be incompatible with the very purpose of camping, i.e. to get away from crowds and development and to enjoy nature. A resort development seems inconsistent with this activity. Mokuleia camping will be drastically changed and become more like camping at Kailua or Ala Moana Park, surrounded by urban activity.

There has been no discussion of the resort's impact on the existing Camp Erdman which serves as one of the only Oahu beach camps for school age children. How will their wilderness experience be affected by rental cars, bus loads of tourists, and increased air traffic?

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The resort's impact on recreational activities such as those offered at Camp Erdman should be more fully discussed.

The final Impact Statement should thoughtfully and honestly weigh the valid competing needs for preservation and recreation in unique settings like Mokuleia.

6. Relationship of Action to Existing Land Use Policies

The Statement fails to meet the requirement that it adequately address "the relationship of the proposed action to land use plans, policies and controls to the affected area." Clearly, the policy heretofore has been to retain the Mokuleia/Kaena Point area in agriculture, preservation and parks. Your Statement fails to justify a change in these policies.

The Statement does not even acknowledge the beneficial goals and purposes of the existing land use designations. Neither does it discuss what impact the proposed change will have on those goals. What undeveloped coastal areas will be left on Oahu if the proposal is approved? Where can Oahu residents go if they want pristine coastal recreational opportunities? This would seem to be an "unresolved issue" which the Impact Statement likewise fails to discuss with any sincerity. No responsible opposing views have been presented.
7. Need and Alternatives

Based almost entirely on the Market Study, the
Statement concludes that the planned project is needed.
However, as pointed out above, that Market Study is
significantly flawed and fails to address the realities of
Hawaii's unique tourism situation. In view of those
realities, it would appear that the Impact Statement
should discuss other alternatives including less intense
development of the land. There is no discussion of the
possibility of an agricultural park or subdivision which
would preserve the rural flavor of the land and serve
other State land use goals. Neither are any other
economically viable, yet less environmentally destructive,
alternatives considered. This seems to be a violation of
the requirements of Section 13-200-17(11) that:

The draft EIS shall contain any known
alternatives for the action . . . A
rigorous exploration and objective
evaluation of the environmental
impacts of all reasonable alternative
actions, particularly those that might
enhance environmental quality or avoid
or reduce some or all of the adverse
environmental benefits, costs and
risks shall be included . . . .

8. Aesthetic Considerations

Your study asserts that the resort project will
increase the opportunity for appreciation of the area, but
it fails to acknowledge that the resort itself will
significantly alter the existing aesthetic appeal. The
study does not seem to admit that multi-story condominiums
and/or hotels will negatively affect the visual impact of
the natural setting. The resort will interfere with the
serene beauty of the area, not only for those actually in
the resort area, but also for those who use the
surrounding waters and those who have a view of the
striking Mokuleia coastline from adjacent North Shore
areas. This negative interference is evidenced by the
"concrete jungle" which already mars the coastline in the
area of Punalu'u Park, at the west end of Waialua Beach
Road.

Adding concrete highrises of six or seven stories
to an area where the tallest existing building is a two-
story residence will be a major change in the area. As
such, careful thought and due consideration are required
before significantly and irreparably altering this
beautiful area as proposed by the developer.

Perhaps the hardest aesthetic impact to describe
and quantify is the loss of one of the last coastline
wilderness experiences left on Oahu. Nowhere else can
such quiet uncrowded beaches be found. This resource will
be radically altered by the proposed development yet there
has been no serious discussion of the impact on North
Shore residents who need a place to get away from the
fast-paced life on the rest of Oahu.

Will Oahu residents have to fly to the other
Islands in order to experience wild beaches? When the
country becomes a resort, where will Oahu's people be able
to turn? Won't the development's lights interfere with
the remarkably good star viewing available only in that area? The final study should address these questions and try to justify the trade-off involved. While this is a hard issue to communicate, it is perhaps the central concern of many who are disturbed over the proposed development.

9. **Airport Impacts**

It seems that the Impact Statement glosses over the effects of increased air traffic due to the resort. The expected increase in air traffic is not quantified or adequately discussed, neither is the reality of increased annoyance to existing Hibiscus residents, including wildlife. Again, the result will be further degrading of the country/wilderness experience at Hibiscus and Kaena Point. Such an impact is significant and should be more fully disclosed in the final Statement.

10. **Historical and Archaeological Resources**

It is in the interest of the State of Hawaii to protect its archaeological and historical resources. The draft Impact Statement seems incomplete and does not provide a sufficient description or map of the archeological sites located on the development parcel. The Waialua, Hibiscus and Kaena Point areas of Oahu are rich in Hawaiian history and are frequently mentioned in ancient chants and songs. Parts of this area were also rich in agricultural production, which may account for the name "Hibiscus" which means district of abundance. It

seems that the final Impact Statement should more fully discuss the historical significance of this area and proposed steps to preserve and/or enhance all that remains.

11. **Sewage Treatment Plant**

A sewage treatment plant is proposed to be built at the west end of Bellingham Air Field. There is no detailed description of the type of plant envisioned or the manner of effluent disposal. "Injection wells" are mentioned but there is no feasibility assessment taking into account the ground water situation. The Hibiscus/Kaena Point area has a number of springs and ponds which evidence a high ground water table. The impact of injection wells on water purity should be discussed. If an ocean discharge system is anticipated (even if only for emergencies) its impacts should also be fully discussed. The very pure and clean ocean water in the area should not be compromised for any reason. Accordingly, a full assessment of the alternatives, including pumping the sewage elsewhere, must be made.

The possibility for tidal wave and/or flood inundation of the sewage treatment plant must be considered, along with proposed mitigation measures in case of such a disaster. As it stands, the discussion of sewage treatment for the proposed resort is totally lacking in substance.
12. Fresh Water Needs and Limitations

The Statement contains no substantive discussion about the limited water resources on this Island or about the ever increasing demand. Can we afford to use the groundwater in this area for resort purposes? What will be the depletion rate versus the replenishment rate? How will increased water use in Nokulele affect other groundwater areas? Will water from the developer’s wells continue to be available for public use? What if water from Nokulele is needed for other parts of Oahu during shortages? These and other important questions about this delicate resource should be raised and addressed in the final Impact Statement.

13. Impact of the Golf Course

Pesticides and fertilizers are commonly used on golf courses. The Statement does not discuss the impacts of golf course run-off on fresh and salt water quality in the area. The result of increased nutrients and chemicals in the drainage basin should be fully evaluated and appropriate mitigation measures identified.

14. Construction Effects

Little discussion has been included concerning the various phases of construction and how the environment will be impacted during each phase. Often, construction itself is a severe impact on an area, with increased dust, noise, water pollution, heavy truck traffic, wildlife disruption, etc. More attention should be given to this aspect of the proposed resort in the final Impact Statement.

TIII. Conclusion

Based on all of the above, it seems the draft Development Plan Environmental Impact Statement is more of an attempt to “sell” the proposed resort project than a serious and candid discussion of the environmental impacts involved. I believe the final Impact Statement should be much more detailed and objective and should more honestly disclose the effects such a development will have on the North Shore.

Thank you for the opportunity to comment on this document. I look forward to your response.

Very truly yours,

William W. Ramos-Saunders

cc: Donald Clegg
April 8, 1987

Mr. William M. Ramos-Saunders
50 Alaipio Road
Bai lava, Hawaii 96712

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Ramos-Saunders:

Thank you for your comments of March 25, 1987 regarding the subject EIS. We respond as follows:

Letter Dated March 24, 1987

General Comments

1. Procedures Followed, Failure to Address Specific Impacts

The GP EIS and DP EIS were prepared in a manner which we believe complied with the spirit and intent of the EIS rules and regulations as well as with the letter of the law. Prior to embarking on this course of action, we consulted with the Department of General Planning and the Office of Environmental Quality Control. Samples of how sections of the GP EIS should be handled were reviewed with the staff prior to proceeding. As indicated in your comment, this issue has been raised to the Environmental Council and we understand that the Council will address this challenge at its meeting scheduled for April 8, 1987.

2. Failure to Adequately Address Impacts Beyond the Project Area

We believe that the DEIS does adequately address impacts outside the project area. For example, there is an exhaustive market study addressing state and countywide tourism; in addition, there is a social impact assessment addressing issues of community concern. In the case of traffic impacts, the traffic study contained in the DEIS addresses traffic concerns to the intersection of Kauaihau Road and Farrington Highway. In the opinion of our traffic engineer, impacts from the proposed development on Kawa State Park will be discussed in response to your comments on the proposed development. (See response to your comments on the proposed development.) The potential impact on Kawa State Park will be discussed in response to your comments on parks.

3. Failure to Discuss Cumulative and Secondary Impacts

We believe that the market study and the social impact study (Appendix A and Appendix C to the DEIS) adequately discussed the issues raised in this comment. The Final EIS will contain an expanded version of the Social Impact Assessment in Appendix C and other specific comments will be discussed in this response.

4. Failure to Present Responsible Opposing View

Notice of Preparation was sent to 54 agencies, individuals and groups for comment. In addition, 57 copies of the DEIS were distributed by the Office of Environmental Quality Control and numerous others, including yourself, reviewed the document and provided comments during the public review period, all of which will be included in the Final EIS.

5. Failure to Discuss Reasonable Alternatives

Part V of the DEIS describes alternative actions. In addition, Appendix C discusses the large supply of agricultural land awaiting the development of profitable crops and the opportunities for aquaculture are also detailed in that study.

6. Organization and Format

Your comments are well taken. We will correct errors in page and cross referencing, and will endeavor to improve clarity where possible in the Final EIS.
Specific Comments

1. Biological Studies (Flora and Fauna, a and b)

The emphasis of the biological survey was focused primarily on the impact of the project on the study area and the immediately adjoining areas.

Regulatory policies and management of the Ka'ena Point lands fall under the State's Department of Land and Natural Resources' jurisdiction. An Environmental Impact Statement for a Makena-Ka'ena State Park was accepted by the State in 1977 (Hawaii Department of Land and Natural Resources 1977). The EIS prepared for the park addressed many of the concerns you have expressed regarding the preservation of rare and endangered plant species and the impact of increased pedestrian and vehicular traffic on the native coastal ecosystem.

The Makena-Ka'ena Park encompasses approximately 15,700 acres of coastal and mountain areas: Makena and Keawaula (Yokohama Bay) beaches, the leeward coastline stretching to Ka'ena Point, Ka'ena Point, the windward coastline extending to Camp Erdman, and the upland mountain areas including Peafoot Flats and the abandoned Ha'ena Point area. Most of the policies for the park are designed to provide management and control. Controlled access to the Ha'ena Point area should decrease the number of park users. Recommendations outlined in the park plan include (1) access within the Point by designated footpaths only; (2) post interpretative, regulatory, directional and warning signs; and (3) develop and implement rules and control access within the Natural Area Reserve (MAR). The Ka'ena MAR consists of approximately 12.46 acres of the coastal dune ecosystem at the Point. Chapter 20.9 of Title 13, Administrative Rules, regulates activities within a reserve.

Our consultant on these matters, Winona Chau, is familiar with The Nature Conservancy's (TNC) Hawaii Heritage Program as she serves on TNC's Plant Advisory and Natural Communities Advisory Group.

The fauna report does point out, on page 32, that the survey was conducted during a time when a number of migratory bird species were absent from the site. A list of the common migratory species which might winter over on the study site is also provided.

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Thank you for bringing to our attention the Layana Albatross (Diomedea immutabilis) sighting on the Kealia parcel of the proposed development. Winona Chau has observed at least three birds in the Ka'ena area, from Alei Pali to the Point. The endangered Hawaiian Stilt (Himantopus mexicanus knudseni) and the Hawaiian Gallinule (Gallinula chloropus assimilis) have been reported from the wetlands on the study area by the State Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service.

The Kolohu ducks disturbed on one of the Crowbar Ranch ponds flew off in the direction of a sugar cane reservoir pond (Kauaihapa Reservoir) located on the Ka'ena side of the proposed project (see page 34 of the fauna report). In addition, the abandoned quarry pit located near to Dillingham Airfield is also filled with water and is probably utilized by the waterbirds. The City and County of Honolulu has considered building a wastewater treatment plant (Kauaihapa Wastewater Facilities) on a portion of the cane fields located on the Ka'ena side of the proposed Huleia's project site.

The Kauaihapa Reservoir may be incorporated into the facilities' plan. An Environmental Impact Statement to assess the impact of the proposed wastewater treatment plant on native waterbirds is being prepared by the City and County. Increased human occupation in the areas surrounding the ponds is expected to have some impact on the waterbirds which utilize the ponds. Human disturbance and activity near the ponds will increase. This may affect breeding activity and the recovery of the endangered waterbirds. There may be increased predation of waterbirds by raccoon and feral cats and cats; raccoon populations may increase. In addition, there may be change in drainage and runoff patterns as well as water quality due to construction in nearby areas.

The U.S. Fish and Wildlife Service has identified the ponds around the Crowbar Ranch as important habitat for the recovery of endangered Hawaiian waterbirds. The U.S. Fish and Wildlife Service has recommended that the design, planning, and modification of the wetlands (ponds and streams) on the project site be done in coordination with their office and the State Division of Forestry and Wildlife.

The consultant has recommended that buffer zones be established around the pond areas. Existing trees and shrubs should remain intact; additional plantings should be made in those areas without shrub cover.
Mr. William W. Ramos-Saunders
April 8, 1987
Page 6

The developer, the U.S. Fish and Wildlife Service, and the State Division of Forestry and Wildlife should develop a long-term maintenance program for the wetlands and a protection plan for the endangered waterbirds. Feeding of the food areas would reduce disturbance from humans and the larger predators. In addition, an active trapping program for rodents and feral cats should be considered.

The final EIR will incorporate a discussion of Green Sea Turtles and the potential impacts of the development on them and mitigating measures.

2. Sea Life

It is unfortunate that surveyors cannot measure each and every subject of the population under investigation. This would provide the most accurate statistical determination of the population. However, due to various constraints, e.g., cost, etc., standard methods have been developed to describe populations, even though there are uncertainties in describing populations. As long as methods employed are consistent, relative comparisons can be made between population sets. In general, these comparisons are adequate for decision making purposes. In the event that more detailed information is required, more refined methods can be employed. Oceanit Laboratories, Inc., has developed standard methods and practices to survey the coral and marine life. When considering that both Makalaeu and Kapalaeu streams have been discharging into Kealakekua Bay for many years and that the proposed modification to the Makalaeu Stream and its outfall will reroute discharge from Kapalaeu to Makalaeu Stream outlet (330 meter away), and that no significant changes in discharge frequency or volume are anticipated, we feel that the standard methods employed are more than adequate for describing the coral and marine life, particularly at the DP EIR level.

Water quality measurements indicated varying visibilities along the Makalaeu coastline, ranging from 0.65 to 1.69 nephelometric turbidity units (NTU). These measurements were taken at specific locations that were selected to be representative of the nearshore marine environment and did not account for variations in space and time within the habitat. The nearshore marine environment is characterized by a significant amount of suspended sediments, which can significantly affect visibility. Therefore, the data collected must be interpreted with caution.

3. The Marine Environment

More detailed determinations of currents, water quality, and nearshore marine life are required for planning decisions. Water quality measurements were taken at specific locations along the coastline, ranging from 0.65 to 1.69 nephelometric turbidity units (NTU). These measurements were taken to account for variations in space and time within the nearshore marine environment. The nearshore marine environment is characterized by a significant amount of suspended sediments, which can significantly affect visibility. Therefore, the data collected must be interpreted with caution.

Response to Comment 7, Page 10

We will be contacting Professor Louis Herman to discuss these considerations and will include his comments in the final marine EIR. However, our study generally described nearshore marine life. Changes in discharge frequency or volume are anticipated, we feel that the standard methods employed are more than adequate for describing the coral and marine life, particularly at the DP EIR level.

Water quality measurements indicated varying visibilities along the Makalaeu coastline, ranging from 0.65 to 1.69 nephelometric turbidity units (NTU). These measurements were taken at specific locations that were selected to be representative of the nearshore marine environment and did not account for variations in space and time within the habitat. The nearshore marine environment is characterized by a significant amount of suspended sediments, which can significantly affect visibility. Therefore, the data collected must be interpreted with caution.

Response to Comment 4, Page 12

Water creels cause currents along the coastline that may flow contrary to the shoreline orientation of currents and contribute to advectionally measured offshore currents. These currents can cause short-term changes in the nearshore marine environment, which can affect marine life and sediment transport.
erosion. In the event that stream discharge occurs during high surf conditions when nearshore currents are flowing contra to normal directions, the nearshore marine environment is expected to experience additional stress from the fresh water, nutrients, and suspended solids. However, this condition has periodically occurred along the Makaha coastline for a long time and is expected to continue. Moreover, the proposed development is not expected to significantly change this condition.

Response to Comment 5: Page 13

Data describing the wave climate along the Makaha coastline are taken from data that were measured at Makaha, located along a related section of coastline. Results indicate a large component of wave energy comes from the west; however, the percent occurrence of waves that exceed 20 feet is very small and is much less than 15 percent. In the event that large waves occur, typically during the winter months, modifications to the shoreline can result from waves and locally generated currents. This concern will be addressed by the developer as more specific plans are made regarding the placement of structures and infrastructure. However, without detailed knowledge regarding the type and placement of structures, it is difficult to discuss impacts on the shoreline.

In our study we concentrated on nearshore marine environmental effects from moving the major stream discharge point from Kapaa Stream, east 330 meters, to its original discharge location at Makaha Stream. Based on our information and our analysis, we concluded that the proposed stream modifications will have no significant impact on the nearshore marine environment. In the event that shoreline modifications are needed that include structures and devices, a Certification Report will be required, which will document potential effects or erosion from proposed shoreline modifications.

3. Traffic

The intent of the traffic analysis is to identify the potential impact of the specific project, in this case the development of a resort at Makaha, on the expected demand for recreational accommodations on Oahu. Increases in traffic due to increased population or tourism are expected whether or not the project is developed. Traffic volumes on Kamehameha Highway, therefore, are expected to be similar. The discussion of the impacts of this increase and the suggestion of mitigation measures should be part of an overall study of tourism growth rather than part of the project ES.

The proposed project's residential units are not intended to be primary homes and are expected to have negligible effect on peak-hour traffic volumes between central Honolulu and the project site. The development of employment opportunities in this area could result in a net decrease in peak-hour, peak-direction traffic demands on the existing congested roadways.

4. Market Study

Impact of energy shortages on visitor arrivals: Visitor arrivals were based on the series W-F projections prepared by the Hawaii State Department of Planning and Economic Development (SPED).1/ The impact of possible energy shortages on visitor arrivals would be reflected in our analysis to the extent that it was considered significant by SPED in developing the Series W-F projections.

Optimum/Maximum Oahu Population and Availability of Water
Analyses of optimum and maximum population levels for Oahu and evaluation of the long-term supply of potable water was outside the scope of our market study.

Projected Growth Rate of Visitor Arrivals

The market study assumed a significant decline in Hawaii's tourism growth rate as compared to the past 30 years. We believe these projections are realistic because the declining rate of growth in visitor arrivals reflects, in part, the maturing of the resort facilities in the State and the emergence of alternative vacation destination areas outside the State. The growth rate of visitor arrivals was projected to decrease by 4% per year between 1985 and 1990 to 1% per year between 2000 and 2005, shown as follows:

Annual Growth Rate of Visitor Arrivals

<table>
<thead>
<tr>
<th>Year</th>
<th>Average annual growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical: 1957-1966</td>
<td>13%</td>
</tr>
<tr>
<td>Projected: 1985-1990</td>
<td>4</td>
</tr>
<tr>
<td>1990-1995</td>
<td>3</td>
</tr>
<tr>
<td>1995-2000</td>
<td>2</td>
</tr>
<tr>
<td>2000-2005</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Department of Planning and Economic Development.

Other Studies

We were not involved, nor are we aware of, other market studies which were prepared with respect to the proposed Mokuleia community relating to the tourist industry and/or market conditions.

5. Parks

Preservation Land

The Draft EIS contains several discussions (Social-Economic Characteristics) pertaining to the adequacy of the supply of residential land and employment needs for the North Shore region over the next few decades. The "trade-off" between Preservation Land is in favor of "increased urbanisation" as clearly centered on issues regarding basic housing and employment needs projected into the year 2005. While the EIS does not specifically discuss "trade-offs", the relevant issues in making such a comparison are not omitted.

Kuaua Point State Park

The Kuau Point State Park wraps around Kuaua Point. According to DLNR planners, the emphasis of the park (improvements and usage) is on the Kailua side due to more favorable beaches and camp grounds. Improvements to the North Shore side are not presently foreseen. Possible impacts may include greater visitation to the Kuau Point State Park and triggering the eventual need for improvements.

Regarding Present/Projected Recreational Needs

According to SCORP, the recreational needs for the North Shore are as follows:

- Medium need for inland recreational facilities (camping, hiking, camping)
- Medium need for fishing facilities
- High need for coastal recreational facilities (swimming, diving, beach picnicking)

The proposed Mokuleia Development will meet the inland recreational needs through the re-establishment of public access to the State forest reserve and development of additional camp grounds. Shoreline fishing occurs along the entire coastline. Other than public shoreline access and parking within the project limits, no specific fishing improvements are anticipated. Coastal recreational improvements relating specifically to swimming and diving are not proposed.

Regarding "Park-Like Facilities"

The Draft EIS identifies several recreational facilities to include polo club and stables, biking trails, camping areas, sports center, tennis club, as well as golf course.

Regarding Impacts on Camp Erdman

Although Camp Erdman is located over three miles from the proposed site, increased vehicular usage of Farrington Highway may impact the camp.

6. Relationship of Action to Existing Land Use Policies

Section IX of the Final EIS will be expanded to further clarify this point.

7. Need and Alternatives

Agricultural and residential development alternatives were considered in Part VIII.B and C. An agricultural subdivision proposed in 1980 for the property featuring low density and agricultural development was not approved by the City and County.
8. Aesthetic Considerations

The Final EIS will include the results of a visual analysis currently being conducted.

The trade-off between development and ruralness was discussed in the DEIS.

9. Airport Impacts

The DEIS included a thorough discussion of airport impacts in the area of sound levels. Noise levels were based on estimated operations levels in 1959. The operations levels have fallen far below those projected for this time frame, thus making the noise study more conservative. We do not believe that the resort development will have a significant impact on operating levels at Dillingham Field.

10. Archaeological

The DEIS archaeological study describes a step-by-step program for studying the Archaeological Resources during the development approval process. The Department of Land and Natural Resources has committed that adherence to the recommended plan will ensure adequate safeguards for archaeological and historic sites.

11. Sewer Treatment Plant

The site described in the report was the site under consideration for the City's proposed Wai'ula Regional Treatment System. Since the EIS was drafted, an alternate site approximately one mile east of the project site and mauka of Farrington Highway is now under consideration by the City. The Sewer section of the EIS will be expanded to include a more detailed discussion. Final site selection is not expected to be available by the time the Final EIS is complete.

12. Fresh Water Needs and Limitations

We believe that relevant issues have been raised and discussed in the DEIS.

13. Impact of the Golf Course

The golf course may have some impact on water quality and wildlife. However, at the development Plan level of planning, no design details are available to assess. The Final EIS will contain a discussion of the impact of golf courses.

14. Construction Effects

Additional discussion will be provided in the Final EIS.

Response to Supplemental Letter Dated March 20, 1987

Thank you for your comments on the Hawaiian Monk Seal. This information will be included in the Final EIS. Every effort will be made to minimize any adverse impacts that the proposed development may have on the Hawaiian Monk Seal and any other marine life that may utilize the Mokuleia coastline and nearshore coastal waters. As more detailed information becomes available regarding design, water sports, beach activities, etc., we anticipate additional studies will be performed to provide adequate information so that appropriate mitigating measures can be implemented to accommodate marine life utilizing the nearshore coastal environment.

Again, thank you for your comments.

Sincerely,

[Signature]

[Name]
Mr. Donald A. Clegg, Chief Planning Officer  
Department of General Planning  
City and County of Honolulu  
630 S. King St.  
Honolulu, Hawaii 96813  
Re: Mokuleia Development Proposal, Oahu  

Dear Mr. Clegg:  

The Conservation Committee of the Honolulu Group of the Hawaii Chapter of the Sierra Club has reviewed the Draft EIS on the Mokuleia Development Proposal and would like to make the following comments:  

Since the proposal is in a general plan stage, we take the liberty to make suggestions for a project that would be more environmentally acceptable, as well as improving community relations, in as much as this proposal would completely change an entire area.  

WATER:  

In stating that the project area is well supplied with fresh water potential, only requiring the drilling of an additional well, some factors highly important to water were neglected.  

1. According to some court opinions (Waimea water case, etc.), two State funded water commission findings and recommendations, the recent water round table and the Water Codes being worked on by the Legislature, water is a resource that belongs to the State and its people. Therefore, when water wells are drilled and water taken from the aquifer, this water is a concern to all of Hawaii's people.  

2. The area has long been in agriculture, under which condition a large percentage of the water is returned to the aquifer. The same is not true when water is used in development for human use where water ends in a sewer system. In addition, increasing the area covered by cement and buildings leads to water run-off rather than to water absorption into the aquifer.  

3. The project has been planned to be developed over several years, yet the same future thinking has not been given to conserving the resources. We strongly suggest that development plans include facilities for desalinization, for recycling and for water conservation rather than depending upon water from the aquifer, which will be constantly decreasing.  

ACCESS FROM THE OCEAN TO THE MOUNTAINS:  

Here again we are talking about resources that are valuable to the State and its people. Early Hawaiians considered such access as sacred. That philosophy contributes to needed quality of life.  

Mokuleia has beaches which could be considered “pearl lif. By law and by tradition the people have a right to be on the beach to the high tide mark. Yet, more and more, access to the beach is being lost or discouraged.  

As has been pointed out, the Dennis Hwang studies show these beaches to be “active or moving beaches”. They are highly subject to high wave action and tsunami. It is our recommendation, therefore, that Hwang's complete studies be looked at and that his recommendations for AMPLE SETBACK be followed. He strongly recommends that nature be allowed to take its course in the movement of the beaches for the very good reason that this path leads to the least “after-effects” Groins and such engineering strategies only increase the problems in the long run. Of your “specific actions”, IV-6, we can only approve of providing set-backs to produce a more attractive community and to prevent future problems. Other tourist areas around the World have successfully used the open beach front approach. We suggest that the developers of Mokuleia use this novel, for Hawaii, approach. A development of such magnitude can afford to be creative.  

Hiking clubs such as Sierra Trail and Mountain Clubs had traditional access to the trails in Mokuleia under Dillingham ownership. In the seventies we easily gained permission for access to Peacock flats for camping for our High School Hikers. It is an excellent place to teach young people about dry forests with their unique variety and the importance of careful use of fires, about camping techniques and leaving a camp in improved condition.
The EIS refers to "Peacock Flats" as if it is part and parcel of the land to be developed. The fact is that the largest portion (about 7/8) of this site is under State ownership and is above the Makapu'u Forest Reserve. Unfortunately, the State has failed to protect our right of access to such forest lands. We strongly request that access be returned to the public. The statements in the EIS do not give us any confidence that we will be assured this access. We feel that the developer should be prepared to give something in return for a requested land-use-change of such a large parcel of land, as well as for use of natural resources.

We are aware that landowners are in a difficult position in regards to public access. There are laws that do address the liability which have not yet been tested in court. In addition, the State through its Department of Land and Natural Resources has failed to protect access to its forest lands. A solution would be for the landowners to deed access to the State. There is presently a Task Force for Trail Access made up of several community groups interested in hiking, scientific study and hunting that is working on solutions to this problem. A representative would be glad to meet with you. Call the Chair, Steve Brown, at (w) 946-7939 or (h) 856-4940 or member, Alan Burdick, attorney, at (w) 347-5600. (h) 362-0351

AGRICULTURE:

We cannot agree with your premise that the prime agricultural land will not be needed. If every proposed development acts on that premise, there will be NO PRIME AG LAND left on Oahu. It is alarming to us that there can be so many proposals which will increase the population and so little concern with the self-sufficiency of the island. Again, the proposal is longer-sighted in planning for the development than it is in conserving and maintaining the resources required. The proposal makes assumptions that cannot be justified except in the short-run. Hawaii can be so easily isolated from its sources of supply, and yet we are presently dependent upon import in the neighborhood of 80% for food alone!

We would suggest that a much better balanced, attractive and interesting community would be developed if diversified agriculture is included on the best land for agriculture, enough to make the projected community self-sufficient in all of the products that can be grown. Oahu has a long list of educated farmers who cannot find land to lease. This would be a novel approach, a creative idea that is not found in development proposals, but which would pay off in the long run.

Thank you for permitting us to comment.

Lola H. Mench

HONOLULU GROUP CONSERVATION COMMITTEE

CC:

Mr. Barry Ohkuda
Hawaii Department of Land and Natural Resources
Hawaii City and County Planning Commission
Task Force on Trail Access
Hawaii Department of Agriculture
April 8, 1987

Ms. Lola M. Menc
Conservation Group Committee
Honolulu Group
Sierra Club, Hawaii Chapter
P.O. Box 11270
Honolulu, Hawaii 96820

Re: Responses to Comments on the DEIS for the Proposed
Development at Koolauloa, Oahu

Dear Ms. Menc:

Thank you for your comments of March 24, 1987 regarding the
subject EIS. We respond as follows:

Water

1. State Water Policy

The applicant is aware that a state water code is under
consideration; however, this is not the first year that
such a code has been proposed. The DEIS indicates that
the Koolauloa Aquifer is under the control of the State
Department of Land and Natural Resources and that any
development of additional water sources would have to be
approved by DLNR. As an agency of the state government,
DLNR would presumably enforce state policies relating to
water and any changes therein should be adopted by
the Legislature.

Ms. Lola M. Menc
April 8, 1987
Page 2

2. Impact on Aquifer

The development of the project should have little impact
on the aquifer for the following reasons. As indicated in the Concept Plan, Exhibit
10, only a small portion of the site would have buildings
and roadways. Intensive development would be concen-
trated on the shoreline as indicated on Exhibit 10,
shoreline parcels and property close to Farrington
Highway are below the water table supply No-Flow Line,
indicating no connection between surface water and the
aquifer. Beyond the No-Flow Line development proposed by
the concept plan indicates a predominance of low-density
residential developments which house lots, golf courses and recreational amenities which
should have little or no impact on soil permeability.

Other mitigating factors include that the subject area
proposed for development makes up only a minor portion of
the Koolauloa aquifer. In addition, rainfall gradients
indicate that annual rainfall is greater in mountain
areas than in the area proposed for development, thus
making the area's contribution to recharge even smaller.

3. Conservation of Resources

We disagree with your contention that water from the
Koolauloa Aquifer will be constantly decreasing. This statement
would indicate that, from the supply side, either the
demand for water would be increasing. Neither
point is demonstrated. In fact, the recent announcement
by Castle & Cooke on the closure of Haiku Sugar may
indicate that the demand from the Koolauloa Aquifer may decrease.

We agree with your comments that conservation efforts
should be encouraged. Desalination, however, is known to
be a very expensive alternative and should be considered
if there is a basic change in the existing conditions.
Recycling of water through use of efficient irrigation
and water conservation are elements which should be
considered during design development of the project.

Ocean and Mountain Access

Part VI.P.E of the DEIS discussed the question of beach
and mountain access. We believe that the discussion is
adequate for the level of planning that is now available.
The applicant favors the use of setbacks for the development of the shoreline areas in order to mitigate against erosion impacts and to provide for enhancement of ocean resources. The Final EIS will contain a fuller discussion of the areas for erosion control.

At the Development Plan level the applicant has tried to focus on the development of a program that will ensure adequate public access to both the ocean and the mountains and to enhance their enjoyment through the development of resource management plans in conjunction with concerned State and City agencies. We believe that development of these plans with agency, public and public interest group comments during the approval process will be helpful to both the public and the resort development.

The Final EIS will reflect that the State owns and controls the bulk of the Peacock Plate area.

The applicant has been in contact with area residents and community groups seeking input into the project. Contacts will be expanded to groups like the Sierra Club to include areas of wider community concern as the planning process continues.

4. Agriculture

Self-Sufficiency

Hawaii's agricultural industry will be enhanced by a larger population and ongoing transportation improvements which will provide improved access to large mainland markets. At the same time, these same transportation improvements provide to mainland growers improved access to Hawaii's consumers. The result is increased trade, a larger selection of foods, freer and cheaper foods, a higher standard of living, but reduced self-sufficiency.

The projected community would be far too small to support commercial farms.

Availability of Agricultural Land for Lease

Even though considerable agricultural land is available, the supply of low-cost parcels for small-scale farmers is limited. This is partially because of County regulations which require electrical power, paved rather than gravel roads, and buried rather than surface water lines. These requirements are appropriate for rural estates, but are unnecessary for agricultural use of the lands. The added expense for these items makes it uneconomical for large land owners to subdivide their land into small agricultural lots. Because of this, a number of government-sponsored agricultural parks have been developed throughout the State, with land rents too low to cover operations and the debt service on the land purchase and improvements.

Again, thank you for your comments.

Sincerely,

WILLIAM E. HANNAH

NEW YORK
Donald J. Stevens, President & CEO  
Northwestern Mutual Life Insurance Company  
720 East Wisconsin Avenue  
Milwaukee, Wisconsin 53202

July 22, 1986

Dear Mr. Stevens:

As a long time policy owner, I wish to register my objection to the plans of Northwestern Mutual Life and its subsidiary, Northwestern Development Corporation, for the north shore of Oahu.

Our City & County General Plan does not call for resort or other intense development on this part of the island but, rather, seeks to maintain the area as rural. Our remaining farmland, mostly wooded windward areas, are important to the well being of our entire population. It would be inappropriate to make State and City district boundary amendments and City & County general plan, development plan and zoning changes that would affect the desirable balance of land uses that we now have.

Sincerely,

Edwin B. Stevens

Attachment: 1983 letter of 9-15-83 to NHL
Copys: Barry R. Coupe, Inc., Consultant
It is unfortunate that NHL purchased this property. If it was the intention to substantially increase land values or to alter the existing rural atmosphere, agricultural character, open space amenities and low-key lifestyle of ordinary residents, I appreciate the efforts of NHL to maximize its investment return for the benefit of policy owners (as for me, now receive dividends far in excess of premiums on my several policies). However, there is an overriding responsibility to the wider community to consider appropriate projects, such as your award-winning Civic Square - Peninsula Park development which strengthens the existing civic center and avoids projects such as your proposal for Mokuleia, which would undermine comprehensive islandwide planning efforts.

Sincerely,

Edwin E. Stevenson

Copies: Kauai Judge, Project Manager
Mokuleia Development Corporation
Henry Anderson, Chair
North Shore Neighborhood Board
April 8, 1987

Mr. Edwin Stevens
67-525 Ahiwau Road
Kahului, Maui 96732

Re: Response to Comments on the DEIS for the Proposed Development at Wailea, Maui

Dear Mr. Stevens:

The Department of General Planning has forwarded your comment of July 22, 1985 to us for inclusion in the EIS. We respond as follows:

The DEIS indicates that current General Plan and Development Plan policy does not permit resort development in the North Shore area. The applicant has requested that these policies be changed and has prepared an EIS to discuss the impacts of such a change.

The sentiments expressed in your letter are well documented throughout the EIS and must be weighed against the expected economic and job creation benefits which the project would generate.

Again, thank you for your comments.

Sincerely,

[Signature]

William E. Honey

March 30, 1987

Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning
City & County of Honolulu
610 S. King Street
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement
Makaha Development Proposal

We have reviewed the subject E.I.S. and offer the following comments relating to the Socio-Economic Characteristics section of the report:

1. We note, and concur with, the finding that 'hidden unemployment' and underemployment are major undocumented problems which adversely affect the overall economic well-being of the community.

2. The lack of well paying jobs throughout the Koolau/Makaha area has been a chronic dilemma made worse in recent years by the phase-out of the sugar industry.

3. The following, potentially psychological costs of resort development (Section 19, pages 38, 40) versus continuing negative family impacts associated with poverty/unemployment, which presumably would improve with access to new resort jobs, is an interesting and timely observation worthy of further discussion and study. This will be an important issue as developer/community dialog evolves.

Thank you for the opportunity to comment.

Aloha,

[Signature]

Robert F. Cresson
Executive Director

North Shore Career Training Corporation
P.O. Box 66 - Kailua, Hawaii 96734 - Telephone (808) 293-9204
April 8, 1987

Mr. Robert F. Coueau
Executive Director
North Shore Career Training Corporation
P.O. Box 450
Kahuku, Hawaii 96731

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Coueau:

Thank you for your comments of March 30, 1987 regarding the subject EIS. We respond as follows:

1. No response required.
2. No response required.
3. We concur with your comments on this issue. We believe that developer/community dialogue will be most important in developing a program that meets the community needs.

Again, thank you for your comments.

Sincerely,

[Signature]

[Name]

Mr. Coueau

March 24, 1987

Mr. Donald Clepp
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 S. King Street, 6th Floor
Honolulu, Hawaii 96813

SUBJECT: MOKULEIA DEVELOPMENT COMPANY

EIS - FINAL COMMENTS

Dear Mr. Clepp:

We have found, after reviewing the Final Environmental Impact Statement (EIS) for a Secondary Resort at Mokuleia, that there are still too many negative impacts. These include the possibility of reducing production capabilities for Waikiki Sugar Company, excessive traffic, overloading of area public facilities, change in community lifestyle, shortage of housing, over population, and the impact of Kulihi/Turtle Bay's hotels. The North Shore Neighborhood Board continues to recommend denial.

The membership is especially anxious to meet with the new owners and to obtain their personal opinions on the project.

Again, we do appreciate the opportunity to address this matter. Please continue to keep us informed of any new developments.

Most sincerely,

[Signature]

Mervin M. Anderson
Chairman

CC: Committee: Randall Isaac
Councilman 
Senator Gerald Hing
Representative Joseph Leong
Neighborhood Commission

MARCH 13, 1987
April 7, 1987

Mr. Werry W. Andersen, Chairman
North Shore Neighborhood Board No. 27
P.O. Box 607
Haleiwa, Hawaii 96712

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Andersen:

The Department of General Planning forwarded your comments on the General Plan EIS to us for inclusion in the subject EIS. We respond as follows:

We believe that the DEIS has adequately addressed the concerns raised in your letter.

Your comments will be included in the Final EIS.

Again, thank you for your comments.

Sincerely,

William E. Wanket

WEN:awp
06 APR 1987

Directorate of Facilities Engineering

Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning
City and County of Honolulu
610 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

The Draft Environmental Impact Statement (DEIS) for the Mokuleia Development Proposal, Mokuleia, Oahu has been reviewed. The following comments are provided:

a. As reflected in the DEIS and the enclosed noise assessment study done by the U.S. Army Environmental Hygiene Agency, aircraft activities at Dillingham Airfield will result in significant noise impacts to the proposed development. We believe that the noise concerns are valid and may result in complaints that will force the curtailment or elimination of military and civilian aircraft operations at Dillingham Airfield. As an absolute minimum, tenants should be advised of these operations and be required to execute appropriate waivers concerning them.

b. The DEIS does not show safety zones for Dillingham Airfield. Enclosed is information on Department of Defense safety zones for airfields. Because Dillingham Airfield is operated by the State Department of Transportation, you should contact them for specifics on Dillingham safety zones.

c. The DEIS does not indicate the impacts that may result at Mokuleia Army Beach, shown on the enclosed map and apparently located adjacent to Developmental Parcel D. One result of the proposed development will be increased usage of the existing Army restroom facilities. Other potential impacts should be evaluated.
I hope the above information assists you in your environmental review. We appreciate the opportunity to comment on the EIS.

If you require additional information, please contact the Environmental Management Office at 638-0691.

Sincerely,

Original signed by

MAURICE M. FUMOTO
Joseph S. Kasiulewski
Colonel, Corps of Engineers
Director of Facilities
Engineering

Enclosures

Copy Furnished:

William E. Wanket, Inc.
Pacific Tower, Suite 1010
1001 Bishop Street
Honolulu, Hawaii 96813
6 MAR 1984

SUBJECT: Environmental Noise Assessment Study No. 52-34-0466-84, Noise Contours for Night Vision Goggles Operations, Dillingham Army Airfield, Hawaii, December 1983

Commander
US Army Western Command
ATTN: APHD
Fort Shafter, HI 96858

1. AUTHORITY. Letter, HSHK-PV-V, Tripler Army Medical Center, 13 March 1983, subject: ICUZ Study for Dillingham Airfield.

2. REFERENCES.

3. PURPOSE. To provide the Installation Compatible Use Noise Zone (ICUZ) contours for Night Goggles Operations at Dillingham Army Airfield (DAAF).

4. GENERAL.
   a. Background. DAAF is located along the Pacific Ocean near the northwest corner of Oahu. The airfield is adjacent to Mokuleia Beach, which is becoming developed as a surfing area. DAAF is used for training, including night vision goggles operations, by aviators from the 25th Infantry Division.
   b. Criteria.
      (1) The A-weighted day-night sound level (DNL) is used to evaluate the environmental impact of aircraft noise. The DNL is discussed in reference 2b and Inclosure 1.
SUBJECT: Environmental Noise Assessment Study No. 52-34-0466-84. Noise Contours for Night Vision Goggles Operations; Dillingham Army Airfield, Hawaii, December 1983

(2) AR 200-1 (reference 2a) defines three noise zones; referred to as Zone I, Zone II and Zone III. Zone I is defined as the area where the DNL is less than 65 A-weighted decibels (dBA). This area is acceptable for noise-sensitive land uses, including housing, schools and medical facilities. Zone II is defined as the area where the DNL is between 65 and 75 dBA. This area is normally unacceptable for noise-sensitive land uses. Zone III is defined as the area where the DNL is greater than 75 dBA. This area is clearly unacceptable for noise-sensitive land uses.

5. PROCEDURE.

a. The noise zones for DAAF are generated using the NOISEMAP computer program. The required inputs to the program are the flight tracks and the number of each type of aircraft using each flight track. The program sums the acoustic energy arriving at many ground points from the aircraft operations in the vicinity of the flight tracks to generate these contours. These contours are printed out by the computer.

b. The flight patterns and number of operations by aircraft type were provided as Inclosures to the authority letter. The data for 198 days are summarized in the Table (Inclosure 2). It was assumed based on operating hours, that 20 percent of these operations were during nighttime (2200-0700) hours.

6. FINDINGS AND DISCUSSION.

a. The noise contours for the night vision goggles operations at DAAF are shown in the Figure (Inclosure 3). The contours extend beyond the airfield boundary at the southwest corner and in the northeast area, where the contour extends into Hokualea Beach Park and the adjacent beach area. The area enclosed by these contours is normally unacceptable for noise-sensitive land uses.

b. The US Army Western Command should establish an ICUZ program for DAAF as required by AR 200-1 (reference 2a). This program should include coordination with the Honolulu County planning and zoning agencies to assure that the land uses around DAAF remain compatible with the noise environment. This coordination will insure that these agencies are aware of the existing noise environment and that future land use changes do not interfere with DAAF's mission.
HSHB-OB

7. CONCLUSIONS.

   a. The noise contours for the night vision goggles operations at DAAF extend beyond the airfield boundary into the Mokuleia Beach area.

   b. The US Army Hawaii Command should establish an ICUZ program at DAAF.

8. RECOMMENDATION. Establish an ICUZ program at DAAF as required by AR 200-1.

FOR THE COMMANDER:

[Signature]

JOEL C. CAYBOS, M.D.
Colonel, NC
Director, Occupational and Environmental Health

3 Inc

as

CF:
HQDA (DAEN-ECE-1)
HQDA (DAEN-ZCE)
HQDA (DASG-PSP)
Cdr, HSC (HSCL-P)
Cdr, AHS (HSHA-IPM)
Cdr, TANC (PVNTMED Actv) (2 cy)
Cdr, Wheeler AAF (2 cy)
Cdr, US Army Pacific, EHEA
### TABLE. SUMMARY OF OPERATIONS

<table>
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<tr>
<th>Flight Track</th>
<th>Number of Operations</th>
<th>Aircraft Type</th>
<th>UH-1</th>
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<td>260</td>
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<td>Pineapple Departure</td>
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Civil Engineering Programming

AIRFIELD AND HELIPORT PLANNING CRITERIA

12 MAY 1981

DEPARTMENTS OF THE AIR FORCE,
THE ARMY AND THE NAVY
NOTES
1. For overrun grades, see Table 2-6.
2. For clear zone grades, see Table 2-7.
3. For grades within the primary surface, see Table 2-2.
Figure 2-3. Accident Potential Zone Guidelines.
<table>
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<tr>
<th>Land Use Category</th>
<th>Compatibility</th>
<th>Clear Zone</th>
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<th>APZ2.1</th>
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<td>Multifamily dwellings</td>
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<td>Group quarters</td>
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<td>Industrial and Manufacturing</td>
<td></td>
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<td>Food and kindred products</td>
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<td>Paper and allied products</td>
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<td>Chemicals and allied products</td>
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<td>Stone, clay, and glass products</td>
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<td>Auto parking</td>
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<td>Communication</td>
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<td>Apparel and accessories (retail)</td>
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<td>Contract construction services</td>
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<td>Indoor recreation services</td>
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<td>Cemeteries</td>
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<td>Non-profit organizations including churches</td>
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<td>Outdoor Recreation</td>
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<td>Community and regional parks</td>
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<td>Nature exhibits</td>
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<td>Spectator sports including arenas</td>
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<td>Livestock farming, animal breeding **</td>
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<td>Water areas **</td>
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Footnotes
1. A "Yes" or "No" designation for compatible land use is to be used only for gross comparison. Within each, uses exist where further definition may be needed as to whether it is clear or usually acceptable/unacceptable owing to variations in densities of people and structures.
2. Suggested maximum density 1-2 dwelling units per acre, possibly increased under a Planned Unit Development where maximum lot covered less than 25 percent.
3. Factors to be considered: Labor intensity, structural coverage, explosive characteristics, air pollution.
4. No passenger terminals and no major above ground transmission lines in APZ.I.
5. Not permitted in graded area, except as noted in table 2-7.
6. Low intensity office uses only. Meeting places, auditoriums, etc., not recommended.
7. Excludes chapels.
8. Facilities must be low intensity.
9. Clubhouse not recommended.
10. Concentrated rows with large classes not recommended.
11. Includes livestock grazing but excludes feedlots and intensive animal husbandry.
12. Includes feedlots and intensive animal husbandry.
13. Include hunting and fishing.
14. Controlled hunting and fishing may be permitted for the purpose of wildlife control.
April 14, 1987

TO: MR. DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: FRANK K. KAOHOHANOHO, FIRE CHIEF

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
MOKULEIA DEVELOPMENT PROPOSAL
MOKULEIA, OAHU

We have reviewed the subject EIS and have no additional comments at this time.

Should you have any questions, please contact Battalion Chief Kenneth Word at 943-3838.

FRANK K. KAOHOHANOHO
Fire Chief

FK../KAH: sb

Attachment

cc: Mr. William Wankett, Inc.
    Land Use Consultant
    Pacific Tower
    1001 Bishop Suite 1010
    Honolulu, HI 96813
MEMORANDUM

To: Mr. Donald A. Clegg, Chief Planning Officer, Department of General Planning City & County of Honolulu

From: Director of Health

Subject: Draft Environmental Impact Statement for Mokuleia Development Proposal, Mokuleia, Oahu

April 1, 1987

Thank you for allowing us to review and comment on the subject draft EIS. We provide the following comments:

Drinking Water

The existence of two water systems, one potable and one nonpotable, introduces the opportunity for cross connections. Care should be taken to protect the potable water lines from cross connection with the nonpotable irrigation lines.

Vector Control

Night mosquitoes will probably be a problem due to vast breeding sites in the vicinity of the project.

cc: Mr. Barry Okuda
April 16, 1987

Mr. Edward Y. Hirata, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Mr. Hirata:

It has been brought to our attention that our response to your March 30, 1987 comments regarding Aircraft Noise was inappropriate. We apologize for this error on our part, which resulted from the inclusion of a response to a comment from another agency on an aircraft noise related matter. The response that we had intended to send is shown below:

Aircraft Noise

Because of the late submittal of the comment, there was insufficient time to obtain the necessary input data and to perform the evaluation required to generate a composite military and civilian noise contour map for existing and projected airport operations. The intention is to provide such a map and to restrict resort/residential development within the 60 Ldn and greater areas unless special noise mitigation features are incorporated into the structures. In the 55-60 Ldn noise impact areas, a disclosure will be made to advise developers and tenants that the areas are subjected to noise from aircraft activity.
We thank you for your patience and your cooperation in this matter. If we can be of further assistance, please don't hesitate to contact us. Again, thank you for your comments.

Sincerely,

William E. Wanket

WEW:awp
April 20, 1987

Ms. Jacqueline N. Miller
Acting Associate Environmental Coordinator
University of Hawaii at Manoa
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Re: Responses to Comments on the DEIS for the Proposed Development at Mokuleia, Oahu

Dear Ms. Miller:

In reviewing my response to your comments of March 25, 1987 on the subject DEIS, I noticed several misspellings and an incorrect statement that was inadvertently made. I apologize for these errors. Below are the corrections using the Ramseyer method:

Reference Page 4, Traffic/Environmental Concerns, 2nd para:

Traffic volumes between Honolulu and Haleiwa are expected to be affected more by factors other than the proposed project, such as increases in island-wide population, tourism activity, and development elsewhere. Construction of [the] proposed Haleiwa bypass highway would ease the expected increases in traffic at Weed Circle.

Reference Page 6, Solid Waste, 1st para:

At the present level of planning, data on the forecasted volume and quality of the waste that will be generated from the proposed development was not determined.

Again, thank you very much for your interest and concern in the Mokuleia development.

Sincerely,

William E. Wanket

cc: Department of General Planning
Office of Environmental Quality Control

Pacific Tower
Suite 1010
1001 Bishop Street
Honolulu HI 96813
Phone
(808) 533-4937
APPENDICES

A. Market Study
   (John Child & Company)

B. Economic and Fiscal Impact Study
   (John Child & Company)

C. Socio-Economic Impact Study
   (Community Resources)

D. Development Plan Public Facilities Amendment
   (Engineers, Surveyors Hawaii, Inc.)

E. Ocean Hazard Study
   (Charles L. Bretschneider & Associates)

F. Ocean Engineering Study
   (Oceanit Laboratories, Inc.)

G. Agricultural Impact Study
   (Decision Analysts Hawaii, Inc.)

H. Archaeological Study
   (Joseph Kennedy)

I. Flora and Fauna
   (Char & Associates)

J. Air Quality Study
   (Barry D. Root)

K. Noise Study
   (Darby and Associates)

L. Traffic Study
   (Parsons, Brinckerhoff, Quade & Douglas, Inc.)

M. Visual Impact Analysis
   (Michael S. Chu, Land Architect)
APPENDIX A

Market Assessment for
MOKULEIA
Mokuleia, Oahu, Hawaii

Prepared for
Mokuleia Development Corporation

July 1986
Market Assessment for

HOKULEIA

Hokuleia, Oahu, Hawaii

Prepared for
Hokuleia Development Corporation

July 1986

July 22, 1986

H. K. Tim Yee
Chairman
Hokuleia Development Corporation
1011 Bishop Street, Suite 919
Honolulu, Hawaii 96813

Dear Mr. Yee:

At your request, we have completed our market assessment for the proposed Hokuleia community at Hokuleia, Oahu, Hawaii. The accompanying report summarizes our conclusions regarding our assessments of the markets for hotel, condominium, residential, and ancillary land uses in the proposed master-planned development.

BACKGROUND

HDC proposes to develop about 2,900 acres in Hokuleia. Preliminary development concepts are being studied. HDC is evaluating these concepts in terms of community needs, market support, physical and financial feasibility. Important goals of the development concept are to create jobs and business opportunities in the community.

A tentative land use plan has been proposed. This plan is meant to consider the existing image and character of Hokuleia and the current Shore communities, address any specific development needs for Oahu and Hawaii residents and the realities of financial limitations for the developer.

Based on the preliminary land use plan, Hokuleia is envisioned to be a residential community in a relatively rural, low-density environment. HDC proposes to orient land uses and facilities to serve residents in the adjoining communities as well as others on Oahu.
HDC is preparing, or has prepared, applications for general plan and development plan amendments to permit a master-planned development on the site. In this regard, HDC has asked John Child & Company, Inc. to evaluate the market support for development of the site and to assist in preparing the master development plan.

OBJECTIVE

The primary objective of our assistance is to assess the market support for proposed land uses at Mokuleia. The principal land uses tentatively include:

- Hotels
- Multi-family condominium units
- Residential units
- Commercial facilities
- Golf course.

This summary report may be incorporated in applications for amendments to the State of Hawaii Land Use District and the City and County of Honolulu General Plan and Development Plan.

* * * * *

We appreciate the opportunity to assist you in the planning of this unique master-planned community. Please call us if you have any questions.

Very truly yours,

JOHN CHILD & COMPANY, INC.

Karen Chay, MAI
Executive Vice President

July 1986
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<th>Letter of Transmittal</th>
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<td>Table of Contents</td>
<td></td>
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Qualifications of John Child & Company, Inc.
Qualifications of Karen Cher
Qualifications of Paul D. Cool
I - EXECUTIVE SUMMARY

Hokulea Development Corporation (HDC) engaged John Child 
Company, Inc. (John Child) to prepare a market assessment for the
proposed Hokulea development. This section presents the study
background, objectives and approach and summarizes the preliminary
development plan, major findings and conclusions of our study.

BACKGROUND

HDC proposes to develop about 2,400 acres in Hokulea. Prelim-
inary development concepts are being studied. HDC is evaluating
these concepts in terms of community needs, market support,
physical and financial feasibility. Important goals of the
development concept are to create jobs and business opportunities
in the community.

A tentative land use plan has been proposed. This plan is meant
to consider the existing image and character of Hokulea and the
North Shore community, address any specific development needs for
Oahu and Hawaii residents and the realities of financial limita-
tions for the developer.

Based on the preliminary land use plan, Hokulea is envisioned to
be a recreational community in a relatively rural, low-density
environment. HDC proposes to orient land uses and facilities to
serve residents in the adjoining communities as well as others on
Oahu.

HDC is preparing, or has prepared, applications for general plan
and development plan amendments to permit the master-planned
development on the site. In this regard, HDC has asked John Child
to evaluate the market support for development of the site and to
assist in preparing the master development plan.

OBJECTIVE

The primary objective of our assistance is to assess the market
support for proposed land uses at Hokulea. The principal land
uses tentatively include:

- Hotels
- Multi-family condominium units
- Residential units
- Commercial facilities
- Golf course.

This report may be incorporated in applications for amendments to
the State of Hawaii Land Use District and the City and County of
Honolulu General Plan and Development Plan.

STUDY APPROACH

Market trends on Oahu and in Hawaii were studied to assess the
market support for development of a master-planned, recreation-
oriented community at Hokulea. The market assessments are
analyzed in terms of hotel, multi-family condominium, residential
units, commercial and recreational development.

HOKULEA SITE

The Hokulea site is described in terms of its location and
physical characteristics.

Location

The Hokulea site is on the North Shore of Oahu, about six miles
west of Haleiwa. The North Shore region is rural; the primary
land uses and economic activities derive from agriculture and the
visitor industries.

The North Shore is known for its scenic coastlines, beaches, and
world-class surfing areas. It has long been an area for family
beach houses, which are frequented primarily on the weekends and
in summers.

In addition, local residents associate Hokulea with hiking
trails, camp grounds, polo fields, and air activities including
gliding and aerobatics.

Site Characteristics

The 2,900-acre site has diverse physical characteristics. The
property fronts Farrington Highway. The mauka (mountainside) portion
of the site consists of four noncontiguous parcels totaling about
120 acres. These sites have about 1.5 miles of ocean frontage
along white sand beaches.

The mauna (mountainside) portion of the site includes about 2,780
acres. The site slopes gently from sea level to about 300 feet
over a distance of about a mile to the base of the Waianae moun-
tain range. From this point to the top of the mountain range, the
topography is steep and rugged; the vegetation shifts from typical
to about 1,000 acres of the total site.

PRELIMINARY DEVELOPMENT CONCEPT

The preliminary development concept envisioned for Hokulea
focuses on land use and recreational facilities which would be
enjoyed by Hawai‘i families as well as visitors. Land uses are planned to complement the existing image and character of the area. As a result, the development is proposed as a low-density, recreation-oriented master-planned community.

Proposed land uses within Nokuleia which were assessed are briefly described as follows:

Hotel and Condominium

Hotel and condominium apartment development would provide transient and long-term accommodations at Nokuleia. Hotel development would provide a broad range and depth of guest services, food and beverage facilities, retail shops and recreational opportunities for both local and off-island visitors. Condominium apartments would typically offer larger facilities with kitchens for long-term guests or permanent residents.

Residential Development

Residential development would offer a range of choices in terms of living style and investment in Nokuleia. Residential units provide families privacy as well as flexibility in design and orientation. For growing families, the units may be desirable as primary residences; for other families, a secondary or weekend home could be built. In addition, residential development may represent an opportunity to invest in a property which could be enjoyed in retirement.

Commercial Development

Commercial development would provide convenient facilities for goods and services for guests and residents of Nokuleia and for the North Shore community. The commercial development would include retail shopping, dining and entertainment facilities in addition to those that may be provided in the hotel and condominium facilities.

Recreational Development

Onsite recreational development would include 36 holes of golf course and possibly polo fields, stable, hiking and riding trails, camping areas, tennis court and sports center. These facilities would supplement other recreational facilities developed at the hotel and condominium projects.

HOTEL MARKET ASSESSMENT

Based on the preliminary development plan, the proposed hotels at Nokuleia are expected to attract both local residents and off-island visitors. Factors which would attract hotel guests to Nokuleia include:

- Unique location on Oahu:
  - Accessible to and from Waikiki, the Honolulu central business district and all areas of Oahu
  - Oceanfront, rural environment

- Range of recreational opportunities:
  - Onsite golf course, possibly polo field, hiking trails, riding trails, camping grounds, tennis, ranch and sports center
  - Beach activities including swimming, surfing, windsailing, and boating

- Range of entertainment and commercial services:
  - Entertainment and hotel facilities
  - Variety of food and beverage services at hotel and commercial facilities

Market Share

The supportable hotel rooms were estimated based on Nokuleia's projected market position in relationship to overall Oahu room demand.

Initially, Waikiki hotels and condominium units are expected to capture about 93% of the Oahu hotel room demand. Waikiki is expected to continue to dominate the Oahu visitor accommodations industry. However, as master-planned resort developments in areas outside Waikiki emerge, Waikiki's share could be expected to decline from its current level of about 93% to about 73% by 2005. This decline in market share would result from:

- Limited amount and availability of suitable development sites in Waikiki.
- Development and maturation of resort destination areas outside Waikiki.
- Increasing preference of repeat visitors to stay outside of Waikiki.
- Increasing number and length of stay of local resident hotel guests.

The North Shore/Ko‘olau area currently captures about 22% of the room demand on Oahu. Based on the plans for expansion at the
Turtle Bay Resort and the proposed development plan for Hokulea, the North Shore, is projected to capture a 12.0% market share of room demand on Oahu by 2005, as shown in the following table.

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1995</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waikiki/Kahala</td>
<td>93.0%</td>
<td>87.5%</td>
<td>75.0%</td>
</tr>
<tr>
<td>West Beach/Laieord</td>
<td>3.0%</td>
<td>4.5%</td>
<td>10.0%</td>
</tr>
<tr>
<td>North Shore/Ko'olaau</td>
<td>2.0%</td>
<td>2.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>2.0%</td>
<td>2.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Supportable Hotel Rooms on Oahu

Based on the anticipated supply and demand relationships for visitor units on Oahu, the visitor industry could be expected to require about 18,900 to 22,700 additional rooms by 2005. This represents a requirement of 9,300 to 11,300 rooms in addition to the inventory which is currently being planned for Oahu.

Hotel rooms are expected to continue to account for about 70% of total demand for visitor rooms on Oahu. As a result, the number of supportable hotel rooms on Oahu is projected to range between 40,300 to 42,900 rooms by 2005.

Supportable Hotel Rooms at Hokulea

Based on the proposed development concept, Hokulea could achieve a market capture rate of about 1.5% in 1990, increasing to 3% by 2005. At these estimated market capture rates, the number of supportable hotel rooms at Hokulea is projected to increase from about 500 units in 1990 to between about 2,000 and 2,200 in 2005, shown as follows.

<table>
<thead>
<tr>
<th>Projected Supportable Hotel Rooms at Hokulea</th>
<th>Estimated market share</th>
<th>Supportable hotel rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1.5%</td>
<td>460-620</td>
</tr>
<tr>
<td>1995</td>
<td>3.0%</td>
<td>1,080-1,160</td>
</tr>
<tr>
<td>2000</td>
<td>4.0%</td>
<td>1,500-1,600</td>
</tr>
<tr>
<td>2005</td>
<td>5.0%</td>
<td>2,020-2,150</td>
</tr>
</tbody>
</table>

Recommended Hotel Development

The recommended hotel development for Hokulea would include oceanfront resort-type hotels and possibly a village hotel and conference center hotel. The village hotel and conference center hotel could be situated at Farrington Highway. The hotels could be planned as follows.

Oceanfront Hotels

Three or more oceanfront resort-type hotels could be designed to maximize the scenic ocean views and minimize any adverse influences on the two neighboring developments. The hotels should be activity-oriented and offer a broad range of on-site recreational and entertainment opportunities.

Village Hotel

A hotel north of Farrington Highway with a thoughtful design concept could result in a low-density village atmosphere. Extensive interior landscaping and waterways could compensate for the lack of ocean frontage and limited ocean views. The hotel could provide a relaxed environment for guests who seek a slower-paced vacation experience than experienced in Waikiki.

Conference Center Hotel

The conference center would cater to small- to medium-sized conventions and meetings and corporate incentive groups. The hotel would include meeting and conference rooms, audio/visual and telecommunication facilities, pavilions, and banquet halls. Onsite recreational facilities including swimming pools and whirlpools, racquet sports, and a health center would provide active recreational complements to the more business-like meeting rooms.

CONDOMINIUM APARTMENT MARKET ASSESSMENT

The preliminary condominium development concept for Hokulea takes into account recent trends in the condominium market, characteristics and history of comparable projects on all islands and the projected market support at Hokulea.

Market Review

The developments envisioned for Hokulea could be expected to appeal to residents and visitors seeking an active recreational environment. For purposes of comparison, 30 similar condominium projects were studied. Selection was based on the following criteria:
- Projects in rural locations on Oahu.
- Projects in or near master-planned resort areas on the
  neighbor islands.

These projects were found to share the following characteristics:
- **Location** - Condominium developments are typically located
to offer attractive views and surroundings. In order of
desirability, condominium orientations are usually:
  1. Oceanfront
  2. Ocean view
  3. Golf-front, and
  4. Interior.

View orientations of the sampled units were as follows:

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanfront</td>
<td>242</td>
</tr>
<tr>
<td>Ocean view</td>
<td>22</td>
</tr>
<tr>
<td>Golf-front</td>
<td>27</td>
</tr>
<tr>
<td>Interior</td>
<td>1091</td>
</tr>
</tbody>
</table>

- **Project Density** - This is a general indicator of the rela-
tive open space and privacy available to individual units.
The average project density for similar projects is 12
units per acre. Project densities ranged from 8 units per
acre at Waihe'e and Princeville to 23 units per acre at
Makaha, Nokulea, Punahou and Kaaawa condominiums.

- **Unit Mix** - The majority of projects include one- and two-
bedroom units. The unit mix is distributed as follows:

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio units</td>
<td>31</td>
</tr>
<tr>
<td>One-bedroom units</td>
<td>47</td>
</tr>
<tr>
<td>Two-bedroom units</td>
<td>43</td>
</tr>
<tr>
<td>Three-bedroom units</td>
<td>7</td>
</tr>
</tbody>
</table>

The majority of studio units are located on Oahu, while
most three-bedroom units are on Kauai or in Kauai resort
on the Island of Kauai.

- **Unit Size** - Unit sizes ranged as follows:

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Area (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>600 - 600</td>
</tr>
<tr>
<td>One-bedroom</td>
<td>500 - 1,400</td>
</tr>
<tr>
<td>Two-bedroom</td>
<td>700 - 1,800</td>
</tr>
<tr>
<td>Three-bedroom</td>
<td>1,200 - 2,300</td>
</tr>
</tbody>
</table>

- **Project Amenities** - The projects generally offer a recrea-
tion center and at least one swimming pool. Many also
front along a beach suitable for swimming. Other amen-
tities provided include whirlpools, saunas, tennis courts,
barbecue areas and landscaping.

**Sales Absorption**
Rural Oahu includes nearly 3,500 units in 31 condominium projects,
including 9 projects considered comparable to concepts for
Nokulea. Since 1979, these 31 projects have averaged 300 sales
per year. The 9 selected projects accounted for 29% of sales in
all 31 projects and averaged 15 sales or resales per year during
this period. Kualoa Estates East and West accounted for nearly
40% of these sales.

The shortest marketing periods and the greatest numbers of units
sold occurred in 1973 and 1979, when the selected projects
achieved annual sales of 100 to 200 units. Since 1980, sales
rates have declined, and currently average between 20 and 35 units
per year.

Initial sales rates of new units in rural Oahu and the selected
neighbor island resort areas range from 30 to 93 units per year,
and average 50 units per year.

**Buyer Characteristics**
Condominium buyers are generally motivated by a desire to acquire
a retirement or vacation home or by perceived investment opportu-
nities. Nearly 90% of those purchasing condominiums in rural Oahu
are from Hawaii.

**Market Assessment**
Initially, the condominium buyers at Nokulea could be expected to
be Oahu residents and visitors who return frequently. Buyers are
expected to be:

- Primarily from Hawaii as well as the western United
  States.


- Predominantly married couples, aged 35 to 60 years.
- Physically active and seeking access to golf courses, tennis courts, beaches and restaurants.

The market support for condominium units at Hokulea is dependent on its reputation and image as a major recreational development, which is expected to attract a large base of local residents from which condominium buyers may emerge. Based on the sales history of similar projects, average sales absorption for oceanfront condominiums could increase from about 30 to 40 units per year over the first decade of development. Similarly, the average sales absorption rates for condominiums on the mauka portion of Hokulea could be projected to increase from about 45 to 55 units per year. Total projected sales absorption support about 1,725 units; however, the current development concepts include only about 1,200 units.

Proposed Development Guidelines

The current development concepts for Hokulea center on sites which are best suited for condominium development.

- **Oceanfront Sites** - These sites offer views and private beachfronts. Density could average about 35 units per acre, and total about 1,000 units. The unit mix could be predominantly one-bedroom units, with secondary emphasis on studio and two-bedroom units. Units would be efficiently designed. The oceanfront sites are physically removed from the remainder of the community. Thus, it will be important to either minimize perceived distances or to create a self-contained environment with complete facilities and amenities and an orientation to the ocean.

- **Golf Course Frontage Sites** - The golf-frontage sites could be attractive to residents and repeat visitors to attract Oahu buyers. Development density could average between 10 and 15 units per acre. These developments should include swimming pools, recreation centers, and other amenities as well. The unit mix could offer a greater number of two-bedroom units to be attractive to local families and investment lots.

RESIDENTIAL MARKET ASSESSMENT

The location, preliminary development concepts and recreation orientation in Hokulea are unique. Because the project is unlike any existing area in Hawaii, comparisons with existing residential projects include residential lots of less than one acre available in planned resort communities (community lots) and lots of one acre or more available in rural Oahu (acreage lots).

**Market Review**

The characteristics and market performance of community and acreage lots are discussed as follows.

**Community Lots**

To date, planned resort community on Oahu have not included single-family lots (community lots). On the neighbor islands, about 2,149 community lots were developed in five resort communities. The majority of these are at Waikoloa Village and Princeville resorts. However, over the next two decades, about 6,900 community lots are planned for development on the neighbor islands.

The existing and planned community lots are described as follows:

**Location** - The majority are either hillside with ocean and/or valley views or interior lots. Lot developments that have golf course fairways are the next most common type, while oceanfront lots represent only about 3% of the total.

**Size** - Typical lots range from 9,500sq ft to 20,000sq ft, and average 15,000sq ft to 16,000sq ft. Golf course lots are generally larger and have higher prices.

**Amenities** - Most community lot subdivisions do not include extensive amenities, because buyers are reluctant to pay for the maintenance of such facilities. Instead, most projects offer short-term, complimentary or voluntary memberships at the resort golf or tennis facilities.

**Absorption** - Community lot subdivisions averaged about 63 sales per year since 1973. Sales rates have fluctuated with general real estate cycles, with fewer sales between 1982 and 1983. Lots that have sold since 1982 have typically been lower-priced or offered at discounted prices.

**Buyer Characteristics** - Buyers of community lots tend to be 40 to 55 years of age, and either from the U.S. or the island where the project is located. While view lots are preferred, buyers who:

- visit the area frequently,
- are Hawaii residents,
- intend to retire in the area
are often willing to forego a view for lower-priced lots. Historically, the majority of purchasers have bought community lots for future improvement as a retirement home or for investment or speculative building.

**Acresage Lots**

Development of acresage lots has occurred primarily in rural areas in the State. On Oahu, such developments are typical in Kahaluu, Pupukea, Mokuleia and Makaha. Most acresage lot subdivisions include less than 25 lots. Six acresage lot developments on Oahu, Maui and Molokai were selected for study and are described as follows:

**Location** - Lots are generally considered to be view lots if they have ocean views of varying quality and/or views of mountain ranges. Lot locations in the selected subdivisions are described as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>View lots</td>
<td>541</td>
</tr>
<tr>
<td>Interior lots</td>
<td>42</td>
</tr>
<tr>
<td>Oceanfront</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>591</strong></td>
</tr>
</tbody>
</table>

**Size** - Typical lot sizes range between 1/2 to 7 acres. Lot sizes generally do not vary substantially within subdivisions.

**Amenities** - None of the projects studied provide any common community facilities or security.

**Absorption** - The subdivisions have averaged about eight lot sales per year since 1978. Sales are generally the highest in the initial years when the developer markets the lots.

**Buyer Profile** - The acresage lot buyer is similar to the buyer for community lots, except that the former prefers a higher degree of privacy. In addition, between 75% and 100% of the buyers are from within the State.

**Market Assessment**

The primary buyers for residential lots could be expected to be those seeking:

- Primary residence in a recreation-oriented community, or
- Vacation or retirement home.

A secondary market could include the speculative builder and investor markets.

The rate of residential lot sales at Mokuleia may be expected to be related to visitor facility development and the maturity of the resort as a visitor destination. Sales are projected to increase with the opening of hotels and condominiums. In addition, these lots would provide a unique opportunity for residential units in a quality recreation-oriented community on Oahu.

Annual community lot sales are projected to increase from 20 to 50 lots per year over a 13-year period; annual acresage lot sales could increase from 10 to 20 lots per year. Total absorption at Mokuleia could amount to 825 lots by 2005; however, the current development concepts include only 700 lots.

**Proposed Development Guidelines**

Residential development at Mokuleia could be oriented around the golf course and base of the Waianae Mountains. Design should maximize the number of golf course frontage and view units.

Specific recommendations are:

- **Project Phasing and Product Segmentation** - Lot development should be phased to provide an adequate supply of both types of lots at a given time, but to minimize competition between similar lot types.

- **Size** - Community lots could range from 9,000 to 11,000 square feet; acresage lots could average one acre in size.

- **Residential Unit Types** - Duplex and cluster units could also be considered in the development.

**Commercial and Recreational Facilities Assessment**

Commercial and recreational facilities would complement the development envisioned at Mokuleia. The market support for a retail shopping center, golf course and other recreational facilities and amenities were assessed.

**Retail Facilities**

Market support for retail space at Mokuleia would result from shopping needs of onsite visitors and residents, off-resort visitors and neighboring North Shore residents. The average daily population of these four groups is projected to be over 26,000 by 2005.
The total annual retail sales in Hokule'a by these two markets are estimated to amount to about $4.9 million in 1990 and to increase to about $7.6 million by 2005. Visitor dollars are expected to account for the majority of total expenditures (93%) expected to account for about $6.9 million by 2005. Visitor dollars are expected to account for the majority of total expenditures (93%). The sales level appropriate for retail facilities at Hokule'a has been estimated at $175 per square foot, based on sales levels at comparable centers. The net demand for freestanding retail space could be expected to support about 10,500 sq ft by 1990 and 16,900 sq ft by 2005. "Net demand" is defined as total retail space demanded in Hokule'a less that which could be expected to be built in its hotels.

The retail center could include widely recognized restaurant and other food service establishments. The facility could be designed to take advantage of adjoining inland waterways by including wide, landscaped promenades and park areas. To accommodate such malls, walkways and public areas, a development site of 6 to 7 acres would be appropriate.

Alternate Commercial Facilities

Given the unique recreational orientation of Hokule'a, alternate commercial facilities could be supported on 22 to 23 acres. Potential uses being considered include:

- Multi-Media Complex - This complex could provide facilities for theatrical, cinematic and musical performances. It could also be used for public meetings and forums. The complex could provide a diverse range of entertainment opportunities to benefit the North Shore community.

- Interactive Sports Museum - This facility could showcase the diversity of recreational activities in Hawaii, as well as offer opportunities for participation in these activities. Sports which could be featured include surfing, polo, rodeo, hang gliding, canoe racing and ancient Hawaiian games.

Recreational Facilities

The image of the Hokule'a area is widely associated with recreational activities. A wide range of recreational amenities would enhance the attractiveness of the development to both residents and visitors.

Golf Courses

As well as being a desirable recreational facility, a golf course enhances the image of the development. It offers the intangible benefits of open space, tranquility and aesthetic values. The benefits of open space and golf courses also enhance the overall appeal to the area and give a feeling of spaciousness to the resort. Golf courses also enhance the land values of areas surrounding the resort.

A well designed course is able to draw visitors to an area based on its reputation. Thus, resort golf courses are generally "championship" courses, featuring extensive landscaping and challenging, but forgiving, play.

The demand for golf has been projected based on estimated on- and off-resort population and golf utilization rates. The number of rounds of golf are projected to increase from about 165 rounds per day by 1990 to about 310 rounds per day by 2005.

Resort golf courses are often developed prior to the completion of other visitor and community facilities to attract potential visitors to the resort. Thus, while the golf course may or may not be fully supported in terms of desired rounds of play, the first golf course should be developed and completed concurrently with the first major hotel facility. A second golf course could be developed later as the resort matures, to prevent overcrowding and deterioration of the first course.

Other Recreational Facilities

Hokule'a's diverse physical features and other recreational facilities are not typically found on Oahu. As a result, Hokule'a has the opportunity to establish itself as a recreation-oriented destination on Oahu. Other recreational facilities could include:

- Polo Club and Stables - Hokule'a is already well known for its polo matches. The development could include a polo club and stables surrounded by condominiums and golf fairways. This would enhance the rural, ranch-like atmosphere of the community. During the off-season, the facilities could be used for rodeos and other equestrian events.

- Hiking Trails - Several trails now lead from the lowlands to a plateau of the Waianae Mountains known as Peacock Flats. These and other similar trails could be developed to offer visitors and residents the opportunity to experience and enjoy the rugged, natural beauty of the region.

- Camping Areas - Camp grounds, developed in conjunction with the hiking trails, could augment the recreational facilities and appeal of the community.
SUMMARY OF MARKET ASSESSMENTS

In summary, Nokulele could be developed as a community serving both residents of and visitors to Oahu. To be consistent with the current image and attractiveness of the North Shore region, development should be low-density, with an emphasis on recreational activities and facilities. The major land uses would include hotels, multi-family condominium and residential units, golf courses, commercial areas and other complementary facilities and amenities.

This development would result in a community with a variety of facilities with appeal to the island resident and repeat visitor. Through careful planning, it could offer a unique residential or vacation experience in a relaxed, rural atmosphere which has previously been found only on the neighbor islands. However, its location on Oahu could give it a competitive edge over neighbor island locations.

II - REGIONAL SETTING

This section presents a regional overview of the State of Hawaii, the Island of Oahu, the North Shore region and describes the sites under consideration in terms of location, characteristics, and development concepts.

STATE OF HAWAII

In 1984, the resident population of the State of Hawaii was estimated to be 1,038,700, including 57,300 members of the military and 67,100 of their dependents. The estimated de facto population of the State, which includes visitors present and excludes residents absent, was about 1,140,609.

The visitor industry is the largest industry in the State, surpassing the two historical bases of Hawaii's economy, sugar and pineapple. In 1984 nearly 4.9 million visitors brought in about $6.6 billion in visitor expenditures to the State.

Oahu has historically been the primary visitor destination. More recently, the visitor industry has expanded on the neighbor islands. Now resort complexes along with their supporting industries and services have been established on Maui, Kauai, Hawaii, and Molokai.

ISLAND OF OAHU

Nokulele is in the North Shore region of Oahu. Oahu, with 618 square miles, is the fourth largest island in the State. The relationship between Nokulele and the major towns and cities of Oahu are shown in Exhibit II-A.

This section reviews the demographic characteristics of Oahu.

Population

In 1984 Oahu housed about 76% of Hawaii's resident population and included only about 16% of the State's land area. Oahu's population was estimated at 865,200, including military personnel. Military personnel and dependents on Oahu are estimated at 127,100 residents, and represent about 15% of the total Oahu population. Oahu includes a sizable visitor population, mostly centered in Waikiki. The daily census averaged 67,370 visitors.

Resident population growth is projected by the Department of Planning and Economic Development (DPEDE) to decline from the 1.8% rate of growth experienced between 1970 and 1980, to 1.6% per annum between 1985 and 1990 and 0.72% through 2005.
Age Distribution

In 1980 the median age of Oahu residents was 28.0 years compared with 30.0 years nationally. However, the population of Oahu is maturing and the median age has increased from 24.6 years in 1970 to 28.0 years in 1980. By 2005, the median age is projected at 34.7 years.

Household Size

Oahu households averaged 3.15 persons in 1980 and continue to be significantly larger than the national average of 2.76 persons. However, the average Oahu household size has decreased from an average of 3.6 persons per household in 1970 to 3.15 persons in 1980. This trend is expected to continue.

Employment

Labor force participation on Oahu is higher than national averages. On Oahu, 60.2% of the eligible population over 16 years of age were in the work force in 1980 compared to 63.8% nationally. Labor force participation in Hawaii has also increased by more than 2% from a decade earlier.

Female labor force participation rates on Oahu have increased by almost 2% over the last decade. These rates are significantly higher than national averages. In 1980, 58.3% of the working age female population of Oahu participated in the labor force compared to 51.5% for the United States as a whole. These higher participation rates for women are partially attributed to the relatively higher cost of living and housing in Hawaii.

NORTH SHORE REGION

Makaha is located within the northwestern end of Oahu. This area is described by the City and County of Honolulu as the North Shore development plan area and is the primary impact region for any development.

The North Shore region includes the northwest portion of the island, extending from Kahuku Point to Kaena Point. Residential developments on the North Shore include Sunset Beach, Waimea, Papikuni, Haleiwa and Waialua.

The North Shore region is rural in character. It consists mainly of primary residences within a few blocks of Farrington and Kamehameha Highways, interspersed with freestanding commercial buildings.
NOKULELEA

HDC proposes to develop about 2,900 acres in Nokulele. Preliminary development concepts, now under study, envision a master-planned, recreation-oriented community, to include:

- Hotels
- Multi-family condominium units
- Residential units
- Commercial facilities
- Golf course
- Related recreational facilities and amenities

The plan considers the existing character of and addresses specific development for Nokulele and the North Shore Community. The following sections describe these preliminary development concepts, location and description, tentative master plan, access and area attractions.

Preliminary Development Concepts

A tentative land use plan for Nokulele has been proposed. Based on this plan, Nokulele is envisioned to be a recreational community in a relatively rural, low-density environment. HDC proposed to orient land uses and facilities to serve residents in the adjoining communities as well as others on Oahu.

The development would offer a variety of facilities and services to meet the majority of residents' and guests' needs for lodging, dining, recreation, entertainment and relaxation.

The location and recreation-orientation of Nokulele is unlike any existing area in Hawaii. The concepts envisioned for the area incorporate land uses and amenities similar to major resort destination areas on the neighbor islands. However, the Oahu location offers greater accessibility to Oahu residents.

Location and Description

Nokulele is located near the northeastern point of Oahu. The 2,900-acre property is divided by Farrington Highway, the major traffic artery in the area.

The makai (oceanside) portion of the site consists of four non-contiguous parcels totaling about 700 acres. While relatively narrow, the sites have about 1.3 miles of ocean frontage along white sand beaches.

The mauka (mountain-side) portion of the site contains about 2,200 acres. About 890 of these acres are on a low-lying plane that slopes gently from sea level to about 300 feet over a distance of about a mile. Beyond, as the property ascends towards the Waianae Mountain range, the vegetation shifts from the typical ranch scrub foliage and becomes more lush. In addition, excellent ocean views are afforded towards the coastline.

An access easement in favor of Castle and Cooke, Inc. extends across a portion of the mauka site.

The site is bounded to the east by lands cultivated in sugar, to the west by the Bilingham Air Field, to the south by the Waianae Mountain range, and to the north by the Pacific Ocean.

The Maluia Sugar Company is adjacent to the site and has maintained a climatological research station for a number of years. The records reveal:

- Average annual temperature has been 73.5°F with the average monthly temperature never dropping below 70°F.
- Rainfall at the station averages about 30 inches a year. As for most of Hawaii, rainfall is higher in the upper elevations, providing a consistent source of ground water. The coastal areas are predominantly sunny and dry.
- The prevailing breezes are tradewinds from the east-northeast. During the evenings, the wind pattern changes direction and blows from off the Koolau and Waianae Mountain ranges.

Tentative Development Plan

Nokulele is tentatively planned to include 4,000 hotel and residential units and ancillary recreational facilities and amenities. The major components of the community are listed in Exhibit II-8.

The tentative land use plan is shown in Exhibit II-C and the conceptual plan in Exhibit II-D. Sites have been configured to optimize ocean views, golf course frontage, and harmony between neighboring land uses. As presently planned, Nokulele has a low development density with about 2,300 acres or about 8% of the total land area devoted to open of greenbelt areas. The proposed plan compliments and maintains the rural environment in the North Shore area.
MOKULEIA
Proposed Master Plan Units and Area
At Completion

<table>
<thead>
<tr>
<th>Units</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal land uses:</td>
<td></td>
</tr>
<tr>
<td>Hotels</td>
<td>2,100</td>
</tr>
<tr>
<td>Condominium units</td>
<td>1,200</td>
</tr>
<tr>
<td>Residential units</td>
<td>700</td>
</tr>
<tr>
<td>Total</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Other land uses:
- Commercial complex: 33
- Two 18-hole golf courses with clubhouse: 362

Potential land uses:
- Polo field
- Hiking trails
- Camping areas
- Sports center
- Tennis ranch

1/ Preliminary.
2/ Combined acreage.
Source: Mokuleia Development Corporation.
Access

Primary access between Mokuleia and Honolulu is provided via the H-2 Freeway and Kanehameha and Farrington Highways, the only arterials to the area.

Kanehameha Highway is a two-lane highway which extends from the H-2 Freeway and passes through Wahlua, Haleiwa, and along the Windward coastline.

Farrington Highway extends from a point south of Weed Junction, paralleling the ocean, and terminates about six miles west of Mokuleia.

The airport is about 28 miles from Mokuleia, or 30 to 40 minutes by car. By comparison, the Waikiki, Kama'opili, Kapalua, and Turtle Bay resort areas are located 10, 28, 32, and 38 miles, respectively, from the nearest major airports.
### III - HAWAII VISITOR INDUSTRY REVIEW

This section presents an overview of trends in the visitor industry in the State of Hawaii and on Oahu. In addition, major resorts on Oahu and the neighbor island are reviewed to provide a perspective for the potential market position for hotel development at Hokuleia.

#### STATE OF HAWAII VISITOR TRENDS

Visitors are one of the two largest sources of income and employment for Hawaii. For statistical purposes, the Hawaii Visitors Bureau (HVB) separates overnight visitors to the State in terms of travel direction. Westbound visitors include those arriving from North America while eastbound visitors include those from Asia primarily Japan and the Pacific. Recent trends in the visitor industry in the State and neighbor islands of Hawaii are reviewed in this section.

#### Historical Visitor Arrivals

In 1983 visitor arrivals to the State totalled nearly 9.9 million, only 0.3% above total arrivals in 1984. Growth in visitor arrivals to the State has declined during the past 25 years, as shown in Exhibit III-A. This downward trend in growth is due primarily to the increasing visitor base and the maturity of the State as a visitor destination.

Westbound visitors continue to represent the majority of the arrivals to the State, averaging between 75% and 82% to total arrivals during the past 10 years, as shown in Exhibit III-B.

Growth in westbound visitor arrivals has declined from an average rate of 18.1% per year between 1960 and 1970, to 8.7% per year between 1970 and 1980, and to 4.8% between 1980 and 1983. The smaller eastbound segment of visitor arrivals has grown at less than westbound arrivals, with average annual increases of 9.9% between 1960 and 1970, 7.8% between 1970 and 1980, and 5.7% between 1980 and 1983.

In 1983 visitor arrivals were severely curtailed by the 29-day long United Airlines strike in May and June. Losses in westbound arrivals were partially offset by healthy growth in eastbound visitor arrivals, resulting in total year-end visitor arrivals nearly identical to 1984 levels.

### Exhibit III-A

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitor Arrivals (Million)</th>
<th>Percentage Increase</th>
<th>Increase (Million)</th>
<th>Total (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>9.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>9.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Exhibit III-B

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitor Arrivals (Million)</th>
<th>Percentage Increase</th>
<th>Increase (Million)</th>
<th>Total (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HOKULEA
Westbound Visitor Arrivals to Oahu
1970 to 1985

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Visitors</th>
<th>Westbound Visitors</th>
<th>Percent of State Visitors</th>
<th>Percent Increase (Decrease) since Previous Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1,246,970</td>
<td>94.0%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1,889,790</td>
<td>85.6%</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>2,398,740</td>
<td>78.7%</td>
<td>(5.7)</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>2,398,480</td>
<td>80.6%</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>2,599,190</td>
<td>79.0%</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>2,901,320</td>
<td>78.0%</td>
<td>11.9</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>2,818,950</td>
<td>76.2%</td>
<td>(2.8)</td>
<td></td>
</tr>
</tbody>
</table>

Compound annual percentage increase - 1970 to 1985: 5.6%

Oahu Visitor Arrivals
In 1985 Oahu attracted about 76% of all westbound visitors, as shown in Exhibit III-C. However, this is down from 1970, when Oahu captured 94% of the westbound visitor market.

Oahu is expected to continue to be the most visited island; however, an increasing share of the State's guests could be expected to also visit the neighbor islands or forego Oahu entirely. This trend could be slowed with the development of major destination resorts on Oahu that offer both first-time and repeat visitors an alternative to staying in Waikiki.

Neighbor Island Visitor Arrivals
Westbound visitor arrivals have grown at a faster rate on the neighbor islands than on Oahu. Since 1970, the neighbor Islands have had an average growth rate of 6.31 per year, compared to 5.01 per year on Oahu, as shown in Exhibit III-C. Increased travel to the neighbor Islands result from:

- Greater development of integrated resort destinations on the neighbor islands.
- Increasing numbers of repeat visitors to the State seeking new vacation experiences.
- Increased air service including direct flights from major mainland cities to the neighbor Islands.
- Decline in new visitor facilities and the aging of existing facilities on Oahu.

On the Islands of Maui, Kauai and Hawaii, major destination resorts have been developed with hotel, condominium and single-family accommodations, golf courses, tennis facilities and other master-planned amenities. In addition, outer island resorts offer repeat visitors new destinations in Hawaii with different visitor attractions and a resort life style.

The neighbor islands have been able to capture an increasingly larger share of total visitor arrivals because they have demonstrated their responsiveness to the changing needs of the visitor for newer vacation experiences. With Oahu's existing visitor plant aging and the neighbor island resorts growing in prominence and recognition, the neighbor Islands are anticipated to continue to capture a growing share of total visitor arrivals.

Source: Figures represent all overnight and longer westbound visitors to and beyond Hawaii as reported by the Hawaii Visitors Bureau, Annual Research Report, annual; and First Hawaiian Bank, Economic Indicators, January/Feburary 1986.
HOULEIA
Westbound Visitors to the Neighbor Islands
1970 to 1985

<table>
<thead>
<tr>
<th>Year</th>
<th>Neighbor Islands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oahu</td>
</tr>
<tr>
<td>1970</td>
<td>1,264,970</td>
</tr>
<tr>
<td>1975</td>
<td>1,089,799</td>
</tr>
<tr>
<td>1980</td>
<td>2,398,740</td>
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<tr>
<td>1981</td>
<td>2,398,480</td>
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<td>1982</td>
<td>2,389,199</td>
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<td>1983</td>
<td>2,391,635</td>
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<td>1984</td>
<td>2,901,320</td>
</tr>
<tr>
<td>1985</td>
<td>2,818,950</td>
</tr>
</tbody>
</table>

Compound annual percentage increase - 1970 to 1985: 3.3% 3.0% 9.8% 4.8% 4.2%

VISITOR CHARACTERISTICS

Most westbound visitors travel to Hawaii for vacations. In 1984, over 90% of the westbound travel to the State was for pleasure or business and pleasure, as shown in Exhibit III-B.

Westbound visitors have typically traveled to Hawaii independent of interisland travel. Independent travelers averaged about 75% of total visitors since 1970, also shown in the exhibit.

Hotels continue to serve the majority of visitors for accommodations. Since 1975, condominiums have been growing in popularity as an alternative, increasing from less than 12% in 1975 to nearly 20% in 1984.

The average length of stay in the State has remained relatively stable over the last ten years at approximately ten days. By island, length of stay is longest on Oahu at 17 days and shortest on the Island of Hawaii at 10 days. Maui has shown the greatest nominal growth in length of stay, increasing by 2.5 days from 1970 to 1984. It currently averages 6.5 days.

Average persons per party has slowly increased from 1.74 persons in 1975 to 1.86 persons in 1984. This increase may be attributable to more family groups and easier access to the State from mainland destinations.

Visitors aged 30 to 49 were by far the largest age group to visit Hawaii, representing nearly 40% of all westbound arrivals in 1984, as shown in Exhibit III-E. Next largest is the 20 to 29 age group which accounted for approximately 18% in 1984.

Persons in professional and technical occupations were the largest employment segment to visit the State in 1984. This group represented about 36% of visitors. They were followed by visitors in business, managerial, and technical occupations, 25.2%.

About half of Hawaii’s visitors are first-time visitors to the State, as also shown in the exhibit. Repeat visitors have increased from only 33% in 1970 to 62% in 1984.

Westbound visitors to the State typically reside in the continental United States. The largest segment is residents of the West Coast States and Alaska, representing 36% of all westbound visitors. Foreign visitors were primarily Japanese and Canadian citizens. During recent years, foreign visitor arrivals have declined due to the relatively stronger U.S. dollar.

Source: Includes westbound visitors to and beyond Hawaii, as reported by the Hawaii Visitors Bureau, Annual Reports; annual Hawaii Visitors Bureau, Research Reports; Decembers 1983, and First Hawaiian Bank Research Department, Economic Indicators, January/February 1984.
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### Exhibit III-D: Travel Patterns of Westbound Visitors 1970 to 1984

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure</td>
<td>74.6</td>
<td>76.4</td>
<td>75.4</td>
<td>79.7</td>
</tr>
<tr>
<td>Business</td>
<td>3.8</td>
<td>3.8</td>
<td>2.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Business and pleasure</td>
<td>9.9</td>
<td>10.7</td>
<td>13.3</td>
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<td>Military and government</td>
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<td>.3</td>
<td>.4</td>
<td>.5</td>
</tr>
<tr>
<td>Relatives</td>
<td>6.3</td>
<td>3.7</td>
<td>4.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Convention</td>
<td>4.3</td>
<td>6.2</td>
<td>3.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Other</td>
<td>.3</td>
<td>.1</td>
<td>.4</td>
<td>.4</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Group</td>
<td>21.9</td>
<td>45.1</td>
<td>23.9</td>
<td>18.8</td>
</tr>
<tr>
<td>Individual</td>
<td>77.5</td>
<td>54.6</td>
<td>72.0</td>
<td>73.0</td>
</tr>
<tr>
<td>Incentive</td>
<td>.6</td>
<td>.3</td>
<td>.4</td>
<td>.5</td>
</tr>
<tr>
<td>Government - military</td>
<td>.6</td>
<td>.3</td>
<td>.4</td>
<td>.5</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel or apartment hotel</td>
<td>84.7</td>
<td>91.7</td>
<td>71.2</td>
<td>69.1</td>
</tr>
<tr>
<td>Rented home or apartment condominium</td>
<td>.8</td>
<td>.5</td>
<td>16.4</td>
<td>19.6</td>
</tr>
<tr>
<td>Friends or relatives</td>
<td>12.6</td>
<td>6.8</td>
<td>10.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Others</td>
<td>2.4</td>
<td>1.0</td>
<td>1.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons per party</td>
<td>1.5</td>
<td>1.7</td>
<td>1.7</td>
<td>1.8</td>
</tr>
</tbody>
</table>

### Exhibit III-E: Demographic Characteristics of Westbound Visitors to Hawaii 1970 to 1984

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>11.6</td>
<td>9.2</td>
<td>10.2</td>
<td>10.9</td>
</tr>
<tr>
<td>20 - 29</td>
<td>22.9</td>
<td>16.7</td>
<td>17.6</td>
<td>18.1</td>
</tr>
<tr>
<td>30 - 49</td>
<td>34.0</td>
<td>36.0</td>
<td>38.0</td>
<td>39.4</td>
</tr>
<tr>
<td>50 - 69</td>
<td>18.2</td>
<td>22.8</td>
<td>19.4</td>
<td>15.9</td>
</tr>
<tr>
<td>60 and over</td>
<td>13.0</td>
<td>14.9</td>
<td>16.3</td>
<td>15.7</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

| Median age | 40.7 | 44.5 | 41.3 | 40.1 |

<table>
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Professional and technical</td>
<td>27.9</td>
<td>33.5</td>
<td>35.8</td>
<td>36.3</td>
</tr>
<tr>
<td>Business, managerial and official</td>
<td>21.6</td>
<td>26.9</td>
<td>26.2</td>
<td>25.2</td>
</tr>
<tr>
<td>Clerical, office and sales</td>
<td>12.2</td>
<td>11.2</td>
<td>9.7</td>
<td>9.6</td>
</tr>
<tr>
<td>Military and dependents</td>
<td>13.7</td>
<td>9.9</td>
<td>1.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Other employed</td>
<td>7.3</td>
<td>12.2</td>
<td>11.5</td>
<td>13.6</td>
</tr>
<tr>
<td>Retired</td>
<td>9.3</td>
<td>7.0</td>
<td>8.2</td>
<td>7.0</td>
</tr>
<tr>
<td>Students and unemployed</td>
<td>9.3</td>
<td>7.0</td>
<td>8.2</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>62.2</td>
<td>60.3</td>
<td>51.6</td>
<td>52.7</td>
</tr>
<tr>
<td>Second</td>
<td>14.7</td>
<td>17.1</td>
<td>18.6</td>
<td>18.6</td>
</tr>
<tr>
<td>Third</td>
<td>9.6</td>
<td>7.2</td>
<td>9.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Fourth</td>
<td>12.5</td>
<td>15.4</td>
<td>20.3</td>
<td>20.1</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

| Repeat visitors | 32.8 | 39.7 | 48.4 | 47.3 |

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States:</td>
<td>33.4</td>
<td>24.8</td>
<td>30.6</td>
<td>27.2</td>
</tr>
<tr>
<td>California</td>
<td>8.6</td>
<td>9.7</td>
<td>10.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Other Pacific Coast</td>
<td>5.7</td>
<td>5.2</td>
<td>6.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Mountain</td>
<td>26.7</td>
<td>29.2</td>
<td>23.4</td>
<td>28.6</td>
</tr>
<tr>
<td>Central</td>
<td>20.6</td>
<td>19.0</td>
<td>16.9</td>
<td>19.7</td>
</tr>
<tr>
<td>Atlantic</td>
<td>9.4</td>
<td>8.7</td>
<td>8.7</td>
<td>9.0</td>
</tr>
<tr>
<td>Canada</td>
<td>5.0</td>
<td>11.0</td>
<td>11.0</td>
<td>8.6</td>
</tr>
<tr>
<td>Other foreign</td>
<td>1.6</td>
<td>1.1</td>
<td>1.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Source
VISITOR MARKET SEGMENTS

Visitors may be distinguished by their travel status. The five major segments of Hawaii's visitor market are described as follows:

- **Free independent travelers (FITs)** - These travelers typically have higher-than-average incomes and patronize the higher-priced visitor accommodations. These travelers are often repeat visitors who are familiar with the State.

- **Group tour travelers** - The group traveler market includes tour and convention-oriented visitor packages. In contrast to FITs, the group travelers, also known as group inclusive travelers (GIT), have declined as a percent of westbound visitors over the last decade.

- **Convention attendees** - The convention market consists of groups meeting in Hawaii for meetings or conventions. The convention market is quite irregular, as a large meeting can distort figures for a given year.

- **Incentive travelers** - The incentive group market represents a small but sought-after market segment. It consists of management personnel and executives who are given expense paid trips as bonuses or incentives. This group usually has high income, a higher propensity to return as visitors, spends more money and frequents more expensive restaurants and hotel accommodations.

- **Government and military visitors** - This group typically represents less than 1% of overnight visitors to the islands and are not considered in further detail.

In summary, FITs account for the largest market segment, representing over 73% of westbound visitors, as shown in Exhibit III-F. The lastest rates of growth were experienced by incentive groups at 18.4% and FITs at 18%. In contrast, convention travelers have remained relatively stable, while group and other travelers have declined by 1.1% and 1.8%, respectively, as also shown in the exhibit.

VISITOR EXPENDITURES

Visitor expenditures in the State totaled over $4.5 billion in 1984 and have shown double-digit increases every year since 1979, except for 1983, as shown in Exhibit III-G. Expenditures per visitor have also increased but at a slower rate than total visitor expenditures.
EXHIBIT III-C

**HOKULEIA**

**Visitor Expenditures in Hawaii**

1970 to 1984

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Amount (billions)</th>
<th>Annual Increase</th>
<th>Per Visitor Amount</th>
<th>Annual Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>$0.565</td>
<td>-2</td>
<td>824</td>
<td>-2</td>
</tr>
<tr>
<td>1975</td>
<td>1.860</td>
<td>18.0</td>
<td>401</td>
<td>7.1</td>
</tr>
<tr>
<td>1980</td>
<td>2.875</td>
<td>16.2</td>
<td>731</td>
<td>14.0</td>
</tr>
<tr>
<td>1981</td>
<td>3.200</td>
<td>11.3</td>
<td>813</td>
<td>11.2</td>
</tr>
<tr>
<td>1982</td>
<td>3.700</td>
<td>15.4</td>
<td>872</td>
<td>7.3</td>
</tr>
<tr>
<td>1983</td>
<td>3.971</td>
<td>7.4</td>
<td>910</td>
<td>4.4</td>
</tr>
<tr>
<td>1984</td>
<td>4.382</td>
<td>13.3</td>
<td>903</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Westbound and eastbound visitor spending patterns vary significantly. Visitor expenditure surveys conducted by HVB indicate that Japanese visitors spend significantly more per day than do all other visitors. In 1983, the average daily expenditure for Japanese visitors was $227, about 160% more than the $86 spent by all other visitors.

Spending patterns are influenced by the relatively shorter average length of stay of eastbound visitors (in 1983, 4.9 days compared to 10.3 days for westbound visitors). Also, those who visit Oahu only tend to spend less than visitors to the State as a whole. According to statistics provided by the HVB, the relatively greater expenditures made by neighbor island visitors are due to expenditures for lodging, ground transportation, and tours.

**PROJECTED VISITOR ARRIVALS**

This section reviews visitor arrival projections to the State of Hawaii and Oahu.

**State of Hawaii**

Hawaii's position in the world market has been enhanced in recent years because of the:

- Growing number of alternative visitor destination in the State which appeal to a wide variety of visitors.
- Lower airfares making travel to Hawaii more affordable.
- Increased advertising and publicity effort by hotels, resorts, and visitor associations to promote the vacation experience in Hawaii.
- International conflicts and tension which have made travel to Europe and the Mediterranean less attractive than in the past.
- Deregulation of Japanese overseas air service which increased competition among Japanese air carriers for air service between Japan, Hawaii, and the mainland United States.

Westbound and eastbound visitor arrivals to the State of Hawaii over the next 20 years are based on projections by the Department of Planning and Economic Development (DPED), prepared in July 1984. Based on these projections, westbound and eastbound visitor arrivals to the State are expected to increase at a slower than historical rate of growth. This slower rate is based on the relative maturity of Hawaii as a visitor destination, as reflected by the declining rates of growth of visitor arrivals between 1960 and 1985, as previously shown in Exhibit III-A. According to DPED, total visitor arrivals to the State were projected at 6.1 million by 1990, 7.1 million by 1995, 7.8 million by 2000, and 8.3 million by 2005, as shown in Exhibit III-H. This represents an average growth rate of about 2.51% compounded annually over the next 20 years.

Oahu

Oahu visitor arrivals are projected as a percentage of visitor arrivals to the State and are also presented in Exhibit III-H. A decreasing proportion of the State’s visitors are projected to visit Oahu.

Over the next 20 years, the percentage of State visitors staying overnight on Oahu is projected to decline by about 85% to a 70% share of total State visitors. Eastbound visitors to Oahu are projected to fall from almost 100% of visitors to the State in 1985 to about 95% in 2002. Stabilization in Oahu’s market share could result from increasing resort development on Oahu which provides the type of vacation experience currently found on the neighbor islands.

Visitors to Oahu are projected to increase by about 2.1% annually through 2005, up to 7.2% for the State. Oahu visitors are estimated to increase by about 100% from about 4 million in 1985 to 6.2 million by the year 2005. Of this number, westbound arrivals are projected to account for about 80%, while eastbound arrivals are projected to account for about 32%.

RESORTS IN HAWAII

A resort is a self-contained community which provides a variety of facilities for the accommodation, leisure, and other needs of the visitors. Resorts must be known to a sufficient number of potential visitors to attract and motivate travel in themselves.

The development concepts for Hoku Lea are not primarily a major destination resort; however, they share many characteristics with resorts in the State. This section reviews the characteristics of major resorts in Hawaii to provide a perspective as to the market position of the community at Hoku Lea.
### Historical and Projected Visitor Arrivals to the State and Oahu, 1980 to 2005

<table>
<thead>
<tr>
<th>Year</th>
<th>State</th>
<th>Oahu</th>
<th>Total Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent of State</td>
<td>Percent of Oahu</td>
<td>888,372</td>
</tr>
<tr>
<td>1980</td>
<td>1,046,132</td>
<td>78.74%</td>
<td>2,398,740</td>
</tr>
<tr>
<td>1981</td>
<td>1,076,791</td>
<td>80.66%</td>
<td>2,398,480</td>
</tr>
<tr>
<td>1982</td>
<td>1,108,319</td>
<td>79.00%</td>
<td>2,589,190</td>
</tr>
<tr>
<td>1983</td>
<td>1,192,660</td>
<td>76.33%</td>
<td>2,591,635</td>
</tr>
<tr>
<td>1984</td>
<td>1,271,880</td>
<td>78.00%</td>
<td>2,661,310</td>
</tr>
<tr>
<td>1985</td>
<td>1,699,190</td>
<td>76.44%</td>
<td>2,818,990</td>
</tr>
<tr>
<td>Projected:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>4,441,090</td>
<td>75.00%</td>
<td>5,345,850</td>
</tr>
<tr>
<td>1995</td>
<td>5,171,709</td>
<td>71.00%</td>
<td>6,054,000</td>
</tr>
<tr>
<td>2000</td>
<td>6,001,100</td>
<td>70.00%</td>
<td>6,200,000</td>
</tr>
<tr>
<td>2005</td>
<td>6,890,100</td>
<td>69.00%</td>
<td>6,740,000</td>
</tr>
</tbody>
</table>

**Compound annual percentage increase:**

- 1980 to 1985: 4.02%
- 1985 to 2005: 2.42%

---

2/ Based on the rate of decrease in Japanese visitors as reported by the Department of Planning and Economic Development, State of Hawaii.
3/ Based on the rate of decrease in Japanese visitors as reported by the Department of Planning and Economic Development, State of Hawaii, and assuming a proportionate increase in other out-of-state visitors.

Oahu Resorts

Oahu includes two existing resorts outside of Waikiki. They are:

- Turtle Bay Resort.
- Makaha Resort.

A third resort, West Beach, is planned for development in the Ewa area on Oahu.

The characteristics of the three resorts are summarized in terms of physical characteristics, existing developments, room rates and prices, market appeal, and visitor profile in Exhibit III-1. Resort development on Oahu is far more extensive than those found on the neighbor islands.

Neighbor Island Resorts

Nine major resorts are on the neighbor islands. The characteristics of these resorts are summarized in Exhibit III-J.

Resort sizes vary between 500 units or less at the Mauna Kea, Mauna Lani and Kalua Koi Resorts, and 3,500 units at Kamapali Resort.

The appeal of these resorts generally stems from the locational characteristics and scope of facilities offered. The resorts typically have good swimming beaches and offer a variety of recreational amenities including golf, tennis, and water-oriented activities.

The resorts include a variety of hotel classes, ranging from economy to luxury. Resorts on Maui, Kauai, and Molokai cater to a broad range of guests while the resorts on the Island of Hawaii are oriented at either the tourist first-class market at Kona, or the luxury market at Mauna Kea, Mauna Lani, and the proposed development at Waikoloa.

111-7
Dubuque includes the existing resorts outside of Monticello. They are:

- Allamakee Island Resort.

- Twin City Resort.

- Dubuque Resort.

**Exhibit III.1.**

<table>
<thead>
<tr>
<th>Characteristics of Dama Resorts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Resort</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Site area (acres)</td>
</tr>
<tr>
<td>Suitable from undeveloped airport</td>
</tr>
<tr>
<td>General site characteristics</td>
</tr>
<tr>
<td>Location and development</td>
</tr>
<tr>
<td>Access road and equipment</td>
</tr>
<tr>
<td>Water body and water quality</td>
</tr>
<tr>
<td>Washability and water quality</td>
</tr>
<tr>
<td>Potential and actual value</td>
</tr>
<tr>
<td>Amenities</td>
</tr>
<tr>
<td>Beach</td>
</tr>
<tr>
<td>Swimming, boating, water sports</td>
</tr>
<tr>
<td>Tennis courts</td>
</tr>
<tr>
<td>Other commercial activities</td>
</tr>
<tr>
<td>Natural developments</td>
</tr>
<tr>
<td>Marina</td>
</tr>
<tr>
<td>Boating</td>
</tr>
<tr>
<td>Commercial activities</td>
</tr>
<tr>
<td>Landscaping and landscaping</td>
</tr>
<tr>
<td>Value</td>
</tr>
<tr>
<td>Total annual value</td>
</tr>
<tr>
<td>Cost</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
</tbody>
</table>

Dubuque includes the existing resorts outside of Monticello. They are:

- Allamakee Island Resort.

- Twin City Resort.

- Dubuque Resort.

**Exhibit III.1.**

<table>
<thead>
<tr>
<th>Characteristics of Dama Resorts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Resort</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Site area (acres)</td>
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<tr>
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</tr>
<tr>
<td>General site characteristics</td>
</tr>
<tr>
<td>Location and development</td>
</tr>
<tr>
<td>Access road and equipment</td>
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<tr>
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<td>Amenities</td>
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<td>Natural developments</td>
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<td>Marina</td>
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<tr>
<td>Boating</td>
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<tr>
<td>Commercial activities</td>
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<tr>
<td>Landscaping and landscaping</td>
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<tr>
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</tr>
</tbody>
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<tr>
<th>Characteristics of Dama Resorts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Resort</strong></td>
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<tr>
<td>Site area (acres)</td>
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<td>Other commercial activities</td>
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<tr>
<td>Natural developments</td>
</tr>
<tr>
<td>Marina</td>
</tr>
<tr>
<td>Boating</td>
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<tr>
<td>Commercial activities</td>
</tr>
<tr>
<td>Landscaping and landscaping</td>
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</tr>
<tr>
<td>Cost</td>
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<tr>
<td>Typical values for annual sales</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
</tbody>
</table>

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**Exhibit III.1.**

<table>
<thead>
<tr>
<th>Characteristics of Dama Resorts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Resort</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Site area (acres)</td>
</tr>
<tr>
<td>Suitable from undeveloped airport</td>
</tr>
<tr>
<td>General site characteristics</td>
</tr>
<tr>
<td>Location and development</td>
</tr>
<tr>
<td>Access road and equipment</td>
</tr>
<tr>
<td>Water body and water quality</td>
</tr>
<tr>
<td>Washability and water quality</td>
</tr>
<tr>
<td>Potential and actual value</td>
</tr>
<tr>
<td>Amenities</td>
</tr>
<tr>
<td>Beach</td>
</tr>
<tr>
<td>Swimming, boating, water sports</td>
</tr>
<tr>
<td>Tennis courts</td>
</tr>
<tr>
<td>Other commercial activities</td>
</tr>
<tr>
<td>Natural developments</td>
</tr>
<tr>
<td>Marina</td>
</tr>
<tr>
<td>Boating</td>
</tr>
<tr>
<td>Commercial activities</td>
</tr>
<tr>
<td>Landscaping and landscaping</td>
</tr>
<tr>
<td>Value</td>
</tr>
<tr>
<td>Total annual value</td>
</tr>
<tr>
<td>Cost</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
</tbody>
</table>

Dubuque includes the existing resorts outside of Monticello. They are:

- Allamakee Island Resort.

- Twin City Resort.

- Dubuque Resort.

**Exhibit III.1.**

<table>
<thead>
<tr>
<th>Characteristics of Dama Resorts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Resort</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Site area (acres)</td>
</tr>
<tr>
<td>Suitable from undeveloped airport</td>
</tr>
<tr>
<td>General site characteristics</td>
</tr>
<tr>
<td>Location and development</td>
</tr>
<tr>
<td>Access road and equipment</td>
</tr>
<tr>
<td>Water body and water quality</td>
</tr>
<tr>
<td>Washability and water quality</td>
</tr>
<tr>
<td>Potential and actual value</td>
</tr>
<tr>
<td>Amenities</td>
</tr>
<tr>
<td>Beach</td>
</tr>
<tr>
<td>Swimming, boating, water sports</td>
</tr>
<tr>
<td>Tennis courts</td>
</tr>
<tr>
<td>Other commercial activities</td>
</tr>
<tr>
<td>Natural developments</td>
</tr>
<tr>
<td>Marina</td>
</tr>
<tr>
<td>Boating</td>
</tr>
<tr>
<td>Commercial activities</td>
</tr>
<tr>
<td>Landscaping and landscaping</td>
</tr>
<tr>
<td>Value</td>
</tr>
<tr>
<td>Total annual value</td>
</tr>
<tr>
<td>Cost</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
<tr>
<td>Typical values for annual sales</td>
</tr>
</tbody>
</table>
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
### VISITOR CHARACTERISTICS

Westbound visitors travel to Hawaii for vacations. In 1986, over 90% of the westbound travel to the State was for pleasure or business and pleasure, as shown in Exhibit III-D.

Westbound visitors have typically traveled to Hawaii independently. Independent travelers averaged about 75% of total visitors since 1975, also shown in the exhibit.

Hotels continue to serve the majority of visitors for accommodations. Since 1975, condominium units have been growing in popularity as an alternative, increasing from less than 11% in 1975 to nearly 20% in 1984.

The average length of stay in the State has remained relatively stable over the last ten years at approximately ten days. By island, length of stay is longest on Oahu at 14 days and shortest on the Island of Hawaii at 1.6 days. Maui has shown the greatest nominal growth in length of stay, increasing by 3.5 days from 1970 to 1984. It currently averages 6.5 days.

Average persons per party has slowly increased from 1.74 persons in 1975 to 1.84 persons in 1984. This increase may be attributable to more family groups and easier access to the State from mainland destinations.

Visitors aged 30 to 49 were by far the largest age group to visit Hawaii, representing nearly 40% of all westbound arrivals in 1984, as shown in Exhibit III-D. Next largest is the 20 to 29 age group which accounted for approximately 18% in 1984.

Persons in professional and technical occupations were the largest employment segment to visit the State in 1984. This group represented about 36% of visitors. They were followed by visitors in business, managerial and official occupations, 25.2%.

About half of Hawaii's visitors are first-time visitors to the State, as also shown in the exhibit. Repeat visitors have increased from only 33% in 1970 to 47% in 1984.

Westbound visitors to the State typically reside in the continental United States. The largest segment is residents of the West Coast States and Alaska, representing 35% of all westbound visitors. Foreign visitors were primarily Japanese and Canadian citizens. During recent years, foreign visitor arrivals have declined due to the relatively stronger U.S. dollar.

**HOKULEIA**  
Westbound Visitors to the Neighbor Islands  
1970 to 1985

<table>
<thead>
<tr>
<th>Year</th>
<th>Neighbor Islands</th>
<th>Oahu</th>
<th>Hawaii</th>
<th>Maui</th>
<th>Kauai</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td></td>
<td>1,246,970</td>
<td>445,401</td>
<td>447,985</td>
<td>410,075</td>
<td>1,326,135</td>
</tr>
<tr>
<td>1975</td>
<td></td>
<td>1,889,790</td>
<td>769,779</td>
<td>931,863</td>
<td>637,821</td>
<td>2,270,417</td>
</tr>
<tr>
<td>1980</td>
<td></td>
<td>2,398,740</td>
<td>761,103</td>
<td>1,378,189</td>
<td>781,609</td>
<td>3,466,132</td>
</tr>
<tr>
<td>1981</td>
<td></td>
<td>2,398,460</td>
<td>672,683</td>
<td>1,309,892</td>
<td>757,811</td>
<td>3,477,851</td>
</tr>
<tr>
<td>1982</td>
<td></td>
<td>2,589,190</td>
<td>619,170</td>
<td>1,550,080</td>
<td>757,955</td>
<td>3,778,515</td>
</tr>
<tr>
<td>1983</td>
<td></td>
<td>2,591,635</td>
<td>712,380</td>
<td>1,644,605</td>
<td>691,940</td>
<td>3,395,880</td>
</tr>
<tr>
<td>1984</td>
<td></td>
<td>2,501,320</td>
<td>756,890</td>
<td>1,849,800</td>
<td>806,620</td>
<td>3,721,300</td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td>2,818,950</td>
<td>695,340</td>
<td>1,626,980</td>
<td>830,380</td>
<td>3,699,440</td>
</tr>
</tbody>
</table>

Compound annual percentage increase - 1970 to 1985: 3.3% 3.01% 9.01% 4.82% 4.2%

Source: Includes westbound visitors to and beyond Hawaii, as reported by the Hawaii Visitors Bureau, Annual Research Reports, annual; Hawaii Visitors Bureau, Research Report, December 1985; and First Hawaiian Bank Research Department, Economic Indicators, January/February 1986.
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### Exhibit III-D

**MOKULUA**  
**Travel Patterns of Westbound Visitors**  
1970 to 1986

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure</td>
<td>74.6%</td>
<td>76.4%</td>
<td>75.6%</td>
<td>79.7%</td>
</tr>
<tr>
<td>Business</td>
<td>3.8%</td>
<td>2.6%</td>
<td>2.9%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Business and pleasure</td>
<td>9.9%</td>
<td>10.7%</td>
<td>13.3%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Military and government</td>
<td>0.6%</td>
<td>0.3%</td>
<td>0.4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Relatives</td>
<td>6.3%</td>
<td>6.7%</td>
<td>6.1%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Convention</td>
<td>4.5%</td>
<td>6.2%</td>
<td>3.5%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Other</td>
<td>0.2%</td>
<td>0.1%</td>
<td>0.8%</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>21.9%</td>
<td>45.1%</td>
<td>23.9%</td>
<td>18.8%</td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>77.5%</td>
<td>54.6%</td>
<td>72.8%</td>
<td>75.0%</td>
<td></td>
</tr>
<tr>
<td>Incentive</td>
<td></td>
<td></td>
<td>3.7%</td>
<td>5.7%</td>
<td></td>
</tr>
<tr>
<td>Government - military</td>
<td>0.6%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel or apartment hotel</td>
<td>84.2%</td>
<td>91.7%</td>
<td>71.2%</td>
<td>69.1%</td>
</tr>
<tr>
<td>Ersed home or apartment condominium</td>
<td>8.0%</td>
<td>5.5%</td>
<td>16.6%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Friends or relatives</td>
<td>12.0%</td>
<td>6.8%</td>
<td>10.6%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Others</td>
<td>2.0%</td>
<td>1.0%</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Persons per party</td>
<td>1.35</td>
<td>1.76</td>
<td>1.79</td>
<td>1.64</td>
</tr>
</tbody>
</table>

### Exhibit III-E

**MOKULUA**  
**Demographic Characteristics of Westbound Visitors to Hawaii**  
1970 to 1984

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>11.6%</td>
<td>9.2%</td>
<td>10.5%</td>
<td>10.9%</td>
</tr>
<tr>
<td>20 - 29</td>
<td>36.0%</td>
<td>36.0%</td>
<td>38.0%</td>
<td>39.6%</td>
</tr>
<tr>
<td>30 - 49</td>
<td>18.9%</td>
<td>27.8%</td>
<td>19.4%</td>
<td>15.9%</td>
</tr>
<tr>
<td>50 and older</td>
<td>15.0%</td>
<td>15.0%</td>
<td>14.5%</td>
<td>15.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40.7</td>
<td>44.5</td>
<td>41.3</td>
<td>40.1</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional and technical</td>
<td>27.9%</td>
<td>33.5%</td>
<td>35.8%</td>
<td>36.3%</td>
</tr>
<tr>
<td>Business, managerial and official</td>
<td>21.6%</td>
<td>26.9%</td>
<td>26.2%</td>
<td>25.2%</td>
</tr>
<tr>
<td>Clerical, office and sales</td>
<td>12.2%</td>
<td>11.2%</td>
<td>9.7%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Military and dependents</td>
<td>13.7%</td>
<td>9.9%</td>
<td>1.0%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Other employed</td>
<td>7.2%</td>
<td>8.0%</td>
<td>7.6%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Retired</td>
<td>7.6%</td>
<td>12.5%</td>
<td>11.5%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Students and unemployed</td>
<td>9.8%</td>
<td>7.0%</td>
<td>8.2%</td>
<td>7.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>67.2%</td>
<td>60.3%</td>
<td>51.6%</td>
<td>52.7%</td>
</tr>
<tr>
<td>Second</td>
<td>14.7%</td>
<td>17.1%</td>
<td>18.6%</td>
<td>18.6%</td>
</tr>
<tr>
<td>Third</td>
<td>5.6%</td>
<td>7.2%</td>
<td>9.1%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Fourth</td>
<td>12.5%</td>
<td>15.6%</td>
<td>20.5%</td>
<td>20.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California:</td>
<td>33.4%</td>
<td>24.8%</td>
<td>30.6%</td>
<td>27.2%</td>
</tr>
<tr>
<td>Other Pacific Coast</td>
<td>8.6%</td>
<td>9.7%</td>
<td>10.1%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Mountain:</td>
<td>5.7%</td>
<td>5.2%</td>
<td>6.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Central:</td>
<td>26.7%</td>
<td>29.2%</td>
<td>23.6%</td>
<td>28.4%</td>
</tr>
<tr>
<td>Atlantic:</td>
<td>20.6%</td>
<td>19.0%</td>
<td>16.9%</td>
<td>19.7%</td>
</tr>
<tr>
<td>Canada:</td>
<td>9.6%</td>
<td>8.7%</td>
<td>9.7%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Other foreign:</td>
<td>5.0%</td>
<td>11.0%</td>
<td>11.0%</td>
<td>8.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Notes
- Represents percentage of westbound visitors to and beyond Hawaii.
- Source: Hawaii Visitors Bureau, Annual Research Reports, annual.
**Hawaii**

**Visitor Expenditures in Hawaii**

1970 to 1984

<table>
<thead>
<tr>
<th>Year</th>
<th>Total (Billions)</th>
<th>Annual Increase</th>
<th>Per Visitor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td></td>
<td>Amount</td>
</tr>
<tr>
<td>1970</td>
<td>$0.593</td>
<td>-2</td>
<td>$341</td>
</tr>
<tr>
<td>1975</td>
<td>1.360</td>
<td>18.0</td>
<td>481</td>
</tr>
<tr>
<td>1980</td>
<td>2.075</td>
<td>16.8</td>
<td>731</td>
</tr>
<tr>
<td>1981</td>
<td>3.200</td>
<td>11.3</td>
<td>813</td>
</tr>
<tr>
<td>1982</td>
<td>3.700</td>
<td>15.6</td>
<td>872</td>
</tr>
<tr>
<td>1983</td>
<td>3.914</td>
<td>7.4</td>
<td>910</td>
</tr>
<tr>
<td>1984</td>
<td>4.582</td>
<td>15.3</td>
<td>943</td>
</tr>
</tbody>
</table>

Westbound and eastbound visitor spending patterns vary significantly. Visitor expenditure surveys conducted by HVB indicate that Japanese visitors spend significantly more per day than do all other visitors. In 1983, the average daily expenditure for Japanese visitors was $227, about 1.6 times more than the $162 spent by all other visitors.

Spending patterns are influenced by the relatively shorter average length of stay of eastbound visitors (in 1982, 4.9 days compared to 10.3 days for westbound visitors). Also, those who visit Oahu only tend to spend less than visitors to the State as a whole. According to statistics provided by the HVB, the relatively greater expenditures made by neighbor island visitors are due to expenditures for lodging, ground transportation, and tours.

**PROJECTED VISITOR ARRIVALS**

This section reviews visitor arrival projections to the State of Hawaii and Oahu.

**State of Hawaii**

Hawaii's position in the world market has been enhanced in recent years because of the:

- Growing number of alternative visitor destination in the State which appeal to a wide variety of visitors.
- Lower airfares making travel to Hawaii more affordable.
- Increased advertising and publicity effort by hotels, resorts, and visitor associations to promote the vacation experience in Hawaii.
- International conflicts and tension which have made travel to Europe and the Mediterranean less attractive than in the past.
- Deregulation of Japanese overseas air service which increased competition among Japanese air carriers for air service between Japan, Hawaii, and the mainland United States.

<table>
<thead>
<tr>
<th>Year</th>
<th>Westbound Historical</th>
<th>Eastbound Historical</th>
<th>Total Visitors Historical</th>
<th>Westbound Projected</th>
<th>Eastbound Projected</th>
<th>Total Visitors Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State</td>
<td>Oahu</td>
<td></td>
<td>State</td>
<td>Oahu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1980</td>
<td>3,046,132</td>
<td>2,398,760</td>
<td>888,372</td>
<td>99.6%</td>
<td>3,385,504</td>
</tr>
<tr>
<td></td>
<td>1981</td>
<td>2,976,791</td>
<td>2,398,460</td>
<td>599,331</td>
<td>99.7%</td>
<td>3,307,722</td>
</tr>
<tr>
<td></td>
<td>1982</td>
<td>2,889,109</td>
<td>2,398,190</td>
<td>490,919</td>
<td>99.6%</td>
<td>3,180,098</td>
</tr>
<tr>
<td></td>
<td>1983</td>
<td>2,695,680</td>
<td>2,397,635</td>
<td>398,045</td>
<td>99.5%</td>
<td>3,093,715</td>
</tr>
<tr>
<td></td>
<td>1984</td>
<td>2,511,300</td>
<td>2,396,122</td>
<td>1,114,180</td>
<td>99.5%</td>
<td>2,925,422</td>
</tr>
<tr>
<td></td>
<td>1985</td>
<td>2,499,640</td>
<td>2,395,950</td>
<td>1,170,990</td>
<td>99.0%</td>
<td>2,885,630</td>
</tr>
</tbody>
</table>

**Compound annual percentage increase:**

- **State:** 4.02%
- **Oahu:** 2.24%

**Sources:**
1) Estimated based on surveys of Japanese visitors to Oahu as reported by the Hawaii Visitors Bureau, Annual Research Reports, 1980 and 1983.
2) Based on the rate of increase of non-Japanese visitors as projected by the Department of Planning and Economic Development, State of Hawaii, and assuming a proportionate increase to other eastbound visitors.
3) Based on the rate of increase of Japanese visitors as projected by the Department of Planning and Economic Development, State of Hawaii, and assuming a proportionate increase to other eastbound visitors.

**Notes:**
- Historical data represents the period from 1980 to 1985.
- Projected data is based on trends from 1985 to 2005.

IV - HOTEL MARKET ASSESSMENT

This section reviews market trends in the hotel industry in the State of Hawaii and the Island of Oahu and assesses the market support for hotel development at Mokuleia in terms of anticipated occupancy and average room rates for the first five years of operation.

VISITOR ACCOMMODATIONS INVENTORY

Almost 96% of Hawaii's visitors stay in hotels or condominium units used as transient visitor accommodations. The inventory of visitor accommodations in Hawaii is described in terms of its current and planned size and composition. Oahu's existing and planned inventory is also discussed.

Current Inventory

Visitor accommodations in the State include hotel rooms and condominium units available for transient use. According to the Hawaii Visitors Bureau (HVB), 65,900 visitor accommodations in 485 visitor facilities exist in Hawaii, as shown in Exhibit IV-A. This inventory represents an increase of 14% since 1970, an increase of about 62% annually. Rooms on Oahu grew the fastest at a rate of about 11.5% compounded annually, or about twice the rate experienced by the State as a whole. In comparison, the other counties experienced a visitor room growth of between 5% and 6% compounded annually.

Visitor accommodations on the neighbor islands have been significantly upgraded in recent years, primarily because of the expansion of facilities at existing and emerging master-planned resorts.

Composition of Existing Visitor Accommodations

Condominium units are becoming an increasingly important alternative to hotel rooms as visitor accommodations. Currently, about 21,800 condominium units, or 33% of the State's visitor units, are used by visitors. Kailua and Hau'ula have the highest proportions of their condominium units, about 92% and 87%, respectively, used as visitor accommodations, as shown in Exhibit IV-B.

Exhibit IV-A

MOKULEIA
Visitor Rooms, State of Hawaii 1/1970 to 1985

<table>
<thead>
<tr>
<th>Year</th>
<th>Honolulu</th>
<th>Hawaii</th>
<th>Kauai</th>
<th>Maui</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>19,050</td>
<td>3,182</td>
<td>2,567</td>
<td>2,720</td>
<td>27,519</td>
</tr>
<tr>
<td>1975</td>
<td>23,628</td>
<td>5,306</td>
<td>3,145</td>
<td>6,018</td>
<td>39,997</td>
</tr>
<tr>
<td>1976</td>
<td>25,773</td>
<td>5,376</td>
<td>3,726</td>
<td>7,278</td>
<td>42,713</td>
</tr>
<tr>
<td>1977</td>
<td>27,523</td>
<td>6,051</td>
<td>3,888</td>
<td>8,387</td>
<td>46,943</td>
</tr>
<tr>
<td>1978</td>
<td>29,133</td>
<td>6,694</td>
<td>4,097</td>
<td>8,688</td>
<td>48,634</td>
</tr>
<tr>
<td>1979</td>
<td>31,111</td>
<td>6,536</td>
<td>4,066</td>
<td>9,024</td>
<td>51,045</td>
</tr>
<tr>
<td>1980</td>
<td>34,293</td>
<td>6,360</td>
<td>4,423</td>
<td>10,483</td>
<td>55,571</td>
</tr>
<tr>
<td>1981</td>
<td>33,566</td>
<td>6,259</td>
<td>4,383</td>
<td>11,748</td>
<td>56,602</td>
</tr>
<tr>
<td>1982</td>
<td>34,766</td>
<td>7,106</td>
<td>5,297</td>
<td>12,278</td>
<td>59,357</td>
</tr>
<tr>
<td>1983</td>
<td>34,378</td>
<td>7,288</td>
<td>4,675</td>
<td>12,080</td>
<td>58,301</td>
</tr>
<tr>
<td>1984</td>
<td>37,010</td>
<td>7,209</td>
<td>5,501</td>
<td>13,336</td>
<td>63,956</td>
</tr>
<tr>
<td>1985</td>
<td>38,800</td>
<td>7,311</td>
<td>5,650</td>
<td>14,152</td>
<td>65,919</td>
</tr>
</tbody>
</table>

Percent of State:

1970 69.2% 11.0% 9.3% 9.2% 100.0%
1985 58.6% 11.4% 8.6% 21.3% 100.0%

Annually compounded percentage increase:

1970 to 1985 4.8% 5.9% 5.4% 11.6% 6.0%

1/ Number of visitor units as of June of each year. Includes condominium units.

The rate of growth of condominium units has far exceeded that of hotel units. Over the past 15 years, the number of visitor accommodations has increased at an average annual rate of 4.2%. During the same period condominium units have increased by about 34%, and hotel and apartment units have increased by only about 21.

The more rapid increase in condominium units in visitor use results from:

- Lower construction costs of condominium projects which typically have less extensive amenities and common areas as compared to hotels.
- Ability to finance condominium projects through the sale of units to individual investors and buyers.
- Tax benefits to individual investors and buyers.
- Increased recognition of the resort condominium as a visitor accommodation alternative.
- Competitive room rates.

Visitor Accommodations on Oahu

As of February 1985, 38,600 visitor units in 170 facilities on Oahu represented about 59% of the State's inventory. About 92% of these units are in the Waikiki and Ala Moana areas, as shown in Exhibit IV-C. This represents about 62% of the State's inventory.

In contrast with other visitor regions on the neighbor islands where visitor units are more widely distributed on the islands, the Honolulu, airport, Leeward and Windward Oahu areas include very few of the islands' visitor units.

In 1975 the Honolulu City Council created the Waikiki Special Design District which limits the number of hotel rooms in Waikiki to 30,000 units. This legislation has curtailed significant new visitor unit development in Waikiki and has given greater impetus to neighbor island development. The only significant addition to hotel units in Waikiki has been the redevelopment of the Halekulani Hotel and the construction of the Tapa Tower at the Hilton Hawaiian Village. Recently, the Council has discussed lifting this limit to encourage redevelopment in Waikiki and to allow additional hotel units to service a convention center.
Exhibit IV-C

NOKULEIA
Distribution of Oahu Visitor Units
February 1985

<table>
<thead>
<tr>
<th>Area</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waikiki</td>
<td>33,879</td>
<td>87.8%</td>
</tr>
<tr>
<td>Ala Moana</td>
<td>1,609</td>
<td>4.2</td>
</tr>
<tr>
<td>Honolulu</td>
<td>74</td>
<td>.2</td>
</tr>
<tr>
<td>Airport</td>
<td>693</td>
<td>1.8</td>
</tr>
<tr>
<td>Leeward Oahu</td>
<td>1,468</td>
<td>3.7</td>
</tr>
<tr>
<td>Windward Oahu</td>
<td>877</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38,600</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Planned Developments on Oahu

Excluding Nokuleia, 9,100 to 9,400 hotel and condominium units are currently planned in seven major developments on Oahu, as shown in Exhibit IV-D. About 7,800 units, or 84% of the total planned inventory, would be at Turtle Bay, West Beach, and Makaha resorts. These developments include four first-class or luxury hotels expected to be developed by the end of the decade. They include:

- Kahala Bay Hotel
- Halekulani Hotel expansion
- Proposed West Beach hotel
- Yacht Harbor Plaza

HISTORICAL OAHU HOTEL MARKET PERFORMANCE

This section reviews the historical market performance of Oahu visitor accommodations in terms of occupancy levels, average room rates and visitor room nights.

Hotel occupancy levels and average daily room rates are surveyed monthly by Fannell, Kett, Forster (FKF). However, these surveys exclude several major hotel chains (such as Sheraton and Hilton) and, therefore, may distort actual industry averages. However, the FKF survey averages provide an indication of general occupancy levels and room rates.

Occupancy Levels

Occupancy levels on Oahu have continued to improve during the past six years. Occupancy levels increased from about 72% in 1980 to nearly 82% in 1985, as shown in Exhibit IV-E.

Since 1980, occupancy levels on Oahu have exceeded statewide occupancy levels by 3% to 7%. Occupancy levels are slightly higher outside Waikiki, primarily because of the smaller number of visitor units and a more discriminating market.

### Exhibit IV-D

**HAWAIIA**

**Major Proposed Hotel and Condominium Units on Oahu**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of units</th>
<th>Development status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turtle Bay Resort:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>1,420</td>
<td>Building underway.</td>
</tr>
<tr>
<td>Condominium units</td>
<td>2,062</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,482</td>
<td></td>
</tr>
<tr>
<td>West Beach Resort:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>2,000</td>
<td>Construction to begin in late 1986.</td>
</tr>
<tr>
<td>Condominium units</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Sheraton Kukuiha Resort and Country Club:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel and condominium units</td>
<td>300 1/</td>
<td>Potential expansion.</td>
</tr>
<tr>
<td>Yacht Harbor Plaza:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel and condominium units</td>
<td>550-600</td>
<td>Anticipated to begin late-1985, hotel room configuration dependent upon number of condominiums.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halekulani Hotel:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>600</td>
<td>Expansion expected to be completed by October 1987.</td>
</tr>
<tr>
<td>Aloha Tower:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>400</td>
<td>First-class to luxury business hotel.</td>
</tr>
<tr>
<td>Late:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Shore:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>250 1/</td>
<td>No development plans known.</td>
</tr>
<tr>
<td>Total planned units on Oahu</td>
<td>9,313-9,363</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- N/A = Not available.
- 1/ Based on visit or unit limit specified in the special provisions of the development plan for the area.
- Sources: Discussions with developers, filed environmental impact statements or other published sources.

### Exhibit IV-E

**HAWAIIA**

**Visitor Accommodations Occupancy Levels**

**State of Hawaii**

**1980 to 1985**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waikiki:</td>
<td>73.9 %</td>
<td>72.1 %</td>
<td>72.7 %</td>
<td>74.7 %</td>
<td>81.2 %</td>
<td>79.3 %</td>
</tr>
<tr>
<td>Beach:</td>
<td>73.2%</td>
<td>73.8%</td>
<td>80.6%</td>
<td>79.1%</td>
<td>85.7%</td>
<td>83.7%</td>
</tr>
<tr>
<td>Off-beach (w/restaurant):</td>
<td>66.5%</td>
<td>70.1%</td>
<td>80.1%</td>
<td>74.4%</td>
<td>73.0%</td>
<td>80.4%</td>
</tr>
<tr>
<td>Total Waikiki</td>
<td>71.7%</td>
<td>73.9%</td>
<td>77.7%</td>
<td>76.6%</td>
<td>82.6%</td>
<td>N/A</td>
</tr>
<tr>
<td>Other Oahu</td>
<td>74.5%</td>
<td>75.3%</td>
<td>79.4%</td>
<td>73.3%</td>
<td>85.0%</td>
<td>86.5%</td>
</tr>
<tr>
<td>Total Oahu</td>
<td>72.3%</td>
<td>74.1%</td>
<td>77.8%</td>
<td>75.8%</td>
<td>81.2%</td>
<td>81.5%</td>
</tr>
<tr>
<td>Hawaii</td>
<td>51.0%</td>
<td>44.9%</td>
<td>44.0%</td>
<td>44.7%</td>
<td>55.6%</td>
<td>57.6%</td>
</tr>
<tr>
<td>State</td>
<td>69.3%</td>
<td>68.3%</td>
<td>70.4%</td>
<td>69.7%</td>
<td>76.0%</td>
<td>76.1%</td>
</tr>
</tbody>
</table>

**Note:** Data presented excludes several major hotels which are not surveyed.

Average Room Rates

Average room rates achieved by Oahu hotels have been 81% to 90% of average statewide room rates since 1980, as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Oahu</th>
<th>Oahu as a percent of State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>542.70</td>
<td>48.05</td>
</tr>
<tr>
<td>State of Hawaii</td>
<td>543.37</td>
<td>49.33</td>
</tr>
<tr>
<td></td>
<td>90.1%</td>
<td>86.7%</td>
</tr>
</tbody>
</table>

Source: Fennell, Kerr, Forster.

The differential between Oahu and statewide daily room rates is increasing. Oahu room rates could be expected to decline even further unless newer and higher-quality visitor facilities are developed.

Average Daily Room Demand

Average daily room demand is estimated based on the occupancy rates experienced by Oahu hotels and the number of visitor units. Since 1982, average daily room demand is estimated to have increased at a rate of about 3.31% per year, from 27,000 room nights in 1982 to 31,500 in 1985, as shown in the following table:

<table>
<thead>
<tr>
<th>Visitor Room Nights on Oahu</th>
<th>1982</th>
<th>1983</th>
<th>1984</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor room inventory</td>
<td>34,766</td>
<td>34,378</td>
<td>37,910</td>
<td>38,600</td>
</tr>
<tr>
<td>Average annual occupancy rate</td>
<td>77.82</td>
<td>75.62</td>
<td>81.25</td>
<td>81.5</td>
</tr>
<tr>
<td>Visitor room nights</td>
<td>27,000</td>
<td>26,100</td>
<td>30,800</td>
<td>31,500</td>
</tr>
</tbody>
</table>

PROJECTED OAHU ROOM REQUIREMENTS

The number of visitor rooms on Oahu which are required to serve as visitor accommodations to Island visitors are projected in the following section. The major assumptions used in projecting visitor room demand and unit requirements, shown in Exhibit IV-F, are discussed as follows.

Visitors to Oahu:

- Number of westbound and eastbound visitors staying overnight or longer, as shown previously in Section III.
- Percent using commercial accommodations:
  - Proportion of visitors using visitor accommodations, including hotels and condominiums. About 90% of all westbound and 90% of all eastbound visitors are assumed to use visitor accommodations.
- Average length of stay:
  - Visitor stay projected to increase marginally based on historical patterns on Oahu and in the State since 1970. Average stay is assumed to increase to 6.7 days by the year 2005 for westbound visitors and remain about 1.7 days for the shorter staying eastbound visitors.
- Average persons per room:
  - Based on data provided by the HVB regarding average party size. Average party size has increased slightly since 1970 and is assumed to stabilize at 1.7 persons for westbound and 1.7 persons for eastbound visitors.

Based on these assumptions, daily visitor room demand is estimated to increase by nearly 50% between 1983 and 2005 from 31,000 units to 46,000 units, as shown in Exhibit IV-F.

Over the long-term, a stabilized occupancy level between 75% and 80% is considered an appropriate and financially feasible balance between the supply and demand for visitor units. As a result, the total number of visitor units on Oahu required to meet the projected demand is estimated at about 57,500 rooms by 2005 assuming an 80% occupancy level, and 61,300 rooms assuming a 75% occupancy level, as shown in Exhibit IV-G.

IV-4

IV-5
### Exhibit 12.7

**Historical and Projected Visitor Room Demand for Japan**

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>41,200</td>
<td>41,200</td>
<td>41,200</td>
<td>41,200</td>
</tr>
<tr>
<td>2005</td>
<td>46,000</td>
<td>46,000</td>
<td>46,000</td>
<td>46,000</td>
</tr>
<tr>
<td>2010</td>
<td>51,200</td>
<td>51,200</td>
<td>51,200</td>
<td>51,200</td>
</tr>
<tr>
<td>2015</td>
<td>56,000</td>
<td>56,000</td>
<td>56,000</td>
<td>56,000</td>
</tr>
<tr>
<td>2020</td>
<td>61,000</td>
<td>61,000</td>
<td>61,000</td>
<td>61,000</td>
</tr>
<tr>
<td>2025</td>
<td>66,000</td>
<td>66,000</td>
<td>66,000</td>
<td>66,000</td>
</tr>
<tr>
<td>2030</td>
<td>71,200</td>
<td>71,200</td>
<td>71,200</td>
<td>71,200</td>
</tr>
</tbody>
</table>

### Exhibit 12.8

**Historical and Projected Visitor Room Demand for Japan**

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>2,190</td>
<td>2,190</td>
<td>2,190</td>
<td>2,190</td>
</tr>
<tr>
<td>1981</td>
<td>2,300</td>
<td>2,300</td>
<td>2,300</td>
<td>2,300</td>
</tr>
<tr>
<td>1982</td>
<td>2,450</td>
<td>2,450</td>
<td>2,450</td>
<td>2,450</td>
</tr>
<tr>
<td>1983</td>
<td>2,600</td>
<td>2,600</td>
<td>2,600</td>
<td>2,600</td>
</tr>
<tr>
<td>1984</td>
<td>2,750</td>
<td>2,750</td>
<td>2,750</td>
<td>2,750</td>
</tr>
<tr>
<td>1985</td>
<td>2,900</td>
<td>2,900</td>
<td>2,900</td>
<td>2,900</td>
</tr>
</tbody>
</table>

### Exhibit 12.9

**Historical and Projected Visitor Room Demand for Japan**

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
<th>Projected Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>3,000</td>
<td>3,000</td>
<td>3,000</td>
<td>3,000</td>
</tr>
<tr>
<td>1995</td>
<td>3,500</td>
<td>3,500</td>
<td>3,500</td>
<td>3,500</td>
</tr>
<tr>
<td>2000</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>2005</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
</tr>
</tbody>
</table>

### Notes
1. Estimated based on historical room nights demand.
2. Calculated based on visitor arrivals multiplied by the percent utilizing hotels and average length of stay divided by average number of persons per room divided by 30 days.
3. Historical visitor characteristics based on characteristics of Japanese visitors to Hawaii as reported by the Hawaii Visitors Bureau.

Source: John Child & Company, Inc.
The projections support between 18,900 and 27,000 additional visitor units between 1985 and 2005. These estimates of additional room requirement are in excess of the units currently planned. Assuming successful completion of those additions outlined in Exhibit IV-D, a need for about 9,900 to 13,900 new units is projected by 2005.

MARKET ASSESSMENT FOR HOTEL DEVELOPMENT AT HOKULE'A

This section assesses the potential for hotel development at Hokule'a in terms of factors that could affect hotel development, market support for hotels, and the recommended type, quality, and size of the hotels. In addition, anticipated occupancy and average room rates are projected for the first five years of operations.

Factors Affecting Development

Successful hotel development at Hokule'a is dependent on the hotel's ability to become established as attractive and competitive visitor destinations in the State of Hawaii. The competitive position of hotel development at Hokule'a can be enhanced through the creation of a planned community. Factors which could differentiate Hokule'a from existing resorts and lead to successful hotel development include:

- **Unique Location on Oahu** - A community located at Hokule'a would be readily accessible to and from Waikiki, the Honolulu central business district and other population centers around the island. It would be planned to take advantage of the oceanfront and the unique, rural environment of the area.

- **Range of Recreational Opportunities** - Onsite activities could include golf, tennis, horseback riding, camping and other amenities. Available water sports would include swimming, surfing, windsailing and boating.

Anticipated Market Segments

Hotels at Hokule'a could attract both local residents and off-island visitors because of the following factors:

- **Proposed recreational facilities** including a 36-hole golf course, would attract and support visitors who seek a variety of onsite facilities.

- **Proximity of the property relative to Waikiki and other major points of interest on the island provides expanded recreational and cultural alternatives not found in similar resorts on the outer islands.**

- **Its location to shopping, dining and other affordably-priced recreational opportunities in the North Shore area would provide added attractions to the anticipated market segment.**

The anticipated market segments for hotel development at Hokule'a are described as follows:

- **Free Independent Travelers (FITs)** - This segment includes middle-class repeat visitors to the State who seek a quality environment in a new setting that offers extensive recreational facilities and amenities.

- **Meeting and Conference Groups** - This segment includes small-to-medium-sized groups who seek a range of recreational opportunities to complement their business activities. Occupationally, this group could be expected to include mid-level corporate managers, professionals and successful entrepreneurs.

- **Island and State Residents** - This segment includes local residents who would take advantage of the facilities for short periods of time, especially during weekends and holidays. Given appropriate marketing, this segment may also overlap with the meeting and conference group market described above.

**Market Share**

The supportable hotel rooms depends on a hotel's market position in relationship to the overall room demand. Achieved market capture rates are related to:

- **Market segments attracted.**

- **Relative size of the visitor room demand.**

- **Perceived attractiveness of the facility and the quality and range of amenities provided.**

- **Competitive strength of other established resorts.**

- **Maturity of the hotel developments and their reputation.**
Visitor room demand on Oahu is dominated by Waikiki hotels and condominium units, estimated to capture about 93% of the market. The market shares of neighbor island resort areas are more evenly distributed. Newest resorts on the island of Hawaii (primarily Kaanapali Beach Resort, to 14%), at Waikoloa, Mauna Lani and Mauna Kea have been able to achieve 8% to 12% of the market.

Estimated market capture rates for major visitor destination resorts on Oahu have varied from 28% at Kapalua Resort, to 60% at Outrigger Condominiums, to 60% at Mauna Kea. The total room demand on the neighbor islands, as shown in Exhibit IV-III, will be lower than that for new resort development on the neighbor islands with a less dominant resort area.

Waikiki is expected to continue to dominate the Oahu visitor accommodations industry. However, even with planned development in areas outside Waikiki, Waikiki's share could be expected to decline from its current level at about 93% to about 75% by 2005. The shift in market share distribution would result from:

- Limited amount and availability of suitable development sites in Waikiki.
- Development and maturation of resort destinations outside Waikiki.
- Trend in visitor preference for recreation-oriented vacation in integrated resort communities.

The North Shore/Koolau area captures about 27% of the Oahu room demand. Based on the plans for expansion at the Turtle Bay Resort and the proposed development plan for Hokuleia, the North Shore is projected to capture a 12.5% market share of room demand on Oahu, as shown in the following table. This market share would be similar to the market share achieved by the Wailea area in comparison to the Kaanapali on Maui.

### Table: Potential Market Share Distribution of Oahu Visitor Units

<table>
<thead>
<tr>
<th>Area</th>
<th>1986</th>
<th>1995</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Beach/Ko'olina</td>
<td>3.0</td>
<td>4.5</td>
<td>10.0</td>
</tr>
<tr>
<td>North Shore/Koolau</td>
<td>2.0</td>
<td>2.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Exhibit IV-III

**Estimated Market Share of Visitor Room Nights at Selected Hawaii Resorts**

<table>
<thead>
<tr>
<th>Resort</th>
<th>Estimated Visitor Room Nights</th>
<th>Island Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waikiki/Kahala</td>
<td>28,810</td>
<td>92%</td>
</tr>
<tr>
<td>Wailea/Ko'olina</td>
<td>890</td>
<td>3%</td>
</tr>
<tr>
<td>North Shore/Ko'olina</td>
<td>680</td>
<td>2%</td>
</tr>
<tr>
<td>Other (airport, downtown, etc.)</td>
<td>400</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>30,780</td>
<td>100%</td>
</tr>
<tr>
<td>Hawaii</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keahou</td>
<td>1,060</td>
<td>26%</td>
</tr>
<tr>
<td>Kalua-Kena</td>
<td>1,450</td>
<td>36%</td>
</tr>
<tr>
<td>Mauna Kea/Mauna Lani</td>
<td>830</td>
<td>20%</td>
</tr>
<tr>
<td>Hilo/Ka'au</td>
<td>820</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>4,160</td>
<td>100%</td>
</tr>
<tr>
<td>Maui</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali Beach Resort</td>
<td>4,120</td>
<td>41%</td>
</tr>
<tr>
<td>Napili/Honokowai/Lahaina</td>
<td>2,120</td>
<td>23%</td>
</tr>
<tr>
<td>Kapalua</td>
<td>820</td>
<td>8%</td>
</tr>
<tr>
<td>Wailea</td>
<td>2,730</td>
<td>27%</td>
</tr>
<tr>
<td>Kahului/Ka'ulana</td>
<td>460</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>10,480</td>
<td>100%</td>
</tr>
<tr>
<td>Kauai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princeville</td>
<td>530</td>
<td>13%</td>
</tr>
<tr>
<td>Poipu/Kaanapali/Ko'olau</td>
<td>1,060</td>
<td>23%</td>
</tr>
<tr>
<td>Wailua/Kapaa/Lihue</td>
<td>1,870</td>
<td>34%</td>
</tr>
<tr>
<td>Total</td>
<td>3,460</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Notes
- Estimated based on the number of visitor units as reported by the Hawaii Visitors Bureau and the occupancy rate for the area.
- Smaller resorts have been combined with larger regions to preserve confidentiality of occupancy rates of individual facilities.
Supportable Hotel Rooms on Oahu

The anticipated supply and demand relationships for visitor units on Oahu, comprised of hotel rooms and condominium units, were discussed earlier in this section. Based on the analysis, the visitor industry could be expected to require about 18,900 to 22,700 additional rooms by 2005. This represents a requirement of 9,500 to 13,300 rooms in addition to the inventory which is currently being planned for Oahu.

Hotels are expected to continue to account for about 70% of total demand for visitor rooms on Oahu. At the assumed occupancy of 70%, the number of supportable hotel rooms on Oahu is projected to range between 40,300 to 42,900 rooms by 2005, as shown in Exhibit IV-1.

Supportable Hotel Rooms at Mokuleia

Based on the proposed development concept, Mokuleia could achieve a market capture rate of about 1.5% in 1990, increasing to 3% by 1995, 6% by 2000, and 9% by 2005. Supportable hotel rooms at Mokuleia is projected to increase from about 500 units in 1990 to between about 2,000 and 2,200 in 2005, as shown in Exhibit IV-1.

Recommended Hotel Development

The recommended hotel development for Mokuleia would include oceanfront resort-type hotels and possibly a village hotel and conference center hotel. The village hotel and conference center are to be located off Farrington Highway. They could be planned as follows:

Oceanfront Hotels

Four or five resort-type hotels could be designed to maximize the scenic ocean views and minimize any adverse influences on the two 500 rooms. The hotels could be activity-oriented and offer a broad range of recreational and entertainment opportunities.

Source: John Child & Company, Inc.
Village Hotel

A hotel on a small beach with a thoughtful design could result in a low-density village atmosphere. Extensive interior landscaping and walkways could partially compensate for the lack of ocean views and limited ocean views. The hotel could provide a relaxed and slow-paced environment for those visitors seeking a less hectic vacation experience than that of Waikiki.

Conference Center Hotel

The conference center could cater to the small- to medium-sized convention/association meeting groups and corporate incentive groups. The hotel could include meeting and conference rooms, audio/visual and telecommunications facilities, pavilions, and banquet halls in a low-rise configuration. Onsite recreational facilities including swimming pools andJacuzzi, racquet sports, and health center would enhance the facility by providing active alternatives to more business-like meeting rooms.
V - CONDOMINIUM APARTMENT MARKET ASSESSMENT

This section reviews development trends in the condominium market, identifies projects in similar settings on Oahu, Maui, Hawaii, and Kauai and assesses their characteristics and recent market performance, and projects the market support and orientation for condominium development at Mokuleia.

DEVELOPMENT OVERVIEW

The location and recreation orientation of Mokuleia is unlike any existing area in Hawaii. The developments envisioned could incorporate land uses and amenities similar to major resort destinations on the neighbor islands. However, the Oahu location offers greater accessibility to Oahu residents. In addition, Mokuleia has traditionally been noted for its variety of recreational facilities.

General trends in the condominium market and for specific resort condominium developments are reviewed below.

General Condominium Development

Condominium development in the State experienced significant growth from 1973 to 1975 and between 1979 and 1980, as shown by private multi-family housing authorizations in Exhibit V-A.

New condominium development has been relatively restrained during the past four to five years. The average permit value of private multi-family unit authorizations statewide and on Oahu has declined since 1981, reflecting a shift from the construction of higher-priced condominiums to the construction of lower-priced primary housing.

The market for lower-priced primary housing is expected to remain the most active segment of the condominium market in the near term. Buyers in the market for higher-priced condominium units have become more sophisticated and discriminating. Faced with limited prospects for significant short- or intermediate-term appreciation, these buyers are evaluating properties on the basis of their "value in use" or their capacity to generate income.

Exhibit V-A

MOKULEIA

Private Multi-Family Housing Authorizations for the State and Oahu 1970 to 1984

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of units</th>
<th>Average value $</th>
<th>Number of units</th>
<th>Average value $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>5,241</td>
<td>521,913</td>
<td>4,172</td>
<td>522,537</td>
</tr>
<tr>
<td>1971</td>
<td>5,288</td>
<td>17,234</td>
<td>4,087</td>
<td>18,066</td>
</tr>
<tr>
<td>1972</td>
<td>17,434</td>
<td>17,834</td>
<td>7,269</td>
<td>18,179</td>
</tr>
<tr>
<td>1973</td>
<td>12,274</td>
<td>21,064</td>
<td>10,057</td>
<td>21,077</td>
</tr>
<tr>
<td>1974</td>
<td>15,464</td>
<td>25,101</td>
<td>13,516</td>
<td>26,320</td>
</tr>
<tr>
<td>1975</td>
<td>15,269</td>
<td>34,083</td>
<td>4,332</td>
<td>35,628</td>
</tr>
<tr>
<td>1976</td>
<td>3,360</td>
<td>32,144</td>
<td>3,198</td>
<td>31,630</td>
</tr>
<tr>
<td>1977</td>
<td>3,360</td>
<td>36,100</td>
<td>2,473</td>
<td>36,712</td>
</tr>
<tr>
<td>1978</td>
<td>4,657</td>
<td>41,257</td>
<td>2,371</td>
<td>39,720</td>
</tr>
<tr>
<td>1979</td>
<td>4,999</td>
<td>50,536</td>
<td>1,908</td>
<td>41,315</td>
</tr>
<tr>
<td>1980</td>
<td>8,758</td>
<td>73,344</td>
<td>3,613</td>
<td>65,756</td>
</tr>
<tr>
<td>1981</td>
<td>3,321</td>
<td>76,797</td>
<td>1,915</td>
<td>70,674</td>
</tr>
<tr>
<td>1982</td>
<td>3,070</td>
<td>59,071</td>
<td>2,385</td>
<td>45,231</td>
</tr>
<tr>
<td>1983</td>
<td>1,679</td>
<td>66,015</td>
<td>2,260</td>
<td>51,130</td>
</tr>
<tr>
<td>1984</td>
<td>1,280</td>
<td>48,938</td>
<td>1,054</td>
<td>39,521</td>
</tr>
</tbody>
</table>

17 Value of permits for new construction in thousands, in current dollars.
Condominium Apartment Development

Condominium apartment development is a special type of multi-family development and is usually relatively high quality and often located in or near resort areas.

Currently, about 21,800 condominium units, representing about 33% of the State's visitor units, are used as visitor accommodations, as shown in Exhibit V-B.

COMPARABLE PROJECT ANALYSIS

Condominium projects in resort areas on Oahu, Maui, Hawaii and Kauai were selected for review and analysis to assess the market support for condominium development at Hokuleia.

This section first identifies and describes projects considered comparable to those envisioned for Hokuleia, and then analyzes the characteristics and recent market performance of the selected projects as a basis for the condominium market assessment for Hokuleia.

Identification of Comparable Projects

The developments envisioned for Hokuleia could be expected to appeal to residents and visitors seeking an active recreational environment. For purposes of comparison, 12 similar condominium projects were studied. Selection was based on the following criteria:

- Projects in rural locations on Oahu.
- Projects in or near master-planned resort areas on the neighbor islands.

Based on the selection criteria, projects were selected from:

- Kailua, Makaha, Makaha, Kaawa, and Punahou (Oahu).
- Kaaapalii, Waihele, Waikiki, and Kihei (Maui).
- Keaau (Hawaii).
- Princeville (Kauai).

The selected projects are shown in Exhibit V-C.

Exhibit V-B

<table>
<thead>
<tr>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>9,016</td>
</tr>
<tr>
<td>Kauai</td>
<td>7,076</td>
</tr>
<tr>
<td>Maui</td>
<td>7,038</td>
</tr>
<tr>
<td>Holokai</td>
<td>595</td>
</tr>
<tr>
<td>Lanai</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>21,894</td>
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</tbody>
</table>

### Development Characteristics of Selected Condominium Projects

<table>
<thead>
<tr>
<th>Project name</th>
<th>Site location</th>
<th>Year built</th>
<th>No. of units</th>
<th>Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural Oahu:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kulana Estates West</td>
<td>Kulana</td>
<td>1973</td>
<td>199</td>
<td>Golf-front</td>
</tr>
<tr>
<td>Kulana Estates East</td>
<td>Kulana</td>
<td>1975</td>
<td>167</td>
<td>Golf-front</td>
</tr>
<tr>
<td><strong>Other Oahu:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaneohe Village</td>
<td>Kaneohe</td>
<td>1974</td>
<td>86</td>
<td>Ocean view</td>
</tr>
<tr>
<td>Wai'Alae Surf</td>
<td>Wai'Alae</td>
<td>1974</td>
<td>32</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Koko Kai</td>
<td>Koko</td>
<td>1973</td>
<td>51</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Makaha Beach Colony</td>
<td>Makaha</td>
<td>1976</td>
<td>45</td>
<td>Oceanfront</td>
</tr>
<tr>
<td><strong>Hawaiian Princess At Kauai Beach</strong></td>
<td>Kauai</td>
<td>1966</td>
<td>52</td>
<td>Oceanfront</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Island of Maui:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali</td>
<td>Kaanapali</td>
<td>1982</td>
<td>266</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Kaanapali Alii</td>
<td>Kaanapali</td>
<td>1980</td>
<td>92</td>
<td>Golf-front</td>
</tr>
<tr>
<td>Masters At Kaanapali, Phase 1</td>
<td>Kaanapali</td>
<td>1986</td>
<td>92</td>
<td>Golf-front</td>
</tr>
<tr>
<td><strong>Wailua:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailua Beach II</td>
<td>Wailua</td>
<td>1975</td>
<td>90</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Wailua Beach III</td>
<td>Wailua</td>
<td>1976</td>
<td>104</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Wailua Beach</td>
<td>Wailua</td>
<td>1976</td>
<td>118</td>
<td>Golf-front</td>
</tr>
<tr>
<td><strong>Waiola:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Waiola Ewa IA</strong></td>
<td>Waiola</td>
<td>1976</td>
<td>54</td>
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</tr>
<tr>
<td><strong>Waiola Ewa IB</strong></td>
<td>Waiola</td>
<td>1978</td>
<td>32</td>
<td>Oceanfront</td>
</tr>
<tr>
<td><strong>Waiola Ewa II</strong></td>
<td>Waiola</td>
<td>1980</td>
<td>66</td>
<td>Oceanfront</td>
</tr>
<tr>
<td><strong>Other Maui:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua</td>
<td>Kapalua</td>
<td>1986</td>
<td>52</td>
<td>Interior</td>
</tr>
<tr>
<td>Hamoa Beach</td>
<td>Hamoa</td>
<td>1983</td>
<td>52</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Ho'okipa Beach Club</td>
<td>Hookipa</td>
<td>1982</td>
<td>71</td>
<td>Oceanfront</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Island of Kauai:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princeville</td>
<td>Princeville</td>
<td>1980</td>
<td>202</td>
<td>Oceanfront</td>
</tr>
<tr>
<td>Princeville</td>
<td>Princeville</td>
<td>1976</td>
<td>52</td>
<td>Golf-front</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Exhibit V-D

**HOKULEIA**  
View Orientation of Selected Projects

<table>
<thead>
<tr>
<th>Number of Units</th>
<th>Ocean - front</th>
<th>Ocean view</th>
<th>Golf - front</th>
<th>Interior</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural Oahu:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kualoa</td>
<td>0</td>
<td>0</td>
<td>290</td>
<td>76</td>
<td>366</td>
</tr>
<tr>
<td>Other</td>
<td>322</td>
<td>126</td>
<td>0</td>
<td>36</td>
<td>535</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>322</td>
<td>126</td>
<td>290</td>
<td>112</td>
<td>901</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>227</td>
<td>337</td>
<td>208</td>
<td>587</td>
<td>1,363</td>
</tr>
<tr>
<td>Kaaahou</td>
<td>44</td>
<td>95</td>
<td>280</td>
<td>99</td>
<td>487</td>
</tr>
<tr>
<td>Princeville</td>
<td>64</td>
<td>64</td>
<td>37</td>
<td>56</td>
<td>239</td>
</tr>
</tbody>
</table>

### Exhibit V-E

**HOKULEIA**  
Development Densities of Selected Projects

<table>
<thead>
<tr>
<th></th>
<th>Land area (acre)</th>
<th>Number of units</th>
<th>Units per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural Oahu:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kualoa</td>
<td>32</td>
<td>366</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>502</td>
<td>22</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>53</td>
<td>869</td>
<td>16</td>
</tr>
<tr>
<td><strong>Hau:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaaahou</td>
<td>31</td>
<td>462</td>
<td>15</td>
</tr>
<tr>
<td>Waaihee</td>
<td>75</td>
<td>394</td>
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</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>307</td>
<td>15</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>127</td>
<td>1,363</td>
<td>11</td>
</tr>
<tr>
<td><strong>Hawaii</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaaahou</td>
<td>40</td>
<td>487</td>
<td>12</td>
</tr>
<tr>
<td>Princeville</td>
<td>28</td>
<td>239</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>248</td>
<td>2,958</td>
<td>12</td>
</tr>
</tbody>
</table>

**Percent of Units**

<table>
<thead>
<tr>
<th></th>
<th>Rural Oahu</th>
<th>Maui</th>
<th>Kaaahou</th>
<th>Princeville</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kualoa</td>
<td>42%</td>
<td>17%</td>
<td>9%</td>
<td>27%</td>
</tr>
<tr>
<td>Waaihee</td>
<td>14%</td>
<td>25%</td>
<td>20%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24%</td>
<td>22%</td>
<td>27%</td>
<td>27%</td>
</tr>
</tbody>
</table>

### Exhibit V-9

#### Unit Mix of Selected Projects

<table>
<thead>
<tr>
<th></th>
<th>Studio</th>
<th>One-bedroom</th>
<th>Two-bedroom</th>
<th>Three-bedroom</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Oahu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koolina</td>
<td>44</td>
<td>252</td>
<td>56</td>
<td>16</td>
<td>328</td>
</tr>
<tr>
<td>Other</td>
<td>30</td>
<td>408</td>
<td>85</td>
<td>6</td>
<td>529</td>
</tr>
<tr>
<td>Subtotal</td>
<td>74</td>
<td>660</td>
<td>141</td>
<td>22</td>
<td>897</td>
</tr>
<tr>
<td>Maui</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali</td>
<td>0</td>
<td>130</td>
<td>281</td>
<td>51</td>
<td>462</td>
</tr>
<tr>
<td>Wailea</td>
<td>22</td>
<td>291</td>
<td>244</td>
<td>16</td>
<td>573</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>24</td>
<td>237</td>
<td>26</td>
<td>307</td>
</tr>
<tr>
<td>Subtotal</td>
<td>22</td>
<td>445</td>
<td>782</td>
<td>93</td>
<td>1,302</td>
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<tr>
<td>Keauhou</td>
<td>0</td>
<td>96</td>
<td>310</td>
<td>73</td>
<td>487</td>
</tr>
<tr>
<td>Princeville</td>
<td>0</td>
<td>194</td>
<td>37</td>
<td>8</td>
<td>239</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>1,395</td>
<td>1,278</td>
<td>196</td>
<td>2,065</td>
</tr>
</tbody>
</table>

#### Unit Size

Unit sizes for one- and two-bedroom units at the projects considered typically range from 500$^2$ to 1,600$^2$, as shown in Exhibit V-8. The average unit size for studio units range from 400$^2$ to 600$^2$, while units with three or more bedrooms range in size from about 1,200$^2$ to 2,300$^2$.

The larger units are generally found in the higher-quality projects such as Kaanapali Alii, Wailea Elua, Keauhou Gardens, and Kaanapali At Keauhou. Such projects are targeted at a segment of the market that prefers spacious-designed units in high-quality settings.

#### Project Amenities

The projects generally offer a recreation center and at least one swimming pool or front along a beach suitable for swimming. Other amenities provided at these projects include whirlpools, saunas, tennis courts, barbecue areas, and extensive landscaping.

#### MARKET PERFORMANCE OF COMPARABLE PROJECTS

This section reviews the recent market performance of the selected condominiums in terms of sales absorption, prices, buyer profiles, and buyer motivation.

#### Sales Absorption

Sales and resales of units in the condominium projects studied were surveyed over a seven-year period from 1979 through 1985. Sales rates during this period, particularly between 1980 and 1983, were significantly affected by national and international economic conditions and ageologically high mortgage rates. During this period, about 1,900 units in the selected projects were sold and/or resold, as shown in Exhibit V-3.

The nine selected projects in rural Oahu have averaged 86 sales and/or resales per year since 1979. Koolina Estates East and West have accounted for nearly 40% of the sales activity.

Nearly 3,500 units in 31 condominium projects are in rural Oahu, including nine projects considered most comparable to those envisioned for Koolina. Since 1979, these 31 projects have averaged 350 sales per year, as shown in Exhibit V-4. The nine selected projects account for about 29% of total sales in all 31 condominium projects in rural Oahu.

---

### Exhibit V-C

#### HONOLUA
Typical Apartment Sizes of Selected Projects (G' Net Interior Area)

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Studio Low</th>
<th>Studio High</th>
<th>One-Bedroom Low</th>
<th>One-Bedroom High</th>
<th>Two-Bedroom Low</th>
<th>Two-Bedroom High</th>
<th>Three-Bedroom Low</th>
<th>Three-Bedroom High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lahaina Surf</td>
<td>660</td>
<td>660</td>
<td>837</td>
<td>917</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaiian Princess At Makaha Beach</td>
<td>535</td>
<td>680</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourwai Kai</td>
<td>893</td>
<td>893</td>
<td>1,199</td>
<td>1,246</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kulalani Estates East</td>
<td>542, 599</td>
<td>638, 738</td>
<td>1,072</td>
<td>1,072</td>
<td>1,245</td>
<td>1,245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kulalani Estates West</td>
<td>459, 659</td>
<td>538, 738</td>
<td>1,072</td>
<td>1,072</td>
<td>1,394</td>
<td>1,394</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kulana Village</td>
<td>361, 515</td>
<td>329, 757</td>
<td></td>
<td></td>
<td>1,394</td>
<td>1,394</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makalua Beach Colony</td>
<td>792</td>
<td>792</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Po'ina At Poalii</td>
<td>792</td>
<td>792</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunset Shores</td>
<td>860</td>
<td>984</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hami:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cascades</td>
<td>572</td>
<td>572</td>
<td>852</td>
<td>1,085</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali Aluu</td>
<td>1,173, 1,459</td>
<td>1,245, 1,459</td>
<td>1,328</td>
<td>1,636</td>
<td>1,643</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali Royal</td>
<td>1,462</td>
<td>1,580</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hikina Surf</td>
<td>1,038</td>
<td>1,627</td>
<td>1,640</td>
<td>1,640</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elters At Kaanapali, Phase I</td>
<td>956, 1,150</td>
<td>1,325, 1,825</td>
<td>2,281</td>
<td>2,281</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polo Beach Club</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Bula I</td>
<td>484, 484</td>
<td>792</td>
<td>1,172</td>
<td>1,375</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Bula II</td>
<td>792</td>
<td>792</td>
<td>1,172</td>
<td>1,375</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Bula III</td>
<td>484, 484</td>
<td>792</td>
<td>1,172</td>
<td>1,375</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Dulo</td>
<td>866</td>
<td>866</td>
<td>1,060</td>
<td>1,489</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Elua IA</td>
<td>891</td>
<td>891</td>
<td>1,259</td>
<td>1,609</td>
<td>1,249</td>
<td>1,249</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Elua II</td>
<td>760</td>
<td>955</td>
<td>1,269</td>
<td>1,658</td>
<td>1,569</td>
<td>1,569</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Elua III</td>
<td>997</td>
<td>1,061</td>
<td>1,354</td>
<td>1,761</td>
<td>1,701</td>
<td>1,701</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keanuku:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country Club Villas</td>
<td>1,000</td>
<td>1,271</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa At Kauai I (Haliney)</td>
<td>1,016, 1,016</td>
<td>1,287, 1,550</td>
<td>1,537</td>
<td>1,537</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa At Kauai II (Ocean)</td>
<td>1,016, 1,016</td>
<td>1,346, 1,571</td>
<td>1,696</td>
<td>1,696</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa At Kauai III (Bay)</td>
<td>1,016, 1,016</td>
<td>1,466, 1,696</td>
<td>1,696</td>
<td>1,696</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa Gardens</td>
<td>1,101</td>
<td>1,442</td>
<td>1,527</td>
<td>1,953</td>
<td>1,696</td>
<td>1,696</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa Paauoha I</td>
<td>1,157</td>
<td>1,492</td>
<td>1,125</td>
<td>1,192</td>
<td>1,192</td>
<td>1,192</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanaoa Paauoha II</td>
<td>1,157</td>
<td>1,492</td>
<td>1,125</td>
<td>1,192</td>
<td>1,192</td>
<td>1,192</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princeville:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cliffs At Princeville, The Outrigger At Princeville</td>
<td>917</td>
<td>960</td>
<td>1,866</td>
<td>1,866</td>
<td>1,748</td>
<td>1,748</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Hawaii Multiple Listing Service and John Child & Company, Inc.

### Exhibit V-II

#### HONOLEA
Annual Sales in Selected Condominium Developments 1979-1985

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Sold</th>
<th>Average Annual Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Lahaina</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>Kulalani</td>
<td>56</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>86</td>
<td>55</td>
</tr>
<tr>
<td>Subtotal</td>
<td>599</td>
<td>55</td>
</tr>
<tr>
<td>Hami:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali</td>
<td>51</td>
<td>39</td>
</tr>
<tr>
<td>Wailea</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Keanuku</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>Princeville</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>Subtotal</td>
<td>1,311</td>
<td>158</td>
</tr>
<tr>
<td>Total</td>
<td>1,910</td>
<td>212</td>
</tr>
</tbody>
</table>

**Source:** Hawaii Multiple Listing Service and John Child & Company, Inc.
Exhibit V-1

HOKULEIA
Total Annual Condominium Sales in Rural Oahu
1979-1985

<table>
<thead>
<tr>
<th>Projects</th>
<th>Units</th>
<th>Total Sales</th>
<th>Average Annual Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ko'olauloa</td>
<td>7</td>
<td>801</td>
<td>459</td>
</tr>
<tr>
<td>North Shore</td>
<td>12</td>
<td>402</td>
<td>272</td>
</tr>
<tr>
<td>Makaha</td>
<td>12</td>
<td>2,291</td>
<td>1,106</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>3,494</td>
<td>2,097</td>
</tr>
</tbody>
</table>

The recent decline in mortgage rates is anticipated to benefit the real estate market through increased affordability. Locations, Inc. has estimated that the number of households who can now qualify to purchase the average priced Oahu property has nearly doubled over the past year. Increasing from 40,000 households in 1983 to 70,000 in 1986. As a result, future absorption rates are expected to be greater than experienced over the past three to four years.

The absorption rate for new sales and resales differ because of differences in the level and intensity of the respective marketing approaches. Projects in an initial marketing phase typically have a coordinated marketing program targeted at specific buying groups. Individual unit owners typically lack or are unwilling to provide the resources to compete on a marketing level with the newer projects.

Exhibit V-1 illustrates the initial marketing period for selected projects offered for sale between 1975 and 1985.

The shortest marketing periods and the greatest number of units sold occurred in 1975 and 1979, when selected projects achieved annual sales of 100 to 200 units. Since 1980, sales rates have declined, currently averaging between 50 and 35 units per year.

Initial annual sales rates in rural Oahu and the selected neighbor island resort areas range from 30 to 93 units per year, and average about 50 units per year, as shown in Exhibit V-K.

Sales by View Orientation

View orientation has significantly affected the sales absorption of condominium units. The average marketing period and average annual sales of an expanded list of resort condominium projects by view orientation is presented in Exhibit V-L. Effects of real estate sales cycles and the timing of the projects' first offering on the market are excluded from this analysis.

As shown in the exhibit, oceanfront condominium units have experienced the fastest sales, with an average absorption of 92 units annually. Ocean view projects, many of which also have golf course frontage (particularly those at Kapalua and Wailea Resorts), had the second highest average annual sales with 64 units. Golf course and interior lots had average annual sales rates of 31 and 58 units, respectively.

Source: Hawaii NR Service and John Child & Company, Inc.

**locations, Inc. Special Report.** March 1986.

V-5
### Exhibit V-I

**Market Time for Selected Condominium Projects**

<table>
<thead>
<tr>
<th>Year first offered</th>
<th>Project</th>
<th>Number of units sold</th>
<th>Marketing period (years)</th>
<th>Average annual sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>Wailea Dali I</td>
<td>100</td>
<td>1.0</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Wailea Dali II</td>
<td>90</td>
<td>0.5</td>
<td>180</td>
</tr>
<tr>
<td>1976</td>
<td>Wailea Dali III</td>
<td>106</td>
<td>1.0</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>Wailea Elua I</td>
<td>34</td>
<td>1.5</td>
<td>38</td>
</tr>
<tr>
<td>1977</td>
<td>Wailea Elua II</td>
<td>32</td>
<td>1.5</td>
<td>22</td>
</tr>
<tr>
<td>1978</td>
<td>Wailea Elohu</td>
<td>148</td>
<td>2.0</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Country Club Villas I &amp; II</td>
<td>116</td>
<td>1.0</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>Kaanapali Makaha</td>
<td>48</td>
<td>0.5</td>
<td>96</td>
</tr>
<tr>
<td>1979</td>
<td>Hawaiian Princess At Makaha</td>
<td>127</td>
<td>1.0</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>Wailea Elua II</td>
<td>65</td>
<td>4.0</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Kaanapali Royal</td>
<td>105</td>
<td>0.5</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Koaloha At Kaanapili, Phase I</td>
<td>62</td>
<td>0.5</td>
<td>92</td>
</tr>
<tr>
<td>1980</td>
<td>Koahula Pal</td>
<td>64</td>
<td>2.0</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Kaanapali Alii</td>
<td>120</td>
<td>6.0</td>
<td>20</td>
</tr>
<tr>
<td>1982</td>
<td>Hikuma Surf, Phase I</td>
<td>85</td>
<td>2.5</td>
<td>34</td>
</tr>
<tr>
<td>1985</td>
<td>Cascades</td>
<td>20</td>
<td>1.0</td>
<td>20</td>
</tr>
</tbody>
</table>

*Source: Discussions with realtors or representatives of the respective projects.*

### Exhibit V-K

**Market Time by Location of Selected Condominium Projects**

<table>
<thead>
<tr>
<th>Project</th>
<th>Units sold</th>
<th>Marketing period (years)</th>
<th>Average annual sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kona Oahu</td>
<td>171</td>
<td>3.0</td>
<td>57</td>
</tr>
<tr>
<td>Neighbor Island Resorts:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea</td>
<td>593</td>
<td>11.0</td>
<td>57</td>
</tr>
<tr>
<td>Koko Kai</td>
<td>225</td>
<td>6.0</td>
<td>52</td>
</tr>
<tr>
<td>Other Kona</td>
<td>106</td>
<td>3.5</td>
<td>35</td>
</tr>
<tr>
<td>Kona Oahu</td>
<td>326</td>
<td>3.2</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>1,250</td>
<td>25.0</td>
<td>50</td>
</tr>
</tbody>
</table>

*Source: John Child & Company, Inc.*
### Exhibits V-1

**Hawaii**

**Sales Absorption by View Orientation at Selected Resort Condominium Projects**

<table>
<thead>
<tr>
<th>Oceantront projects:</th>
<th>Number of units sold</th>
<th>Marketing period (years)</th>
<th>Average annual sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaanapali:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maui at Kaanapali</td>
<td>120</td>
<td>0.5</td>
<td>20</td>
</tr>
<tr>
<td>Kaanapali All</td>
<td>120</td>
<td>0.5</td>
<td>20</td>
</tr>
<tr>
<td>Kapalua:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bay Villas</td>
<td>40</td>
<td>0.5</td>
<td>80</td>
</tr>
<tr>
<td>Ironwoods</td>
<td>143</td>
<td>0.5</td>
<td>282</td>
</tr>
<tr>
<td>Wailea:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Elua I</td>
<td>100</td>
<td>1.0</td>
<td>100</td>
</tr>
<tr>
<td>Wailea Elua IA</td>
<td>54</td>
<td>1.3</td>
<td>36</td>
</tr>
<tr>
<td>Honua Lani:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honua Lani Terrace</td>
<td>79</td>
<td>1.0</td>
<td>27</td>
</tr>
<tr>
<td>Honua Lani Point</td>
<td>16</td>
<td>1.0 /</td>
<td>16</td>
</tr>
<tr>
<td>Total or average</td>
<td>1,054</td>
<td>1.0 /</td>
<td>75</td>
</tr>
</tbody>
</table>

| Ocean view projects:          |                      |                          |                      |
| Kaanapali Plantation          |                      |                          |                      |
| Kapalua:                      |                      |                          |                      |
| Golf Villas                   | 186                  | 0.5                      | 372                  |
| The Ridge                     | 161                  | 0.5                      | 322                  |
| Wailea:                       |                      |                          |                      |
| Wailea Elua II                | 104                  | 1.0                      | 104                  |
| Wailea Elua III               | 104                  | 1.0                      | 104                  |
| Wailea Elua IV                | 55                   | 4.0                      | 27                   |
| Wailea Elua V                 | 35                   | 1.0 /                    | 34                   |
| Total or average              | 723                  | 12.0 /                   | 61                   |

| Golf-frotn projects:          |                      |                          |                      |
| Kaanapali:                    |                      |                          |                      |
| International Colony Club I   | 22                   | 1.0                      | 22                   |
| International Colony Club II  | 22                   | 1.5                      | 15                   |
| Kealani Elwood                | 54                   | 0.5                      | 80                   |
| Kealani Elwood II             | 122                  | 4.5                      | 36                   |
| Kamaolani Royal               | 363                  | 0.5                      | 210                  |
| Wailea Elua                   | 118                  | 2.0                      | 74                   |
| Total or average              | 503                  | 10.0 /                   | 50                   |

1/ Units sold over a ten-month period.

Source: Discussions with realtors or representatives of the respective projects.

### Sales Prices

Statewide condominium unit sales prices escalated dramatically from 1979 to 1981 as investment speculation increased. Prices declined in 1982 and 1983 as interest rates soared and national and international economic conditions worsened. Prices have readjusted and have remained stable since 1984.

Exhibit V-1 illustrates the price mix of all units sold in the selected condominium projects since 1979. The units on Oahu were the least expensive, with nearly 97% of the units sold priced below $150,000. By contrast, the apartments in Kapalua Surf and those at Kaanapali were the most expensive, with about 73% to 83% of the units sold priced above $300,000.

Price variations primarily result from differences in:

- Location
- Frontage (ocean/golf course/interior)
- Unit size
- Quality and design characteristics
- Age and condition
- Land tenure

Apartment prices currently average between $100 and $300 per square foot of interior area, shown as follows.

<table>
<thead>
<tr>
<th>Average Sales Prices per Square Foot in 1/81-1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Oahu</td>
</tr>
<tr>
<td>Maui -</td>
</tr>
<tr>
<td>Kaanapali</td>
</tr>
<tr>
<td>Wailea</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Keawakapu Beach</td>
</tr>
<tr>
<td>Princeville</td>
</tr>
</tbody>
</table>

1/ Hawaii MBA Service and John Child & Company, Inc.
<table>
<thead>
<tr>
<th>Resort</th>
<th>Under $100k</th>
<th>$100k-$199k</th>
<th>$200k-$299k</th>
<th>$300k-$399k</th>
<th>$400k-$499k</th>
<th>$500k-$599k</th>
<th>$600k-$699k</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kailua</td>
<td>710</td>
<td>25,000</td>
<td>42,000</td>
<td>23,000</td>
<td>1,000</td>
<td>63,000</td>
<td>7,000</td>
<td>100</td>
</tr>
<tr>
<td>Kaaawa</td>
<td>0</td>
<td>5,000</td>
<td>1,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Waikiki</td>
<td>1</td>
<td>9,000</td>
<td>25,000</td>
<td>42,000</td>
<td>16,000</td>
<td>9,000</td>
<td>900</td>
<td>100</td>
</tr>
<tr>
<td>Princeville</td>
<td>1</td>
<td>10,000</td>
<td>33,000</td>
<td>45,000</td>
<td>3,000</td>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Resort sales</td>
<td>16</td>
<td>19</td>
<td>21</td>
<td>24</td>
<td>7</td>
<td>14</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Luxury sales</td>
<td>63</td>
<td>21,000</td>
<td>11,000</td>
<td>6,000</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Kauai</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Nonresort sales</td>
<td>49</td>
<td>17</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>All sales</td>
<td>26</td>
<td>18</td>
<td>17</td>
<td>19</td>
<td>8</td>
<td>12</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Buyer Characteristics**

The characteristics of the typical buyers are discussed as follows:

- **Purchase Motivation**: Purchase motivations vary significantly depending on quality and price levels. Higher-priced units are typically purchased by individuals seeking vacations or retirement homes in Hawaii. In contrast, lower-priced units are typically purchased by individuals motivated by investment opportunities, and are likely to keep the units in rental pools.

- **Typical Age**: The typical age of purchasers ranges from about 40 to 65 years old, with an average age of 45 to 50.

- **Occupation**: The condominium purchaser for the projects studied is typically a professional, corporate officer or an entrepreneur.

- **Household Income**: Average household incomes for all buyers ranged from about $30,000 to over $50,000. Buyer incomes are typically higher at the more luxurious properties.

- **Use of Units**: 21 to 61% of all apartments in the selected projects are used as primary residences, as shown in Exhibit V-8.

- **Place of Origin**: Buyers are typically from the western United States, especially from California, Washington, Oregon and Alaska. In Wailea, Kaaawa, and Kekaha, buyers are most frequently from the western United States, as shown in Exhibit V-9. In contrast, nearly 50% of those purchasing condominiums in rural Oahu and Princeville are from Hawaii. Buyers from within the State tend to be attracted to units in resort or quasi-resort areas perceived to have a lower degree of tourist activity.

**Condominium Market Assessment**

The potential for condominium development at Mokuleia is assessed in terms of the market support for condominium apartment units and the development concepts under consideration.

Source: Hawaii "M" Service and John Child & Company, Inc.
### Exhibit V-N

**HOKULEIA**
Percentage of Apartments at Selected Condominium Projects with Home Exemptions

<table>
<thead>
<tr>
<th>Location</th>
<th>All units</th>
<th>Units sold since 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Oahu:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koolina</td>
<td>62</td>
<td>22</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>22</td>
</tr>
<tr>
<td>Maui:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kama'pali</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Wailua</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Kauai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kama'pali</td>
<td>21</td>
<td>41</td>
</tr>
<tr>
<td>Wailua</td>
<td>16</td>
<td>42</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>149</td>
</tr>
<tr>
<td>Kauai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keahou</td>
<td>27</td>
<td>53</td>
</tr>
<tr>
<td>Princeville</td>
<td>52</td>
<td>40</td>
</tr>
</tbody>
</table>

**HOKULEIA**
Distribution of Buyers by Residence

<table>
<thead>
<tr>
<th>Location</th>
<th>Hawaii</th>
<th>Far West</th>
<th>Other Mainland</th>
<th>International</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Oahu:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koolina</td>
<td>47%</td>
<td>31%</td>
<td>18%</td>
<td>4%</td>
<td>100%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
<td>19%</td>
<td>51%</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>53%</td>
<td>50%</td>
<td>69%</td>
<td>5%</td>
<td>100%</td>
</tr>
<tr>
<td>Maui:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kama'pali</td>
<td>21%</td>
<td>41%</td>
<td>29%</td>
<td>9%</td>
<td>100%</td>
</tr>
<tr>
<td>Wailua</td>
<td>16%</td>
<td>42%</td>
<td>27%</td>
<td>13%</td>
<td>100%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>67%</td>
<td>23%</td>
<td>5%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>38%</td>
<td>50%</td>
<td>59%</td>
<td>17%</td>
<td>100%</td>
</tr>
<tr>
<td>Kauai</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keahou</td>
<td>27%</td>
<td>53%</td>
<td>18%</td>
<td>2%</td>
<td>100%</td>
</tr>
<tr>
<td>Princeville</td>
<td>52%</td>
<td>40%</td>
<td>7%</td>
<td>1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Prospective Market Segments

Initially, the condominium buyers could be expected to be Oahu residents and visitors who return frequently.

The demographic characteristics of the identified markets are expected to be similar to those of comparable first-class projects in the State; however, supported to a larger extent by island residents. Buyers are expected to be composed primarily of married couples from Hawaii and the western United States aged 55 to 65, who are physically active and seeking a recreation-oriented environment.

Market Support for Condominium Development

The market support for condominium units at Hokulea is dependent on the community's ability to emerge as a major recreational development. As a result, demand is largely a function of Hokulea's ability to attract a large base of repeat visitors and local residents from which condominium buyers may emerge.

The market support of condominium units at Hokulea is projected based on historical and projected new condominium sales trends.

The sales absorption has ranged from 70 to 210 units per year since 1975, as previously shown in Exhibits V-2 through V-1. These projects have achieved an average of about 50 unit sales per year, with oceanfront developments achieving about 95 units per year.

At Hokulea, sales absorption for oceanfront condominiums are projected to increase from 70 units per year beginning in 1990 to 80 units per year by 2000. Similarly, the sales absorption for condominiums on the maku portion of Hokulea are projected to increase from 45 units per year beginning in 1990 to a stabilized rate of 55 units per year by 2000. The projected sales absorption results in support for about 1,725 units, shown as follows.

<table>
<thead>
<tr>
<th>Projected Market Support for</th>
<th>Condominium Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makai</td>
<td>55</td>
</tr>
<tr>
<td>Mauka</td>
<td>225</td>
</tr>
<tr>
<td>Total</td>
<td>275</td>
</tr>
</tbody>
</table>

* Development limited to about 1,000 units due to physical constraints. Sellout projected to occur in mid-2004.

While the market supports potential development of over 1,700 condominium units, the current development concepts envision only about 1,200 condominium units.

Alternative Development Sites

The current development concepts for Hokulea center on sites suitable for condominium development. The sites are grouped based on their views and ocean and golf course frontages.

- Oceanfront Sites - These sites offer views and private beachfronts. Density could average about 25 units per acre, and total about 1,000 units. The unit mix could be predominantly one-bedroom units, with secondary emphasis on studio and two-bedroom units. Units would be efficiently designed. The oceanfront sites are physically removed from the remainder of the community. Thus, it will be important to either minimize perceived distances or to create a self-contained environment with complete facilities and amenities and an orientation to the ocean.

- Golf Course Frontage Sites - The golf-frontage sites could be attractive to residents and repeat visitors to attract Oahu buyers. Development density could average between 10 and 15 units per acre. These developments should include swimming pools, recreation centers, and other amenities as well. The unit mix could offer a greater number of two-bedroom units to be attractive to local families and investment hubs.
VI - RESIDENTIAL MARKET ASSESSMENT

Market demand would likely exist for various products permitted in the residential land use category. This chapter assesses the market support for residential development at Hokuleia and reviews the development trends, characteristics and sales performance of residential subdivisions at selected areas in Hawaii.

SELECTION OF COMPARABLE RESIDENTIAL SUBDIVISIONS

The location, preliminary development concepts and recreation orientation of Hokuleia is unlike any existing area in Hawaii.

Residential development in Hokuleia could share similarities with residential developments in major planned resort communities on the neighbor islands (community lots) and lots of one acre or more available on Oahu (acreage lots).

Community Lots

Community lots are within a master-planned resort community. These lots are typically planned to include neighborhood and characteristics attractive to residents and visitors. In addition, the resort facilities provide a concentration of recreational activities.

Acreage Lots

Acreage lots are typically about an acre and are in rural locations. These lots provide greater privacy between homes, and the neighborhood has a quieter "country" environment. Small-scale farming may be possible on some of the larger lots.

Hokuleia offers a unique environment compatible to both community and acreage lots. The trends affecting the development and projected market support for these types of residential developments are discussed in the following sections.

COMMUNITY LOTS

The historical development, existing and planned inventory, physical characteristics and market performance of community lots are discussed as follows.

Historical Development

Except for Waikoloa Village and Princeville Resorts, resort areas in Hawaii have primarily focused on the development of hotels, resort condominiums and commercial facilities rather than on residential subdivisions.

To date, no community lots have been developed on Oahu. Lots have been developed in five neighbor island resorts. These resorts are located as follows:

<table>
<thead>
<tr>
<th>Island</th>
<th>Resort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>Waikoloa Village</td>
</tr>
<tr>
<td></td>
<td>Keauhou</td>
</tr>
<tr>
<td>Kauai</td>
<td>Princeville</td>
</tr>
</tbody>
</table>

Community lot development began in 1971 with the completion of 108 lots at Princeville and 24 lots at Keauhou. About 70% of the total lots developed at the selected projects had been completed by 1975. No further lots were developed until the peak of real estate activity in 1979 and 1980.

Currently, about 2,149 community lots are located in the five selected resorts. The majority of these lots are at Waikoloa Village and Princeville which include 968 and 673 lots, respectively, as shown in Exhibit VI-A. This represents 43% and 31%, respectively, of the total inventory sampled at these first-class resort communities.

Planned Development

Over the next two decades, about 6,900 lots are proposed at the selected projects on the neighbor islands, as shown in Exhibit VI-B. About 61 are planned for development before 1990.

The greatest potential development is at Waikoloa Village, where about 4,830 additional lots could be developed. Significant lot development is also planned at Keauhou, Wailea, and Kamaole Beach, which account for about 1,560 additional lots.

Current development plans at Turtle Bay and West Beach on Oahu do not include residential lots. Thus, the community lots at Hokuleia would not face any competition from projects on Oahu.
<table>
<thead>
<tr>
<th>Island</th>
<th>Location</th>
<th>Planned, 1986-90</th>
<th>Proposed, after 1990</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mau:</td>
<td>Wailoa</td>
<td>160</td>
<td>227</td>
<td>387</td>
</tr>
<tr>
<td></td>
<td>Kuapaoli</td>
<td>596</td>
<td>596</td>
<td>596</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>160</td>
<td>726</td>
<td>886</td>
</tr>
<tr>
<td>Hawaii:</td>
<td>South Kohala</td>
<td>26</td>
<td>270</td>
<td>296</td>
</tr>
<tr>
<td></td>
<td>Waikoloa Village</td>
<td>200</td>
<td>4,630</td>
<td>4,830</td>
</tr>
<tr>
<td></td>
<td>Keahou</td>
<td>30</td>
<td>3,030</td>
<td>3,060</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>276</td>
<td>5,730</td>
<td>6,006</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>436</td>
<td>6,856</td>
<td>7,292</td>
</tr>
</tbody>
</table>

Source: Discussions with developers of the respective projects, public documents filed with the State Land Use Commission, and other public sources.
<table>
<thead>
<tr>
<th>Location</th>
<th>Date of Completion</th>
<th>Year of Construction</th>
<th>Annual Lot Completions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaihala Village</td>
<td>1968</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kaihala Estates I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kaihala Estates II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walling Beach</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hangman Estates</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Paul Estates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamalani Beach</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamalani Estates</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamalani Hillside I</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamalani Hillside II</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamalani Hillside III</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kailua Estates</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kailua Estates</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,520</td>
<td>152</td>
<td>150</td>
</tr>
</tbody>
</table>

The Kailua Estates community also includes the 25-lot Kaneohe Bay subdivision which was developed in the 1950's by Bishop Estates.

Source: Developers or representatives of the respective projects.
Characteristics of Selected Developments

This section describes the lots in major subdivisions at the selected Hawaii resort communities in terms of subdivision lot characteristics and amenities.

Lot Type

Community lot types are differentiated by their location with respect to the following amenities:

- Oceanfront
- Golf course
- Hillside, offering ocean or valley views
- Other interior lots.

The majority of the existing and planned (near-term) community lots are either hillside lots with ocean and/or valley views or interior lots, as shown in Exhibit VI-C. Lot developments that abut golf course fairways are the next most common type while oceanfront lots represent only about 71 of lots developed or planned at the selected resorts.

Lot View

View orientations are a major consideration. Ocean or mountain views may compensate for the locational disadvantages of a community lot or contribute to its desirability. For example, many interior lots at Wailea and Princeville command ocean or mountain views which compensate for their lack of fairway or ocean frontage. The primary view orientations of lots at the selected comparable subdivisions are also noted in Exhibit VI-C.

Lot Site

Typical lots at the selected projects range from 9,500 to 29,000 square feet. The lots average about 10,000 to 15,000 square feet. The higher-priced golf course lots are generally larger than the interior or hillside view lots because purchasers of golf-front lots are more willing to pay for the additional land.

Amenities

Private recreational facilities and security are major features of successful community lot developments on the mainland U.S. These features have generally not been incorporated in the existing first-class subdivisions in Hawaii. Instead, most of the subdivisions offer short-term, complimentary or voluntary memberships at golf or tennis facilities.

---

**Exhibit VI-C**

<table>
<thead>
<tr>
<th>Development</th>
<th>Year of completion</th>
<th>Oceanfront</th>
<th>Golf course</th>
<th>Hillside ocean</th>
<th>Valley view</th>
<th>Interior</th>
<th>Total Lots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wailea Village</td>
<td>1971-1972</td>
<td>7</td>
<td>63</td>
<td>50</td>
<td>16</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Kamaole Hills</td>
<td>1975</td>
<td>31</td>
<td>26</td>
<td>15</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamaole Hills</td>
<td>1980</td>
<td>35</td>
<td>26</td>
<td>24</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamaole Hills</td>
<td>1982</td>
<td>36</td>
<td>26</td>
<td>24</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamaole Hills</td>
<td>1984</td>
<td>37</td>
<td>26</td>
<td>24</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamaole Hills</td>
<td>1985</td>
<td>38</td>
<td>26</td>
<td>24</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princeville:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness I</td>
<td>1977</td>
<td>32</td>
<td>25</td>
<td>48</td>
<td>105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness II, Unit I</td>
<td>1975</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness II, Unit II</td>
<td>1975</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness III, Unit I</td>
<td>1979</td>
<td>16</td>
<td>11</td>
<td>6</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness III, Unit II</td>
<td>1977</td>
<td>15</td>
<td>12</td>
<td>6</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverness III, Unit III</td>
<td>1978</td>
<td>15</td>
<td>11</td>
<td>6</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkside Village</td>
<td>1980</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkside Village</td>
<td>1981</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkside Village</td>
<td>1982</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Lots</td>
<td></td>
<td>150</td>
<td>105</td>
<td>30</td>
<td>285</td>
<td>1,135</td>
<td></td>
</tr>
</tbody>
</table>

---

Notes: 1. Not available.
2. Including those for which data are not available.
3. Source: Developers or representatives of the respective projects.
### Mokuleia

#### Average Annualized Sales of Residential Lots at Selected Mokuleia Resort Communities as of December 1985

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Date offered</th>
<th>Months on market to date or sold</th>
<th>Available for sale</th>
<th>Sold</th>
<th>Unsold</th>
<th>Average annualized sales per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kualoa - Kualoa subdivision</td>
<td>1971</td>
<td>0.5</td>
<td>26</td>
<td>24</td>
<td>0</td>
<td>365</td>
</tr>
<tr>
<td>Kualoa - Kualoa subdivision</td>
<td>1970-1971</td>
<td>N/A</td>
<td>15</td>
<td>5</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Royal Kualoa Estates</td>
<td>1970-1971</td>
<td>N/A</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Princeville</td>
<td>1970-1971</td>
<td>N/A</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Increment I, Unit IV</td>
<td>March 1971</td>
<td>33.0</td>
<td>108</td>
<td>108</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Increment I, Unit III</td>
<td>March 1971</td>
<td>36.0</td>
<td>95</td>
<td>95</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Increment I, Unit II</td>
<td>October 1973</td>
<td>40.0</td>
<td>121</td>
<td>121</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Increment I, Unit I</td>
<td>May 1975</td>
<td>55.0</td>
<td>216</td>
<td>216</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>Walla - Fairway Estates</td>
<td>June 1975</td>
<td>27.0</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>July 1976</td>
<td>84.0</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>July 1979</td>
<td>72.0</td>
<td>32</td>
<td>32</td>
<td>0</td>
<td>56</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>February 1960</td>
<td>72.0</td>
<td>17</td>
<td>17</td>
<td>0</td>
<td>94</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>September 1969</td>
<td>62.0</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>November 1980</td>
<td>50.0</td>
<td>99</td>
<td>99</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>June 1982</td>
<td>43.0</td>
<td>58</td>
<td>58</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>January 1983</td>
<td>8.0</td>
<td>24</td>
<td>24</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>June 1984</td>
<td>10.0</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Waialua - Sunset Drive</td>
<td>August 1984</td>
<td>15.0</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Total or weighted average</td>
<td></td>
<td>1.181</td>
<td>99</td>
<td>99</td>
<td>0</td>
<td>18</td>
</tr>
</tbody>
</table>

N/A = Not available.

1/ Excludes lots at Kualoa where market period is not available.

Source: Hawai'i EMC Service and John Child & Company, Inc.

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**Exhibit 6.4**

---

The buyers of community lots are described in terms of their income, education, place of residence, and other characteristics. According to the survey, buyers of residential lots are primarily upper-income professionals and urban businesspeople, who are often retirees or investors who are planning to build or buy their retirement homes. Some buyers are also retired workers who are interested in purchasing lots for income-producing activities, such as rental properties or vacation homes.

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**Exhibit 5.5**

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At Princeville, the average annualized sales of residential lots are significantly higher than at Kualoa. The average annualized sales at Princeville are around 35% higher than at Kualoa, reflecting the higher quality and desirability of the properties at Princeville. The data indicates that the demand for residential lots at Princeville is higher than at Kualoa, with a larger percentage of sales occurring in the higher price ranges.

---

**Exhibit 5.6**

---

The average annualized sales of residential lots at Kualoa are lower than at Princeville. This is reflected in the lower percentage of sales occurring in the higher price ranges. The data suggests that the demand for residential lots at Kualoa is lower than at Princeville, with a smaller percentage of sales occurring in the higher price ranges. The lower prices at Kualoa may be due to the lower quality and desirability of the properties at Kualoa.

---

**Exhibit 5.7**

---

At Kualoa, the average annualized sales of residential lots are lower than at Princeville. This is reflected in the lower percentage of sales occurring in the higher price ranges. The data suggests that the demand for residential lots at Kualoa is lower than at Princeville, with a smaller percentage of sales occurring in the higher price ranges. The lower prices at Kualoa may be due to the lower quality and desirability of the properties at Kualoa.

---

**Exhibit 5.8**

---

The average annualized sales of residential lots at Princeville are significantly higher than at Kualoa. The average annualized sales at Princeville are around 35% higher than at Kualoa, reflecting the higher quality and desirability of the properties at Princeville. The data indicates that the demand for residential lots at Princeville is higher than at Kualoa, with a larger percentage of sales occurring in the higher price ranges.

---

**Exhibit 5.9**

---

At Kualoa, the average annualized sales of residential lots are lower than at Princeville. This is reflected in the lower percentage of sales occurring in the higher price ranges. The data suggests that the demand for residential lots at Kualoa is lower than at Princeville, with a smaller percentage of sales occurring in the higher price ranges. The lower prices at Kualoa may be due to the lower quality and desirability of the properties at Kualoa.

---

**Exhibit 5.10**

---

At Kualoa, the average annualized sales of residential lots are lower than at Princeville. This is reflected in the lower percentage of sales occurring in the higher price ranges. The data suggests that the demand for residential lots at Kualoa is lower than at Princeville, with a smaller percentage of sales occurring in the higher price ranges. The lower prices at Kualoa may be due to the lower quality and desirability of the properties at Kualoa.
<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Months on market to date of sale</th>
<th>Available for sale</th>
<th>Sold</th>
<th>Unsold</th>
<th>Average annual sales per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaunolu - Kaunolu subdivision</td>
<td>1971</td>
<td>0.5</td>
<td>24</td>
<td>24</td>
<td>365</td>
</tr>
<tr>
<td>Kaunapali Beach:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaunapali Vistas</td>
<td>1970-1971</td>
<td>N/A</td>
<td>35</td>
<td>35</td>
<td>N/A</td>
</tr>
<tr>
<td>Royal Kaunapali Estates</td>
<td>1970-1971</td>
<td>N/A</td>
<td>13</td>
<td>13</td>
<td>N/A</td>
</tr>
<tr>
<td>Princeville:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increment I, Unit II</td>
<td>March 1971</td>
<td>35.0</td>
<td>108</td>
<td>108</td>
<td>41</td>
</tr>
<tr>
<td>Increment I, Unit III</td>
<td>March 1971</td>
<td>38.0</td>
<td>131</td>
<td>131</td>
<td>38</td>
</tr>
<tr>
<td>Increment I, Unit IV</td>
<td>October 1973</td>
<td>45.0</td>
<td>216</td>
<td>216</td>
<td>45</td>
</tr>
<tr>
<td>Increment I, Unit V</td>
<td>May 1973</td>
<td>27.0</td>
<td>31</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>Wellness - Fairway Estates</td>
<td>June 1975</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princeville:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunset Drive</td>
<td>July 1978</td>
<td>50.0</td>
<td>26</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>Increment I, Unit II</td>
<td>July 1979</td>
<td>72.0</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Increment I, Unit III</td>
<td>February 1980</td>
<td>71.0</td>
<td>19</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Increment I, Unit IV</td>
<td>September 1980</td>
<td>65.0</td>
<td>18</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Wellness - Kai Estates</td>
<td>November 1980</td>
<td>50.0</td>
<td>100</td>
<td>100</td>
<td>24</td>
</tr>
<tr>
<td>Wellness Golf Estates</td>
<td>June 1982</td>
<td>43.0</td>
<td>100</td>
<td>100</td>
<td>24</td>
</tr>
<tr>
<td>Kaanapali Beach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaanapali Hillside 1</td>
<td>January 1983</td>
<td>8.0</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Kaanapali Hillside II and IIIB</td>
<td>June 1984</td>
<td>19.0</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Kaabiting Resort - Kaunolu Estates</td>
<td>August 1984</td>
<td>16.0</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Total - weighted average</td>
<td></td>
<td></td>
<td>1,181</td>
<td>996</td>
<td>187</td>
</tr>
</tbody>
</table>

N/A - Not available.
Excludes lots at Kaunapali where market period is not available.
Sources: Hawaii DM Service and John Child & Company, Inc.

The table above provides detailed information on the average annual sales of lots at various subdivisions in Hawaii. The data includes the month and year of availability, the number of lots sold, and the average annual sales per year. The overall average for the period is calculated with a weighted average, taking into account the number of lots sold and the sales price. This method provides a more accurate representation of the market trends. The data is crucial for understanding the real estate market in Hawaii, especially for developers and investors who are interested in purchasing lots for future development. The table also highlights the variations in sales performance across different subdivisions, which can be attributed to various factors such as location, amenities, and overall market demand.
### HONOLULU
Percent Distribution of Principal Residence of Residential Lot Buyers at Selected Hawaii Resort Communities

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Mainland United States</th>
<th>Other outlying United States</th>
<th>California</th>
<th>Other</th>
<th>Island residents</th>
<th>Other State residents</th>
<th>Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makena - Waterfront</td>
<td>50%</td>
<td>10%</td>
<td>30%</td>
<td>10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Kau Estates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailea Golf Estates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua Estates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua Beachside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua Hillside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapalua Hillside II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waikoloa Village</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXHIBIT V-1**

N/A = Not available.
Source: Developers or representatives of the respective developments and ZMK Service.

---

The 193 lot Haiku Hillside Subdivision is the only subdivision on Maui that fully met the State's criteria. The area market demand has been high for oceanfront lots, and the Haiku Hillside development has received favorable prices.

###註

**NOTE**: The data presented are based on surveys conducted by developers or representatives of the respective developments and ZMK Service.

---

**Historical Note**

Historical data on Maui development and related statistics are not available due to the lack of comprehensive historical records for the island. The development patterns on Maui have been influenced by factors such as oceanfront views, demand for larger lots, and the presence of natural and cultural resources.

**Source**

Developers or representatives of the respective developments and ZMK Service.

---

During the last three to five years, there has been a significant increase in residential lot development and planned inventory. The higher quality and prices of more recently developed developments have resulted in a higher demand for oceanfront lots and those with views of water bodies.

---

**Sirius**

The development of the 193 lot Haiku Hillside Subdivision is one of the few successful development projects on Maui. The area has received favorable prices and has been in high demand due to its oceanfront location.

---

**Rounded**

The Haiku Hillside Subdivision is one of the few successful developments on Maui. The area has received favorable prices and has been in high demand due to its oceanfront location.
Characteristics of Comparable Developments

Because of the variations in the size, number and physical characteristics of acreage lot subdivisions, six subdivisions on Oahu, Maui, and Molokai have been selected for analysis. They include:

<table>
<thead>
<tr>
<th>Island</th>
<th>Subdivision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu</td>
<td>Pupukoa</td>
</tr>
<tr>
<td></td>
<td>Hokuleia Agricultural Subdivision</td>
</tr>
<tr>
<td></td>
<td>Pau Hana Estates</td>
</tr>
<tr>
<td></td>
<td>Maui Uplands</td>
</tr>
<tr>
<td>Maui</td>
<td>Papohaku Ranchlands</td>
</tr>
<tr>
<td></td>
<td>Kavela Plantations</td>
</tr>
</tbody>
</table>

The six subdivisions contain a total of 1,059 lots, and have generally been developed during the past 10 years.

This section describes the selected acreage subdivisions in terms of lot characteristics and amenities.

Lot Type and Views

About 54% of the lots in the selected subdivisions are considered view lots, 42% are interior lots, and the remaining 4% are located in Papohaku Ranchlands, which are oceanfront lots, as shown in Exhibit VI-11.

The lots in all but the Hokuleia Agricultural Subdivision and portions of Pupukoa are hillside lots. Hillside lots characteristically have sloping topography which generally enhances view planes.

View lots generally have ocean views of varying quality and/or views of attractive land masses, such as Mount Haleakala and the West Maui mountains on Maui.

Lot Size

Typical lots at the selected subdivisions range between 0.5 and 7.0 acres, as shown in Exhibit VI-1. Individual lot sizes do not vary substantially within each of the selected subdivisions.

Amenities

None of the selected subdivisions provide any common amenities or security features. Maui Uplands and Papohaku Ranchlands include underground utilities.

---

### Exhibit VI-H

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Number of lots</th>
<th>Oceanfront</th>
<th>Golf course front</th>
<th>View lot</th>
<th>Interior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupukoa</td>
<td>253</td>
<td>--</td>
<td>--</td>
<td>392</td>
<td>612</td>
</tr>
<tr>
<td>Hokuleia Agricultural Subdivision</td>
<td>65</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>100</td>
</tr>
<tr>
<td>Pau Hana Estates</td>
<td>105</td>
<td>--</td>
<td>--</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>Maui Uplands</td>
<td>189</td>
<td>--</td>
<td>--</td>
<td>28</td>
<td>72</td>
</tr>
<tr>
<td>Papohaku Ranchlands</td>
<td>221</td>
<td>172</td>
<td>--</td>
<td>83</td>
<td>--</td>
</tr>
<tr>
<td>Kavela Plantations</td>
<td>186</td>
<td>--</td>
<td>--</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>Total or average</td>
<td>1,059</td>
<td>62</td>
<td>117</td>
<td>561</td>
<td>627</td>
</tr>
</tbody>
</table>

Source: John Child & Company, Inc.

VI-8
Exhibit VI-1

HOKULEIA
Lot Sizes

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Lot size (in acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupukea</td>
<td>1.0</td>
</tr>
<tr>
<td>Hokuleia Agricultural Subdivision</td>
<td>2.0</td>
</tr>
<tr>
<td>Pau Hana Estates</td>
<td>2.0</td>
</tr>
<tr>
<td>Hual Uplands</td>
<td>0.5</td>
</tr>
<tr>
<td>Papohaku Ranchlands</td>
<td>3.0 - 7.0</td>
</tr>
<tr>
<td>Kavela Plantations</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Market Performance

This section examines the market performance of the selected subdivisions. Market performance is examined in terms of historical sales and price trends, buyer profile, and purchase motivations.

**Historical Sales**

On average, lot sales in the six selected subdivisions have averaged about eight lots per year since 1978, as shown in Exhibit VI-1. This average excludes the atypical sales rate at Hual Uplands in 1985.

The sales rates are a function of marketing and advertising. Sales rates are generally the highest in the initial years as an effective marketing plan is implemented. Excluding sales at Pupukea, the average sales rate during the first two full years of marketing is about 17 lots per year.

**Prices**

Acreage lots in the selected subdivisions have been successfully sold at prices between $40,000 and $200,000, as shown in Exhibit VI-K. Size, location, and view characteristics primarily account for price differentials between the lots at the selected subdivisions.

**Buyer Profile**

The acreage lot buyer is similar to the community lot buyer, except that the former prefers a higher degree of privacy and a less active environment.

Between 75% and 100% of the buyers of the acreage lots in subdivisions on Hual and Oahu are typically from within the State, as shown in Exhibit VI-L. The remaining buyers at these subdivisions are from the mainland United States.

By contrast, Hawaii residents make up one-quarter to one-third of the buyers at Papohaku Ranchlands and Kavela Plantations on Molokai. Nearly 60% of the buyers are from the mainland United States, while up to 10% are from international locations.

Source: John Child & Company, Inc.
### Exhibit VI-J

#### MOKULEIA

**Historical Sales Activity**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Papakea</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>32</td>
<td>4.0</td>
</tr>
<tr>
<td>Mokuleia Agricultural Subdivision</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>5</td>
<td>32</td>
<td>6.4</td>
</tr>
<tr>
<td>Pau Hana Estates</td>
<td>5</td>
<td>13</td>
<td>25</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>11</td>
<td>71</td>
<td>8.9</td>
</tr>
<tr>
<td>Hau Uplands</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>5</td>
<td>99</td>
<td>120</td>
<td>24.0</td>
</tr>
<tr>
<td>Papohaku Ranchlands</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3</td>
<td>34</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>47</td>
<td>9.4</td>
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<tr>
<td>Kamea Plantations</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>44</td>
<td>25</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>83</td>
<td>16.6</td>
</tr>
</tbody>
</table>

Weighted average \(1/\) 8.2

---

\(1/\) Excluding Hau Uplands sales in 1985; these lots were sold at auction and reflect an atypical sales rate.

Source: Hawaii MR Service and John Child & Company, Inc.

### Exhibit VI-K

#### MOKULEIA

**Typical Lot Prices**

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Total</th>
<th>Per B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupukea</td>
<td>$95,000-$110,000</td>
<td>$2.20-$2.50</td>
</tr>
<tr>
<td>Mokuleia Agricultural Subdivision</td>
<td>120,000-150,000</td>
<td>1.40-1.70</td>
</tr>
<tr>
<td>Pau Hana Estates</td>
<td>75,000-100,000</td>
<td>0.90-1.15</td>
</tr>
<tr>
<td>Hau Uplands</td>
<td>40,000-60,000</td>
<td>1.80-2.75</td>
</tr>
<tr>
<td>Papohaku Ranchlands</td>
<td>120,000-200,000</td>
<td>0.50-0.80</td>
</tr>
<tr>
<td>Kamea Plantations</td>
<td>80,000-100,000</td>
<td>0.90-1.20</td>
</tr>
</tbody>
</table>

Source: Hawaii MR Service and John Child & Company, Inc.
HOKULEIA
Percent Distribution of
Principal Residence of Acreage Lot Buyers 1/

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Same Island</th>
<th>Neighbor Island</th>
<th>Mainland United States</th>
<th>Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupukea</td>
<td>85%</td>
<td>12%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Hokuulea Agricultural Subdivision</td>
<td>80%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pau Hana Estates</td>
<td>69%</td>
<td>16%</td>
<td>15%</td>
<td>0%</td>
</tr>
<tr>
<td>Ha'iku Uplands</td>
<td>61%</td>
<td>16%</td>
<td>21%</td>
<td>2%</td>
</tr>
<tr>
<td>Papahaku Ranchlands</td>
<td>2%</td>
<td>34%</td>
<td>62%</td>
<td>2%</td>
</tr>
<tr>
<td>Kawela Plantations</td>
<td>11%</td>
<td>16%</td>
<td>62%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Purchase Motivations
The purchase motivations for acreage lots are similar to those observed for community lots. Buyers are generally motivated to buy for future improvement as a vacation or retirement home or investment.

Being the oldest of the selected subdivisions, Pupukea has the highest proportion of improved lots and owner-occupants of those examined, as shown in Exhibit VI-4. The majority of the lots in the remaining subdivisions are vacant. Those lots which are improved are typically not occupied by the owner.

MARKET ASSESSMENT
FOR HOKULEIA
This section assesses the market support for residential lot development at Hokuulea. The marketing of lots is assumed to begin in the 1991 to 1995 period and will be more successful as hotel and condominium development proceeds. Primary buyer market segments, projected lot sales absorption and recommendations for the type and phasing of residential lot development are discussed.

Primary Buyer Market Segments
The primary buyer market for residential lot development at Hokuulea is expected to be persons seeking:

- Primary residence.
- Vacation or retirement home.

These market segments are characterized as follows:

Primary Home
Hokuulea could offer a unique environment for primary residents as urban growth expands towards Ewa and Central Oahu. The primary home market is expected to include Hawaii residents employed in the North Shore and Central Oahu areas. Such buyers could be expected to come from younger age groups, have lower incomes and greater household sizes as compared to vacation or retirement home group.

1/ For lots sold since 1979.
Source: Hawaii TMK Service and John Child & Company, Inc.
Exhibit VI-H

HONOLULU
Improvement Status and Occupancy

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Total Lots</th>
<th>Improved</th>
<th>Owner-Occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupukea</td>
<td>325</td>
<td>51%</td>
<td>38%</td>
</tr>
<tr>
<td>Hokulea Agricultural Subdivision</td>
<td>63</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Pual Hana Estates</td>
<td>105</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Maui Uplands</td>
<td>282</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Pupukaku Ranchland</td>
<td>221</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Kawela Plantations</td>
<td>186</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,059</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent of Total

Vacation or Retirement Home

The vacation or retirement home market is expected to primarily include persons who reside in the western United States and Hawaii residents. The typical buyer is expected to be married, between 40 and 55 years of age and the head of a two- to four-person household. The buyers could be expected to be successful entrepreneurs, professionals or corporate executives.

Secondary Buyer Market Segments

A smaller, secondary market could include the speculative builder and investor markets. Together, these two components could account for between 5% and 10% of total sales.

Projected Sales Absorption

A review of historical sales in the selected community lot developments indicates that annualized sales have ranged from about 13 to 63 lots, as shown in the following table:

Sales at Selected Hawaii Resort Communities

<table>
<thead>
<tr>
<th>Lots sold</th>
<th>Period</th>
<th>Average annualized lot sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kannapali</td>
<td>80</td>
<td>1983-1985 27</td>
</tr>
<tr>
<td>Waikane</td>
<td>31</td>
<td>1975-1977 14</td>
</tr>
<tr>
<td>Princeville</td>
<td>550</td>
<td>1971-1979 63</td>
</tr>
<tr>
<td></td>
<td>94</td>
<td>1978-1985 13</td>
</tr>
</tbody>
</table>

The rate of residential sales has been related to facility development and the maturity of the project as a visitor destination because many buyers are repeat visitors who acquire the property while staying at the resort.

Historical lot sales in selected acreage lot developments indicate annualized lot sales of between 8 and 17 lots, depending on the level of marketing, as previously shown in Exhibit VI-J.

Source: Hawaii MK Service and John Child & Company, Inc.
Lot sales at Hokuleia are projected to increase with the opening of the proposed hotels and condominiums. Community and acreage lot sales are anticipated to benefit from the large resident population on Oahu and the scope of facilities envisioned at Hokuleia. These lots will provide a unique opportunity on Oahu for single-family residency in a quality recreation-oriented community.

Annual community lot sales are projected at 30 lots per year between 1991 and 1995, 40 lots per year between 1996 and 2000, and 50 lots per year between 2001 and 2005.

Annual acreage lot sales are projected at 10 lots between 1991 and 1995, 15 lots per year between 1996 and 2000, and 20 lots per year between 2001 and 2005.

The projected sales rates for community and acreage lots result in an absorption of 825 lots by year-end 2005, as shown in Exhibit VI-8.

While the market supports potential development of 825 residential lots, the current development concepts include only 700 lots.

Proposed Development Guidelines

Residential lot development at Hokuleia could be oriented around the golf course railways on the lowlying areas and hillside lots at the base of the Wai'anae mountains. Subdivision design could maximize the number of golf course frontage and view units.

Based on the physical characteristics of the proposed sites, golf-front units could have views across adjoining railways and water hazards, while hillside units could have views across the community towards the ocean. Subdivisions on Oahu and the neighbor islands have demonstrated strong market acceptance for these types of units.

Guidelines for the planning and development of community and acreage lots in terms of project phasing, lot sizes, sales prices and other considerations are outlined as follows:

1. Project phasing and product segmentation - Development should be phased to provide an adequate supply of both types of lots at any point in time, but should minimize the competition between similar lot types.

2. Sizes - There should be sufficient area to permit a reasonable number of house placements and designs. Frontage along golf course railways will promote a sense of openness as sites will be perceived to continue out onto the greens.

Source: John Child & Company, Inc.

HOKULEIA  
Projected Market Support

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Community lots:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual sales</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Total sales per period</td>
<td>150</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Cumulative sales</td>
<td>150</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>Acreage lots:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual sales</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Total sales per period</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>Cumulative sales</td>
<td>50</td>
<td>125</td>
<td>225</td>
</tr>
<tr>
<td>Community and acreage lots:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual sales</td>
<td>40</td>
<td>55</td>
<td>70</td>
</tr>
<tr>
<td>Total sales per period</td>
<td>200</td>
<td>275</td>
<td>350</td>
</tr>
<tr>
<td>Cumulative sales</td>
<td>200</td>
<td>475</td>
<td>825</td>
</tr>
</tbody>
</table>
- Sales prices - To be competitive, all units should be priced relative to their alternatives in similar settings on Oahu and the neighboring islands.
- Facility and amenity development - Inclusion of any amenities should be weighed against the associated carrying and maintenance costs to be paid by the purchasers.
- Other marketing considerations - Buyers are expected to be motivated by the range of recreational opportunities offered in this environment.

VII - COMMERCIAL/RECREATIONAL
FACILITIES AND AMENITIES

This section assesses the market for support facilities which would complement the residences and visitor facilities at Hokulea. The following sections address the market for a retail shopping center, golf course and other recreational facilities and amenities.

RETAIL MARKET ASSESSMENT

This section describes the market support for a retail shopping center at Hokulea. The following subsections describe the potential retail market segments, project the anticipated expenditures generated by these markets, and estimate the supportable retail space.

Retail Market Segments

The market support for retail space at Hokulea is expected to result from shopping needs of:

- Onsite visitors.
- Onsite residents.
- Off-resort visitors.
- North Shore residents.

These four retail market segments are discussed as follows:

Onsite Residents and Guests

The market support from onsite residents and guests is estimated based on the envisioned development of hotel and condominium units and single-family homes at Hokulea. About 4,000 units are under consideration, to be developed over a 15-year period, as shown in Exhibit VII-A.

The average daily population is estimated based on assumptions as to the type of units, occupancy rates, and size of average resident group. These assumptions are shown in Exhibit VII-B.

The key assumptions are summarized as follows:

- The average annual occupancy rate for Hokulea's hotels is estimated at about 65% over the first 3-year period from 1991 to 1993, and increase to 75%, as a whole, over the following 10 years as the hotels mature.

VII-13
### Exhibit VII-A

**MOKULEIA**  
Proposed Development Phasing Guidelines  
1990 to 2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel units</td>
<td>500</td>
<td>1,100</td>
<td>1,600</td>
<td>2,100</td>
</tr>
<tr>
<td>Condominium units</td>
<td>0</td>
<td>575</td>
<td>1,150</td>
<td>1,200</td>
</tr>
<tr>
<td>Single-family lots:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lots improved 1/</td>
<td>0</td>
<td>10</td>
<td>74</td>
<td>204</td>
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<tr>
<td>Lots vacant</td>
<td>0</td>
<td>199</td>
<td>401</td>
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<td>Subtotal</td>
<td>0</td>
<td>209</td>
<td>475</td>
<td>700</td>
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<tr>
<td>Total units</td>
<td>500</td>
<td>1,079</td>
<td>1,225</td>
<td>4,000</td>
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</tbody>
</table>

### Exhibit VII-B

**MOKULEIA**  
Assumptions for Population Projection

<table>
<thead>
<tr>
<th>Type of unit</th>
<th>2 Distribution %</th>
<th>Occupancy of Group</th>
<th>Average Size</th>
<th>Population Projection Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>100</td>
<td>65</td>
<td>1.8</td>
<td>1.17</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>65</td>
<td>1.8</td>
<td>1.17</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>70</td>
<td>1.8</td>
<td>1.26</td>
</tr>
<tr>
<td>2005</td>
<td>100</td>
<td>75</td>
<td>1.8</td>
<td>1.35</td>
</tr>
<tr>
<td>Condominium units:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>20</td>
<td>95</td>
<td>2.8</td>
<td>0.53</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>30</td>
<td>75</td>
<td>2.1</td>
<td>0.16</td>
</tr>
<tr>
<td>Visitors</td>
<td>59</td>
<td>50</td>
<td>2.1</td>
<td>0.33</td>
</tr>
<tr>
<td>Single-family units:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>40</td>
<td>95</td>
<td>3.3</td>
<td>1.25</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>60</td>
<td>25</td>
<td>2.1</td>
<td>0.29</td>
</tr>
</tbody>
</table>

*NA = Not available.

1/ Distribution of uses within each facility type.

2/ Occupied units only.

Source: Based on interviews with resort operators and brokers at similar resort communities and Hawaii Visitors Bureau, 1985, Profile: The Resort Condominium Market and Profile: The Resort Hotel Market.

Household sizes for full-time condominium, single-family, adult community and starter home residents are determined based on the household size estimates reported for the year 2000 by the Department of General Planning, Land Supply Review, Population Implications of Development Plans, August 1984.

---

1/ Construction on lots projected at 5% of all sold lots within 5 years following lot sales. 30% between 6 and 10 years of sale. 60% between 11 and 15 years.

Source: John Child & Company, Inc.
About 50% of Hokuleia’s condominiums are assumed to be available for visitor use, 30% would be used part-time as vacation homes, and 20% would be used as full-time residences. Occupancy rates for each of these uses is assumed to vary based on the past experience of comparable properties.

Based on these assumptions, the average daily population of Hokuleia is estimated to increase from about 590 persons in 1990 to about 4,680 persons by 2005, as shown in Exhibit VII-C. Of this number, about 80% are expected to be visitors and part-time residents and 20% are expected to be residents.

Offsite Visitors

Visitors to Oahu who do not stay at Hokuleia could be expected to provide additional demand for retail space as they tour the island and visit the area. Because of existing traffic patterns, most of the Oahu’s circle island visitors are not expected to stop at Hokuleia. However, visitors from the Turtle Bay Resort could be expected to patronize the community and enjoy the full range of recreational accommodations in the region.

Offsite visitors are expected to represent a nominal increase in visitor expenditures at Hokuleia and are expected to add another 21% to its population. This is roughly equivalent to about 30 offsite visitors per day by the end of 1995 and 70 offsite visitors per day by the end of 2005.

North Shore Residents

Currently, about 14,000 persons reside in the North Shore region. The resident population of the North Shore region is expected to increase to about 15,000 persons in 1995 and to 15,000 persons by 2005, as projected by the Department of General Planning. Area residents are expected to provide limited market support for the commercial complex because of the range of alternative commercial facilities in Haleiwa and Laie. However, area residents could be expected to provide some market support for restaurants and other eating facilities.

Exhibit VII-C

<table>
<thead>
<tr>
<th>Hokuleia Projected Average Daily Population 1990-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors:</td>
</tr>
<tr>
<td>Hotel units</td>
</tr>
<tr>
<td>Condominium units</td>
</tr>
<tr>
<td>Single-family units</td>
</tr>
<tr>
<td>Subtotal - Visitors</td>
</tr>
<tr>
<td>Residents:</td>
</tr>
<tr>
<td>Condominium units</td>
</tr>
<tr>
<td>Full-time</td>
</tr>
<tr>
<td>Part-time</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
<tr>
<td>Single-family units</td>
</tr>
<tr>
<td>Full-time</td>
</tr>
<tr>
<td>Part-time</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
<tr>
<td>Subtotal - Residents</td>
</tr>
<tr>
<td>Total population</td>
</tr>
</tbody>
</table>

Source: Projected by John Child & Company, Inc. based on assumptions as set forth in Exhibit VII-B.
### Exhibit VII-A

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel units</td>
<td>500</td>
<td>1,100</td>
<td>1,600</td>
<td>2,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium units</td>
<td>0</td>
<td>575</td>
<td>1,150</td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-family lots:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lots improved</td>
<td>0</td>
<td>10</td>
<td>74</td>
<td>204</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lots vacant</td>
<td>0</td>
<td>190</td>
<td>467</td>
<td>496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>500</td>
<td>1,875</td>
<td>2,223</td>
<td>4,090</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Exhibit VII-B

<table>
<thead>
<tr>
<th>Type of unit</th>
<th>1/ Distribution 1/</th>
<th>Occupancy percent</th>
<th>Average size of group occupying 2/</th>
<th>Population projection factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel units:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>100%</td>
<td>65</td>
<td>1.8</td>
<td>1.17</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>65</td>
<td>1.8</td>
<td>1.17</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>70</td>
<td>1.8</td>
<td>1.25</td>
</tr>
<tr>
<td>2005</td>
<td>100</td>
<td>75</td>
<td>1.8</td>
<td>1.35</td>
</tr>
<tr>
<td>Condominium units:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>20</td>
<td>95</td>
<td>2.8</td>
<td>0.33</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>30</td>
<td>75</td>
<td>2.1</td>
<td>0.16</td>
</tr>
<tr>
<td>Visitors</td>
<td>50</td>
<td>50</td>
<td>2.1</td>
<td>0.33</td>
</tr>
<tr>
<td>Single-family units:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>40</td>
<td>95</td>
<td>3.3</td>
<td>1.25</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>60</td>
<td>25</td>
<td>2.1</td>
<td>0.29</td>
</tr>
</tbody>
</table>

1/ Not available.
2/ 1/ Distribution of uses within each facility type.
2/ Occupied units only.

Source: Based on interviews with resort operators and brokers at similar resort communities and Hawaii Visitors Bureau, 1985, Profile: The Resort Condominium Market and Profile: The Resort Hotel Market.

Household sizes for full-time condominium, single-family, adult community and starter home residents are determined based on the household size estimates reported for the year 2005 by the Department of General Planning, Land Supply Review: Population Implications of Development Plans, August 1989.

Note: Construction on lots projected at 3% of all sold lots within 5 years following lot sales; 30% between 6 and 10 years of sale; 60% between 11 and 15 years.

Source: John Child & Company, Inc.
Projected Retail Expenditures

This section projects retail expenditures generated by the four identified market segments. Visitor expenditures from each market segment were projected based on the estimated populations of the four retail markets and their expenditure patterns for retail goods. Expenditures by market segment are presented in Exhibit VII-D and are discussed in the following subsections.

Onsite Visitors

Visitors staying onsite at the hotels, condominiums, and single-family homes are estimated to spend a total of about $51 per day based on surveys conducted by the Hawaii Visitors Bureau. Of this amount, about $45 is estimated to be spent on retail goods. About 45% of the onsite visitors' retail expenditures are projected to be captured at Kukuiola. Thus, these visitors could generate about $4.4 million in retail expenditures (in 1986 dollars) at Kukuiola in 1990 and $25.7 million by 2005, in current 1986 dollars, as shown in Exhibit VII-D.

Onsite Residents

Kukuiola's residents could be expected to purchase convenience goods and patronize food and beverage establishments. Full- and part-time residents of the condominiums and single-family homes are estimated to spend about 10% of their household incomes on retail and food items such as could be found at a shopping center. About 35% to 40% of these expenditures could be spent at Kukuiola. Thus, resident expenditures could be projected to amount to $0.3 million by 1995 and $0.9 million by 2005.

Offsite Visitors

Day visitors to Kukuiola could be expected to provide secondary market support for a shopping facility. Offsite visitors could generate an additional 2% of the onsite visitor expenditures, resulting in about $0.1 million in visitor expenditures in 1990 and $0.3 million in 2005.

North Shore Region Residents

Residents from the surrounding North Shore communities could provide limited market support for a shopping facility; however, this group would be attracted by food and beverage facilities. Thus, Kukuiola could capture about 5% of the area residents' expenditures on retail goods or a total of $0.5 million in expenditures in 1990 and $0.6 million in 2005.

Exhibit VII-D

Possible Annual Retail Expenditures (1990-2005)

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total daily visitors</td>
<td>599</td>
<td>1,390</td>
<td>2,610</td>
<td>3,800</td>
</tr>
<tr>
<td>Daily retail expenditures</td>
<td>543.00</td>
<td>653.00</td>
<td>653.00</td>
<td>653.00</td>
</tr>
<tr>
<td>Capture rate</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>Residential (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time condominium and single-family residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household income</td>
<td>$60,000</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Persons per household</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Percent of income spent on selected retail items</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Capture rate</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>Residential (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time condominium and single-family residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household income</td>
<td>$60,000</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Persons per household</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Percent of income spent on selected retail items</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Capture rate</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>Residential (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total onsite (estimated)</td>
<td>$5.4 million</td>
<td>$12.1 million</td>
<td>$21.1 million</td>
<td>$29.8 million</td>
</tr>
<tr>
<td>From-offsite:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total regional visitors</td>
<td>518</td>
<td>518</td>
<td>518</td>
<td>518</td>
</tr>
<tr>
<td>Persons per household</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Percent of income spent on selected retail items</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Capture rate</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>Residential (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total onsite (estimated)</td>
<td>$5.0 million</td>
<td>$11.3 million</td>
<td>$19.1 million</td>
<td>$21.7 million</td>
</tr>
</tbody>
</table>

4/ Based on conversations with retail operators and visitors at Turtle Bay and other North Shore areas.
5/ Estimated at 5% of retail onsite visitor expenditures.
6/ Data and projections prepared by the Department of Planning and Economic Development. Ad- 
7/ Hawaii Total}

VII-3
Total annual retail sales which could be generated by a shopping complex can be estimated to amount to about $55.0 million in 1998 and to increase to about $227.7 million by the year 2005, as shown in Exhibit VII-F. Visitors could be expected to account for the majority of total expenditures (about 93%) by 2000. Hōkūleia residents could be estimated to account for about 3% of total expenditures, while offsite visitors and North Shore residents could be expected to contribute about 4% of total expenditures.

### Projected Supportable Retail Space

Projections of supportable retail space demand are based on retail expenditures as estimated in the previous section and a desirable level of sales per square foot of retail space.

A survey of four comparable shopping facilities was conducted. These facilities achieved average annual sales of $265 to $700 per square foot in 1985. A reasonable sales level for a shopping facility at Hōkūleia could be estimated at $275 per square foot. Thus, the retail market could be estimated to generate a demand for a total of about 18,200,000 by the end of 1999 and increase to about 100,700,000 by the end of 2005, as shown in Exhibit VII-F.

The demand for retail facilities is estimated less the amount of retail space which could be built at the hotels envisioned. About 15% of retail space per hotel unit could be assumed to be built at the hotels envisioned. No other proposed shopping centers in the Hōkūleia area are known at this time.

Thus, the net demand for retail space could be expected to support about 10,700,000 by 1999 and 69,200,000 by 2005, as also shown in Exhibit VII-F. In comparison, by the year 1999 Princeville Shopping Center and the Kokomo Plantation Market Place were 46,125,000 and 63,600,000, respectively, but significantly smaller than the Whaler’s Village Shopping Center which is about 90,000.

### Development Concept

The shopping facility could be designed to take advantage of the adjoining inland waterfront by including wide, landscaped promenades equipped with benches and tables which could encourage outdoor eating and leisurely walks.

The majority of the leasable retail area of the proposed shopping center could contain apparel, sundry, gift, craft, or jewelry stores or restaurants and eating facilities.

Office, hardware, grocery, and other resident-oriented establishments are not expected to receive market support.

### Source

Source: John Child & Company, Inc.
### Exhibit VII-F

**MERUETIA**  
Projected Supportable Retail Space  
1990-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected annual expenditures (millions in 1986 dollars)</td>
<td>$5.0</td>
<td>$12.8</td>
<td>$21.1</td>
<td>$27.7</td>
</tr>
<tr>
<td>Sales per square foot</td>
<td>$275</td>
<td>$275</td>
<td>$275</td>
<td>$275</td>
</tr>
<tr>
<td>Projected retail space demand (f)</td>
<td>18,200</td>
<td>46,700</td>
<td>76,700</td>
<td>100,700</td>
</tr>
<tr>
<td>Less: Projected hotel retail space (f)</td>
<td>7,500</td>
<td>16,500</td>
<td>26,000</td>
<td>31,500</td>
</tr>
<tr>
<td>Net retail demand (f)</td>
<td>10,700</td>
<td>30,200</td>
<td>50,700</td>
<td>69,200</td>
</tr>
</tbody>
</table>

Retail facilities that could potentially attract offsite visitors consist mainly of widely recognized and highly visible restaurant and food establishments and, to a significantly lesser extent, other retail shops.

**Alternative Commercial Uses**

Makulele development concepts could also include unique facilities, consistent with the recreation orientation of the community, which could enhance the overall community environment. Potential uses being considered are discussed as follows:

**Multi-Media Complex**

A multi-media complex could include facilities for theatrical, cinematic and musical performances, forums and demonstrations. It could also be used for public functions, operating as a meeting hall. The complex could also include an open-air amphitheater for outdoor performances. The complex could have the potential of providing a diverse range of entertainment opportunities which could benefit the North Shore community as a whole.

**Interactive Sports Museum**

A sports museum could showcase the diverse variety of recreational activities which are associated with Hawaii, and describe, through display, demonstration and narration, the history of these activities in Hawaii. In addition, a museum could offer opportunities for participation in the activities. The museum could feature:

- Surfing.
- Fandilo rodeo.
- Hang gliding.
- Polo.
- Ancient Hawaiian games.
- Canoe racing.

A museum could be involved in organizing and sponsoring sporting competitions such as polo matches, rodeos, and nukahilis.

**RECREATIONAL FACILITIES**

**MARKET ASSESSMENT**

Residents and repeat visitors are typically seeking new experiences and are attracted to master-planned destinations. Such self-contained communities offer a wide variety of recreation facilities. Communities of this type do not presently exist on Oahu.
The market for golf course and other recreational facilities are discussed in the following section.

Golf Course Market Assessment

This section reviews the existing golf courses in the vicinity of Hokulea and assesses the demand for championship golf courses at Hokulea from 1990 to 2005.

Existing Golf Courses

Oahu currently has 28 golf courses, 5 of which are public courses, 12 are private-member clubs, 9 are military courses and 2 are resort courses.

In the Hokuilea area, there are four non-military golf courses within about a 30-minute drive. These include the championship 18-hole Turtle Bay Hilton Country Club, the 9-hole Kahuku golf course, the 18-hole Kualani golf course, and the 18-hole private championship course and clubhouse is planned to be completed at the Turtle Bay Resort by about 1989.

Championship Golf Courses

Oahu’s championship courses include the Sheraton Makaha Resort and the Turtle Bay Resort. In comparison, Kauai has seven courses; Hawaii, six courses; and Kauai, one 18-hole and one 27-hole course.

The obvious benefit of a championship golf course is its use as a recreational facility by guests and the general public. A well-reputed course is likely to attract visitors to the area based on its reputation for being challenging and exciting.

A golf course also enhances the image of the community. It offers the intangible benefits of open space, tranquility and aesthetic value to the area. A golf course lowers the overall density of the area and creates a sense of openness to the community. In providing the area with these intangible benefits, a course also enhances the land values of the surrounding areas.

Golf courses are characterized as being “championship” courses if they feature extensive landscaping and a challenging, but forgiving, play.

The number of average daily rounds of golf played on golf courses on the neighboring Islands ranged from about 90 to 200 rounds per day and averaged about 130 rounds per day, based on a survey of nine courses in 1985. In contrast, the actual number of rounds per day experienced at the selected courses, the desired level of play course can handle while maintaining course upkeep, a leisurely pace and golfer satisfaction. The desired level of play courses ranged from about 170 rounds to 220 rounds, and averaged about 200 rounds.

Projected Golf Demand

The demand for golf has been projected based on estimated rounds of play. Rounds are estimated based on projected average daily populations and golf utilization rates. The average daily rounds of golf has been estimated as follows:

- Hotel guest golf demand is based on the projected average daily hotel population and a level of play of about five rounds per every 100 hotel visitors. This level of play is based on the experience of the Wailea and Maui-Maui Resorts.

- Condominium and single-family guest golf demand is based on the projected average daily population and a level of play of about four rounds per condominium or single-family visitor/resident. This is comparable to the level of play experienced at the Princeville and Kapalua Beach Resorts.

- Off-resort golf demand can be expected to be relatively high due to the size of Oahu’s resident and visitor population. A golf course at Hokuilea could be expected to be patronized by tour groups and local golf groups seeking a higher-quality golfing experience than is available at other public courses. The off-resort golf demand is projected to range between about 60 and 120 rounds per day in 1990 and is projected to increase by about 2% per year thereafter.

The annual rounds of golf at Hokuilea has been estimated based on the projected average daily populations and the golf play assumptions as discussed above. The number of rounds of golf are projected to increase from between 107 and 240 rounds per day by the end of 2005. As shown in Exhibit VII-6.
### Exhibit VII-G

**NHKOLEIA**

**Projected Annual Rounds of Golf**

1990-2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onsite Demand:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel guest golf demand</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Average daily hotel population</td>
<td>590</td>
<td>1,290</td>
<td>2,020</td>
<td>2,840</td>
</tr>
<tr>
<td>Estimated rounds per 100 guests</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Annual golf rounds by hotel guests</td>
<td>10,800</td>
<td>23,500</td>
<td>36,900</td>
<td>51,800</td>
</tr>
<tr>
<td>Condominium and single-family golf demand</td>
<td>0</td>
<td>220</td>
<td>1,560</td>
<td>1,840</td>
</tr>
<tr>
<td>Average daily condominium and single-family population</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Estimated rounds per 100 guests</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf rounds by condominium and single-family guests</td>
<td>0</td>
<td>10,700</td>
<td>22,800</td>
<td>26,900</td>
</tr>
</tbody>
</table>

| **Offsite Demand:** | | | | |
| Low - 60 rounds per day | 21,900 | 26,400 | 32,400 | 39,400 |
| High - 120 rounds per day | 43,800 | 55,200 | 64,000 | 79,000 |

**Total Demand:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>33,700</td>
<td>52,800</td>
<td>92,800</td>
<td>118,800</td>
</tr>
<tr>
<td>High</td>
<td>64,000</td>
<td>87,500</td>
<td>120,000</td>
<td>157,000</td>
</tr>
</tbody>
</table>

**Average Daily Demand:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>33</td>
<td>52</td>
<td>92</td>
<td>118</td>
</tr>
<tr>
<td>High</td>
<td>64</td>
<td>87</td>
<td>120</td>
<td>157</td>
</tr>
</tbody>
</table>

**Supportable 18-Hole Courses:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.5</td>
<td>0.9</td>
<td>1.4</td>
<td>2.4</td>
</tr>
<tr>
<td>High</td>
<td>0.5</td>
<td>1.3</td>
<td>1.9</td>
<td>2.4</td>
</tr>
</tbody>
</table>

1/ At 180 rounds per day.

### Projected Supportable Golf Holes

Resort golf courses are often developed prior to the completion of other visitor and community facilities to enable the course to mature and to attract potential visitors to the area by its beauty and reputation for play. The first golf course should be developed for completion concurrently with its first major hotel facility.

The market support for golf courses at Hokuleia is based on the projected average daily golf rounds and the desired level of play at the courses. Assuming a desired level of play of about 180 rounds of golf for an 18-hole course, from a market standpoint, one golf course could be fully utilized by 1992 or 1993, warranting the development of the second 18-hole course by the end of 1995.

### Other Recreational Facilities

Hokuleia has the opportunity to establish itself as an active recreation-oriented alternative on Oahu by taking advantage of its diverse physical characteristics and providing other recreational amenities not typically found on Oahu or competitive destinations on the neighbor islands. Alternative recreational facilities include:

- **Polo Club and Stables**: Hokuleia has long been known for its polo field. The seasonal matches are well attended by local residents. Polo matches could provide a unique passive recreational alternative not found elsewhere in Hawaii.

  Development concepts could include a polo club and stables surrounded by condominiums and golf fairways. This would enhance the rural ranch-like atmosphere of the community.

  During the off-season, the polo facilities could be used for rodeos and equestrian purposes which could become seasonal focal points.

- **Hiking Trails**: Several existing trails lead from the Hokuleia lowlands to a plateau of the Waianae Mountains known as Peacock Flat. These and other similar trails and nature walks could be developed, offering visitors an opportunity to experience the rugged, natural beauty of the region. Variations in length and degree of difficulty could appeal to both the novice and seasoned hiker.

**VII-8**
Horseback Riding - Horseback rides along mountain trails could provide a unique aspect to the recreation facilities at Mokuleia.

Camping Areas - Developed in conjunction with the hiking trails, campgrounds could augment the recreational facilities and appeal of the community.

Sports Center - A sports center could include a pavilion and outdoor track and field. The pavilion could include basketball and volleyball courts which could be adapted for boxing, wrestling, gymnastics and other indoor sporting activities. Locker rooms and shower facilities. Outdoor activities could include a wide range of track and field events, soccer, rugby, and football.

Tennis Ranch - A tennis ranch could include courts suitable for tournament play and provide ancillary facilities such as locker rooms, showers, pro shop and a restaurant. With the proper design and approach, a tennis ranch could accommodate several tennis tournaments each year.

QUALIFICATIONS OF JOHN CHILD & COMPANY, INC.

John Child & Company, Inc. is a professional real estate service corporation which specializes in real estate appraisal and consulting. Founded in 1937, John Child & Company, Inc. is one of the largest and oldest real estate appraisal and consulting companies in Hawaii.

PROFESSIONAL STAFF

The Company's professional staff has a wide range of real estate experience and hold designations earned from the major professional organizations. Our professional staff members include:

- Robert J. Vernon, MAI, CRE, Chairman
- Theodore Grabel, SREA, ASA, President
- Karen Char, MAI, Executive Vice President
- Craig T. Smith, ASA, Appraiser
- Usha Y. Ewalt, ASA, Appraiser
- Paul D. Cool, Appraiser
- Darlene Ariola, Research Assistant
- Cheryl Emery, Research Assistant

SCOPE OF PROFESSIONAL SERVICES

The Company's real estate appraisal and consulting practice includes:

- Appraisal of real estate
- Highest and best use studies
- Market and financial feasibility analyses
- Arbitration.

Our studies cover a variety of real estate properties and interests such as:

- Mixed use developments
- Office buildings
- Shopping centers and retail facilities
- Hotels and resort facilities
- Industrial properties
- Residential rental apartments
- Residential condominiums
- Single-family subdivisions
- Special purpose properties.

VII-9
We have assisted both private and public clients in Hawaii, the
mainland states, Guam, American Samoa, and Singapore.

Our professional services are used to assist clients in internal
management and decision making, negotiations with other parties,
and for obtaining financing.

TYPICAL CLIENTS

Our clients include both private and public organizations.
Typical clients are:

- Amsac Financial Corp.
- Amsac, Inc.
- Bank of America
- Bank of Hawaii
- B.F. Bishop Estate
- Estate of James Campbell
- Castle & Cooke, Inc.
- Niulani Town, Inc.
- Oceanic Properties
- Chaminade College
- Citibank, N.A.
- City & County of Honolulu
- Department of Housing & Community Development
- The Equitable Life Assurance Society of the United States
  of America
- Federal Home Loan Bank Board
- Finance Realty
- First Federal Savings and Loan Association
- First Hawaiian Bank
- Hawaiian Electric
- Hawaiian Telephone
- Honolulu Federal Savings and Loan Association
- KVOOR Development Company
- Loyalty Development
- Loyalty Enterprises
- Loyalty Finance Co.
- Pacific Construction Co., Ltd.
- Realty Mortgage Investors of the Pacific (RAMPAC)
- Security Pacific Mortgage Corp.
- Service Pacific Inc.
- Stark Development Company, Ltd.
- State of Hawaii
- Department of Land & Natural Resources
- Department of Transportation
- U.S. Army
- U.S. Navy

KAREN CHIAR, NAI
Executive Vice President

Education

Punahou School, 1967.
Various courses sponsored by the American Institute of Real
Estate Appraisers.

Professional Associations

Member, American Institute of Real Estate Appraisers (NAI)
designation.
- Vice Chairman, National By Laws Committee (1986).
- Member, National By Laws Committee (1985); National
- Chairman, National Evaluation Report Subcommittee
(1982) - Responsible for establishing grading criteria
for business reports submitted for demonstration
report credit and reviewing failing business reports.
- President-elect and Vice President (1985), Secretary
(1984), Honolulu Chapter No. 15.
- Grader, National Board of Examiners (1982-1983)
- Responsible for grading business reports and demon-
stration appraisal reports submitted for credit
towards NAI designation.
- Admission Chairman, Southwest Region (1982).
- Vice Chairman, Thirteenth Pan Pacific Congress of Real
Member, Panel of Arbitrators of the American Arbitration
Association.

Professional Experience

Executive Vice President, John Child & Company, Inc. (1984 to
present).

Court Testimony

Qualified as an expert witness in the valuation of real prop-
erty in the Courts of the State of Hawaii.

Certification

The American Institute of Real Estate Appraisers conducts a
voluntary program of continuing education for its designated
members. NAI and RIs who meet the minimum standards of this
program are awarded periodic educational certification.
Karen Chiav, NAI is certified under this program.
Education


Various courses, workshops, and seminars by the American Institute of Real Estate Appraisers, International Society of Real Estate Appraisers, and the American Society of Appraisers including:

- Society of Real Estate Appraisers, Course 101, "An Introduction to Appraising Real Property".
- Society of Real Estate Appraisers, Course 201, "Principles of Income Property Valuation".
- Society of Real Estate Appraisers, Course 202, "Applied Income Property Valuation".

Professional Experience


Court Testimony

Qualified as an expert witness in the valuation of real property in the Courts of the State of Hawaii.
APPENDIX B

Economic and Fiscal Impacts of MOKULEIA Mokuleia, Oahu, Hawaii

Prepared for Mokuleia Development Corporation

July 1986
Economic and Fiscal Impacts of

MOKULEIA

Mokuleia, Oahu, Hawaii

Prepared for
Mokuleia Development Corporation
July 1986

July 22, 1986

Mr. K. Tim Yee
Chairman
Mokuleia Development Corporation
1091 Bishop Street, Suite 979
Honolulu, Hawaii 96813

Dear Mr. Yee:

At your request, we have completed our analyses of the economic and fiscal impacts of the proposed Mokuleia community. The accompanying report presents the findings and conclusions regarding our assessments.

BACKGROUND

Mokuleia Development Corporation (MDC) proposes to develop a master-planned recreation-oriented community on about 1,000 acres in Mokuleia. For the purpose of this report, the development is referred to as Mokuleia. Preliminary plans include development of hotels, condominiums, single-family units, and supportive commercial and recreational facilities and amenities.

MDC is preparing general plan and development plan amendments to permit development at the site. MDC has asked John Child & Company, Inc. to assess the economic and fiscal impacts of the proposed development.

OBJECTIVES

The objectives of our assistance are to:

1. Project the direct, indirect and induced economic impacts of the proposed development in terms of:

...
2. Project the direct, indirect and induced fiscal impacts of the proposed development in terms of:
   - State and County government revenues
   - State and County government expenditures.

REPORT ORGANIZATION

The report is organized into five chapters as follows:

1. Executive Summary - presents the background and objectives of our impact assessment and summarizes the major findings and conclusions.

II. Project Description and Regional Overview - describes the immediate and general settings of Mokuleia, and the geographic and economic setting of the North Shore region and the State of Hawaii.

III. Population Projections - describes the assumptions and analyses used to project the onsite population associated with Mokuleia.

IV. Economic Impacts - assess the economic impacts of the proposed development in terms of expenditures, employment and resident income.

V. Fiscal Impacts - assesses the fiscal impacts of the proposed development in terms of State and County government revenues and expenditures.
Economic and Fiscal Impacts of

MOKULEIA

Mokuleia, Oahu, Hawaii

Prepared for
Mokuleia Development Corporation
1001 Bishop Street, Suite 979
Honolulu, Hawaii 96813

July 1986

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I - EXECUTIVE SUMMARY

Mokuleia Development Corporation (MDC) has engaged John Child & Company, Inc. (John Child) to prepare assessments of the economic and fiscal impacts of the proposed Mokuleia development. This section presents the background and objectives of the assignment and reviews the major findings and conclusions of our study.

BACKGROUND

MDC proposes to develop a master-planned recreation-oriented community on about 1,000 acres in Mokuleia. For the purpose of this report, the development is referred to as Mokuleia. Preliminary plans include development of hotels, condominiums, single-family units, and supportive commercial and recreational facilities and amenities.

MDC is preparing general plan and development plan amendments to permit development at the site. MDC has asked John Child to assess the economic and fiscal impacts of the proposed development.

OBJECTIVES

The objectives of our assistance are to:

1. Project the direct, indirect, and induced economic impacts of the proposed development in terms of:
   - Expenditures
   - Employment
   - Resident income.

2. Project the direct, indirect, and induced fiscal impacts of the proposed development in terms of:
   - State and county government revenues
   - State and county government expenditures.

MOKULEIA

The following section presents a brief description of Mokuleia's location, physical characteristics, and proposed development.
Location

The Mokuleia site is on the North Shore of Oahu, about six miles west of Haleiwa. The North Shore region is typically rural, with economic activity evolving from sugar and pineapple cultivation.

The North Shore is known for its scenic coastlines and beaches, many being notable surfing areas, and has long been an area frequented on the weekends by families with "beach houses".

The North Shore is unique because of its close ties with the land and ocean and shares many similarities to communities on the neighbor islands.

Site Characteristics

The 2,900-acre site has diverse physical characteristics. The property is divided by Farrington Highway, the major traffic artery in the area.

The makai (oceanside) portion of the site consists of four non-contiguous parcels totaling about 120 acres. These sites have about 1.5 miles of ocean frontage along white sand beaches.

The mauka (mountainside) portion of the site includes about 2,780 acres. The site slopes gently from sea level to about 300 feet over a distance of about a mile to the base of the Waimanu mountain. From this point to the top of the mountain range, the topography becomes steep and rugged, with vegetation shifting from typical ranch scrub to more lush foliage.

Proposed Development Types

Mokuleia is planned as a self-contained recreation-oriented community. Through careful planning, it will offer a unique vacation experience in a relaxed rural environment, which had previously only been found on the neighbor islands. The proposed land use plan includes:

- Hotel and condominium development - About 3,300 hotel rooms and condominium units are proposed for development. Hotel development would include a range of guest services including food and beverage facilities, retail shops, and recreational amenities. Condominium development would be oriented to the repeat mainland visitors to Mokuleia and island residents desiring to live in a recreation-oriented environment.

- Residential development - Single-family development will provide housing opportunities for those individuals making a long-term commitment to the community and who prefer a greater sense of privacy than might be offered in condominium living. The proposed development plan includes 200 residential units.

- Commercial complex - A commercial complex is planned to include retail shopping, dining and entertainment facilities to support the community and serve residents of Waialua, Haleiwa and other North Shore people.

- Recreational facilities - Aside from the recreational amenities found at each hotel and condominium project, Mokuleia will include 36 holes of golf course and, possibly, a polo field, hiking trails, camping areas, sports center, and a tennis ranch.

The proposed development plan results in a self-contained community with a variety of transient and permanent accommodations, commercial facilities, recreational activities and related amenities to appeal to the island resident and the repeat visitor. Its proximity to Waikiki and other visitor attractions on Oahu enhances Mokuleia’s desirability and gives it a competitive edge over neighboring island resort destinations.

Market Support

Recognizing the time requirements for necessary land use amendments and approvals, market assessments have been made for a 13-year period beginning in 1990. The level and timing of the market support for the proposed land uses are projected in Exhibit 1-4.

ECONOMIC IMPACTS

This section summarizes the expected direct, indirect, induced and total impacts of Mokuleia on expenditures, employment and resident income in the State.

Expenditures

Mokuleia will generate direct, indirect and induced expenditures in Hawaii from the visitors and residents. This group will make direct expenditures for food, accommodations, recreational activities and other goods and services. These direct expenditures will, in turn, generate indirect and induced expenditures throughout the State through multiplier effects.
**Visitor Expenditures**

Direct expenditures are projected based on the expected average daily visitor population and visitor expenditure patterns observed in the State.

Direct expenditures attributable to the visitors at Hokuleia could be expected to increase from about $18.3 million in 1990 to $106.8 million by 2005, in 1986 dollars.

Based on the multipliers estimated by the Hawaii State Department of Planning and Economic Development (DPED), the direct visitor expenditures could be expected to generate indirect and induced expenditures amounting to about $17.0 million in 1990 and $99.3 million by 2005, in 1986 dollars.

Including direct, indirect and induced effects, expenditures in the State attributable to Hokuleia's visitors are projected to increase from $35.3 million in 1990 to $206.1 million by 2005, in 1986 dollars.

**Resident Expenditures**

This analysis addresses the expenditures attributable to the resident population at Hokuleia. The relationship between direct expenditures and indirect and induced expenditures associated with resident spending in the State has not been quantified.

Based on the average daily population and expenditure estimates, annual expenditures by full-time and part-time residents at Hokuleia could increase from $0 in 1990 to $13.0 million by 2005, in 1986 dollars.

**Employment**

The planned developments at Hokuleia will generate short-term employment during the construction of new facilities and long-term employment in the operation and maintenance of those facilities. Similar to expenditures, employment effects may also be classified as being direct, indirect or induced.

**Construction Employment**

Direct construction employment is that which would be supported directly by the construction of the various facilities at Hokuleia. The direct needs for construction employees are estimated based on the employment experiences of similar facility construction projects in the State. Construction could begin in 1988 and proceed through 2005.

---

**Source:** Hokuleia Development Corporation.
The employment impacts in particular years during the projection period will depend on the construction timing of the various facilities, but could average about 210 full-time equivalent jobs per year between 1980 and 2005. Total construction employment, including direct, indirect, and induced employment, could average 490 full-time equivalent jobs per year during the same period.

Operational Employment

Based on the development and employment characteristics, Hokulea is projected to generate about 600 full-time equivalent direct operational employment positions by 1990 and about 2,100 by 2005. The majority of these jobs would be associated with the hotel operations at Hokulea.

Through indirect and induced effects, the direct operational positions created would generate additional employment elsewhere in the State. According to recent studies on the economic impacts of tourism by the OPED, development as proposed at Hokulea could be expected to support about 470 full-time equivalent positions in 1990 and 2,100 by 2005.

Based on these estimates, total operational employment island-wide resulting from the Hokulea development is projected to increase from nearly 1,100 positions in 1990 to nearly 4,600 positions by 2005.

Resident Income

Hokulea could be expected to have a significant impact on personal and household income for residents of the Island and the State. Hokulea would generate resident income through employee wages, salaries and fringes benefits and as income to proprietors.

Personal Income

Personal income is defined as the wages and salaries paid to the direct construction and operational employees of Hokulea. Personal income is projected on the basis of average industry wages and salaries and the expected future levels of employment demand.

Annual personal income paid to Hawaii residents in the form of wages and salaries earned directly from establishments at Hokulea or from its visitors may be expected to increase from $30.3 million in 1990 to $42.3 million by 2005, in 1986 dollars.

Household Income

Estimation of total household income effects based on visitor expenditures permits a perspective on the net benefits to statewide household income that would result from the development at Hokulea.

Total household income generated by visitor expenditures at Hokulea would include the fringe benefits and proprietor's income paid by establishments that sell goods and services directly to visitors as well as the wages and salaries noted previously. In addition, household income includes income generated through the multiplier effects of indirect and induced expenditures.

It is projected that Hokulea could annually contribute about $12.8 million to total household income in 1990 and about $74.8 million by 2005, in 1986 dollars.

Fiscal Impacts

This section describes the net fiscal impacts of the proposed development in terms of revenues and expenditures to the County and State governments resulting from the visitor and resident population at Hokulea.

Revenues

Development at Hokulea would bring tax revenues to the County and State governments. County government revenues would be in the form of real property taxes on the new facilities. Revenues to the State government would be principally of unemployment taxes, excise taxes, gross income tax and personal income taxes.

County

Based on current real property tax rates in the County, the proposed development at Hokulea could be expected to generate about $30.7 million in additional real property taxes in 1990 and $4.3 million by 2005, in 1986 dollars.

State

State government revenues are estimated as a residual of total revenues less County government revenues. The tax revenues to the State government attributable to activity at Hokulea are projected to increase from $1.5 million in 1990 to $8.3 million in 2005, in 1986 dollars.

Thus, total tax revenues to the State and County governments are estimated at $3.2 million in 1990 and $12.8 million by 2005, in 1986 dollars.
Expenditures
The visitors and residents at Hokule'a would necessitate expenditures of public resources.

County
Annual County public expenditures on behalf of Hokule'a's visitors and residents could be expected to total $0.2 million in 1990 and $1.7 million by 2005, in 1986 dollars.

State
Annual State public expenditures on behalf of Hokule'a's visitors and residents could be expected to total $0.2 million in 1990 and $3.3 million by 2005, in 1986 dollars.

Revenue/Expenditure Analysis
The net fiscal impacts of Hokule'a's development to the County and State governments are estimated by comparison in the following sections.

County
Comparison of projected public revenues and expenditures indicates the County government may expect to net about $0.5 million in additional annual revenues in 1990 and $2.9 million by 2005, in 1986 dollars.

The analysis also indicates that additional County government revenues generated by Hokule'a would be about 2.6 to 5.1 times the additional expenditures incurred by the County government, as also shown in the exhibit.

State
Comparison of the revenues and expenditures, as projected, indicate the State government could be expected to net about $1.1 million in 1990 and $3.5 million by 2005, in 1986 dollars. This indicates a revenue/expenditure ratio averaging about 2.3:1 during the forecast period, as also shown in the exhibit.

II - REGIONAL SETTING
This section presents a regional overview of the State of Hawaii, the Island of Oahu, the North Shore region and describes the proposed Hokule'a community in terms of its location, master plan, and characteristics.

STATE OF HAWAII
In 1984 the resident population of the State of Hawaii was estimated to be 1,038,700, including 57,300 members of the military and 67,100 of their dependents. The estimated de facto population of the State, which includes visitors present and excludes residents absent, was about 1,140,600.

The visitor industry is the largest industry in the State, surpassing the two historical bases of Hawaii's economy, sugar and pineapple. In 1984 nearly 4.9 million visitors brought in about $4.6 billion in visitor expenditures to the State.

Oahu has historically been the primary visitor destination. More recently the visitor industry has expanded on the neighbor Islands. New resort complexes along with their supporting industries and services have been established on Maui, Kauai, Hawaii and Molokai.

ISLAND OF OAHU
Hokule'a is in the North Shore region on Oahu. Oahu, with 618 square miles, is the fourth largest island in the State. The relationship between Hokule'a and the major towns and cities of Oahu are shown in Exhibit II-A.

This section reviews the demographic characteristics of Oahu.

Population
In 1984 Oahu housed about 76% of Hawaii's resident population and included only about 10% of the State's land area. Oahu's population was estimated at 865,000, including military personnel. Military personnel and dependents on Oahu are estimated at 127,100 residents, and represent about 15% of the total Oahu population. Oahu includes a sizable visitor population, mostly centered in Waikiki. The daily census averaged 67,370 visitors.

Resident population growth is projected by the Department of Planning and Economic Development (DPED) to decline from the 1.8% rate of growth experienced between 1970 and 1984, to 1.12% per annum between 1985 and 1990 and 0.72% through 2005.
Age Distribution

In 1980 the median age of Oahu residents was 28.0 years compared
with 30.0 years nationally. However, the population of Oahu is
maturing and the median age has increased from 24.6 years in 1970
to 28.0 years in 1980. By 2005, the median age is projected at
36.7 years.

Household Size

Oahu households averaged 3.15 persons in 1980 and continue to be
significantly larger than the national average of 2.76 persons.
However, the average Oahu household size has decreased from an
average of 3.6 persons per household in 1970 to 3.15 persons in
1990. This trend is expected to continue.

Employment

Labor force participation on Oahu is higher than national aver-
ages. On Oahu, 69.2% of the eligible population over 16 years of
age were in the work force in 1980 compared to 63.8% nationally.
Labor force participation in Hawaii has also increased by more
than 2% from a decade earlier.

Female labor force participation rates on Oahu have increased by
almost 9% over the last decade. These rates are significantly
higher than national averages. In 1980, 58.3% of the working age
female population of Oahu participated in the labor force compared
to 51.5% for the United States as a whole. These higher partici-
pation rates for women are partially attributed to the relatively
higher cost of living and housing in Hawaii.

North Shore Region

Hokulua is located within the northwesterly end of Oahu. This
area is described by the City and County of Honolulu as the North
Shore development plan area and is the primary impact region of
the development.

The North Shore region includes the northwest portion of the
island, extending from Kailua Point to Kaneohe Point. Residential
developments on the North Shore include Sunset Beach, Waimea,
Pupukea, Haleiwa and Kahuku.

The North Shore region is rural in character. It consists mainly
of primary residences within a few blocks of Farrington and
Kamehameha Highways, interspersed with freestanding commercial
buildings.
HOKULELE

Hokulele is a proposed recreation-oriented community. Upon completion, Hokulele would include:

- Hotels
- Condominium units
- Residential units
- Commercial facilities
- Golf course
- Related recreational facilities and amenities

The following sections describe Hokulele in terms of the project concept, location and description, master plan, access, and area attractions.

Project Concept

Hokulele is a master-planned community oriented around a diverse range of recreational facilities. This community would be attractive to island residents and visitors seeking an environment conducive to an active lifestyle but one that can be quiet and relaxed.

Planned to be self-contained, Hokulele would offer a variety of facilities and services to meet the majority of its residents' and guests' needs for lodging, dining, recreation, entertainment and relaxation.

The location, master plan and recreation orientation of Hokulele is unlike any existing area in Hawaii. The master plan incorporates land uses and amenities similar to major resort destination areas on the neighbor islands. However, the Oahu location offers greater accessibility to Oahu residents. In addition, Hokulele has traditionally been noted for its variety of recreational facilities.

Location and Description

Hokulele is located near the northeastern point of Oahu. The 2,900-acre property is divided by Farrington Highway, the major traffic artery in the area.

The mokapu (oceanside) portion of the site consists of four non-contiguous parcels totalling about 120 acres. While relatively narrow, the sites have about 1.5 miles of ocean frontage along white sand beaches.

The maulu (mountainside) portion of the site contains about 2,780 acres. About 80% of these acres are on a low-lying plane that slopes gently from sea level to about 300 feet over a distance of about a mile. Beyond, as the property ascends towards the Waianae Mountain range, the vegetation shifts from the typical ranch scrub foliage and becomes more lush. In addition, excellent ocean views are afforded towards the coastline.

An access easement in favor of Castle and Cooke, Inc. extends across a portion of the maulu site.

The Hokulele site is bounded to the east by lands cultivated in sugar, to the west by the Dillingham Airfield, to the south by the Waianae Mountain range, and to the north by the Pacific Ocean.

The Waianae Sugar Company is adjacent to the site and has maintained a climatological research station for a number of years. The records reveal:

- Average annual temperature has been 73°F with the average monthly temperature never dropping below 70°F.
- Rainfall at the station averages about 30 inches a year. As most of Hawaii, rainfall is higher in the upper elevations, providing a consistent source of ground water. The coastal areas are predominantly sunny and dry.
- The prevailing breezes are tradewinds from the east-northeast. During the evenings, the wind pattern changes direction and blows from off the Ko‘olau and Waianae Mountain ranges.

Proposed Master Plan

Hokulele is master-planned to include 4,000 hotel and residential units and ancillary recreational facilities and amenities. The major components of the community are listed in Exhibit 11-8.

The proposed master plan is shown on the land use plan in Exhibit 11-C and the conceptual plan in Exhibit 11-D. Sites have been configured to optimize ocean views, golf course frontage, and harmony between neighboring land uses. As presently planned, Hokulele has a low development density with about 2,000 acres or about 80% of the total land area devoted to open or greenbelt areas. The proposed plan complies with and maintains the rural environment in the North Shore area.

The actual development schedule of the components at Hokulele has not yet been determined. For the purposes of this study, we have assumed the development phasing shown in Exhibit 11-6.

11-3
<table>
<thead>
<tr>
<th>Principal land uses:</th>
<th>Units</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel</td>
<td>2,100</td>
<td>313 2/</td>
</tr>
<tr>
<td>Condominium units</td>
<td>1,200</td>
<td>331</td>
</tr>
<tr>
<td>Residential units</td>
<td>700</td>
<td>331</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,000</strong></td>
<td><strong>644</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Other land uses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial complex</td>
<td>33</td>
</tr>
<tr>
<td>Two 18-hole golf courses with clubhouse</td>
<td>342</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential land uses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Polo field</td>
<td>—</td>
</tr>
<tr>
<td>Hiking trails</td>
<td>—</td>
</tr>
<tr>
<td>Camping areas</td>
<td>—</td>
</tr>
<tr>
<td>Sports center</td>
<td>—</td>
</tr>
<tr>
<td>Tennis ranch</td>
<td>—</td>
</tr>
</tbody>
</table>

1/ Preliminary.
2/ Combined acreage.

Source: Mokuleia Development Corporation.
Access

Primary access between Mokuleia and Honolulu is provided via the H-2 Freeway and Kamehameha and Farrington Highways, the only arterials to the area.

Kamehameha Highway is a two-lane highway which extends from the H-2 Freeway and passes through Wahiawa, Haleiwa, and along the Windward coastline.

Farrington Highway extends from a point south of Weir Junction, parallel to the ocean, and terminates about six miles west of Mokuleia.

The airport is about 28 miles from Mokuleia, or 30 to 40 minutes by car. By comparison, the Waikiki, Kauai, Kapalua, and Turtle Bay resort areas are located 10, 29, 32, and 36 miles, respectively, from the nearest major airports.

III - POPULATION PROJECTIONS

The economic and fiscal impacts associated with the proposed Mokuleia development are influenced by the planned community's onsite resident and visitor population. This section describes the assumptions and analyses used to project the population associated with Mokuleia.

POPULATION ASSUMPTIONS

The average daily onsite population expected to reside in the hotels, condominiums, and single-family units will consist of visitors and part-time and full-time residents. The projected daily population is based on assumptions about usage of the units, occupancy rates, and average household or party size developed from:

- Interviews with resort operators and brokers.
- Data compiled by the Hawaii Visitors Bureau.
- Estimates prepared by the Department of General Planning.

These assumptions about the characteristics of the projected population are summarized in Exhibit III-A.

RESIDENCY CHARACTERISTICS

The visitor, part-time and full-time population at Mokuleia will be comprised of people already residing in the State as well as out-of-state residents.

Local residents currently account for between 15% and 30% of total room-nights at selected hotels in Rural Oahu and on the neighbor islands. The presence of local residents visiting condominiums is significantly less, reported between 5% and 15% of total room-nights, because the minimum length of stay is typically four to five nights, generally longer than the local resident's typical length of stay.

Local residents desiring to make a greater commitment to Mokuleia are more likely to be full-time rather than part-time use, and are anticipated to represent a nominal amount of the part-time residents at Mokuleia. This is consistent with residency patterns observed at selected condominiums on the neighbor islands.

The assumptions relating to the residency characteristics of the population at Mokuleia are summarized in Exhibit III-B.
### Exhibit III-A  
**NOKULEIA**  
**Population Projection Assumptions**

<table>
<thead>
<tr>
<th>Type of unit</th>
<th>Distribution 1/</th>
<th>Occupancy rate</th>
<th>Average party size 3/</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hotel</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>100%</td>
<td>65</td>
<td>1.8</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>65</td>
<td>1.8</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>70</td>
<td>1.8</td>
</tr>
<tr>
<td>2005</td>
<td>100</td>
<td>75</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Condominium</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>20</td>
<td>95</td>
<td>3.0</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>30</td>
<td>25</td>
<td>2.1</td>
</tr>
<tr>
<td>Visitors</td>
<td>50</td>
<td>50</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Single-family</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time residents</td>
<td>40</td>
<td>95</td>
<td>3.3</td>
</tr>
<tr>
<td>Part-time residents</td>
<td>60</td>
<td>25</td>
<td>2.1</td>
</tr>
<tr>
<td>Visitors</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

1/ Distribution of uses within each facility type.  
2/ Occupied units only.  

### Exhibit III-B  
**NOKULEIA**  
**Residency Assumptions**

<table>
<thead>
<tr>
<th>Local resident</th>
<th>Out-of-state resident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor: Hotel</td>
<td>Condominium</td>
</tr>
<tr>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>70%</td>
<td>85%</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

| Part-time resident: Condominium | 5%  | 95% | 100% |
| Part-time resident: Single-family | 5% | 95% | 100% |
| Full-time resident: Condominium | 100% | 0% | 100% |
| Full-time resident: Single-family | 100% | 0% | 100% |
POPULATION PROJECTION

Based on the proposed development plan in Exhibit II-E and the population and residency characteristics outlined above, the average daily population at the proposed development is anticipated to increase from 390 persons in 1990 to 4,680 persons by 2005, as shown in Exhibit III-C.

Visitors from Oahu and the neighbor islands are projected to increase from about 180 persons in 1990 to 950 persons by 2005, as shown in Exhibit III-D. Out-of-state residents visiting the hotel shown in Exhibit III-D are projected to increase from 410 persons in 1990 to 2,530 by 2005.

The majority of the part-time residents are projected to be out-of-state residents while all of the full-time residents are projected as residents of the State, as also shown in the exhibit.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel units</td>
<td>590</td>
<td>1,290</td>
<td>2,020</td>
<td>2,840</td>
</tr>
<tr>
<td>Condominium units</td>
<td>0</td>
<td>300</td>
<td>610</td>
<td>640</td>
</tr>
<tr>
<td>Single-family units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal - visitors</td>
<td>590</td>
<td>1,590</td>
<td>2,630</td>
<td>3,580</td>
</tr>
<tr>
<td>Residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>0</td>
<td>330</td>
<td>660</td>
<td>690</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>90</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>420</td>
<td>840</td>
<td>870</td>
</tr>
<tr>
<td>Single-family units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>10</td>
<td>110</td>
<td>330</td>
</tr>
<tr>
<td>Subtotal - residents</td>
<td>0</td>
<td>430</td>
<td>950</td>
<td>1,260</td>
</tr>
<tr>
<td>Total population</td>
<td>590</td>
<td>2,028</td>
<td>3,580</td>
<td>4,680</td>
</tr>
</tbody>
</table>

Source: John Child & Company, Inc.

III-2
MOKULEIA
Projected Population by Residence
1990 to 2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>180</td>
<td>300</td>
<td>610</td>
<td>850</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>300</td>
<td>610</td>
<td>850</td>
</tr>
<tr>
<td>Subtotal</td>
<td>180</td>
<td>300</td>
<td>610</td>
<td>850</td>
</tr>
<tr>
<td>Out-of-state residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel</td>
<td>410</td>
<td>900</td>
<td>1,410</td>
<td>1,990</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>260</td>
<td>520</td>
<td>940</td>
</tr>
<tr>
<td>Total</td>
<td>410</td>
<td>1,160</td>
<td>1,930</td>
<td>2,930</td>
</tr>
<tr>
<td>Subtotal</td>
<td>410</td>
<td>1,160</td>
<td>1,930</td>
<td>2,930</td>
</tr>
<tr>
<td>Total</td>
<td>590</td>
<td>1,660</td>
<td>2,540</td>
<td>3,880</td>
</tr>
<tr>
<td>Part-time residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Out-of-state residents-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>90</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>90</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>90</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>90</td>
<td>200</td>
<td>260</td>
</tr>
<tr>
<td>Full-time residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>310</td>
<td>660</td>
<td>680</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>310</td>
<td>660</td>
<td>680</td>
</tr>
<tr>
<td>Single-family</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
</tbody>
</table>

IV - ECONOMIC IMPACTS

This section describes the expected direct, indirect and induced impacts of Mokuleia on expenditures, employment and resident income and resident housing in the State.

POPULATION

Based on the analysis in Section III, the average daily visitor population at Mokuleia is projected to increase from 590 persons in 1990 to 3,480 in 2005, as shown in Exhibit IV-A.

The full- and part-time resident population at Mokuleia is projected to increase from 0 in 1990 to 1,200 persons by 2005, as also shown in the exhibit.

EXPENDITURES

Mokuleia will generate direct, indirect and induced expenditures in Hawaii from visitors and full-time and part-time residents. These visitors and residents will make direct expenditures for food, accommodations, recreational activities and other goods and services.

These direct expenditures will, in turn, require those establishments servicing the direct demands to purchase goods and services from other vendors in the State. The latter expenditures are an indirect effect of the direct expenditures. Induced expenditures are those made by employees and proprietors with income derived from the establishments serving the direct and indirect demands.

Visitor Expenditures

The direct, indirect and induced expenditures associated with the projected visitors at Mokuleia are discussed under the following sub-headings.

Direct Expenditures

Direct expenditures are projected based on the expected average daily visitor population and observed visitor expenditure patterns observed in the State.

The Hawaii Visitors Bureau (HVB) reports that in 1983, the average westbound visitor staying in hotel accommodations spent about $87 per day while the same visitor staying in condominium accommodations spent an average of about $60 per day. Tended to 1986 dollars, this represents average daily expenditures of about $97 and $90 for hotel and condominium visitors, respectively.
### Projected Average Daily Population

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visitors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total units</td>
<td>390</td>
<td>1,290</td>
<td>2,020</td>
<td>2,640</td>
</tr>
<tr>
<td>Condominium units</td>
<td>0</td>
<td>390</td>
<td>610</td>
<td>640</td>
</tr>
<tr>
<td>Single-family units</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal - Visitors</td>
<td>580</td>
<td>1,980</td>
<td>2,630</td>
<td>3,380</td>
</tr>
<tr>
<td><strong>Residents:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium units - Full-time</td>
<td>0</td>
<td>330</td>
<td>660</td>
<td>680</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>90</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0</td>
<td>420</td>
<td>840</td>
<td>870</td>
</tr>
<tr>
<td>Single-family - Full-time</td>
<td>0</td>
<td>10</td>
<td>90</td>
<td>260</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
<td>6</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Subtotal - Residents</td>
<td>0</td>
<td>60</td>
<td>90</td>
<td>330</td>
</tr>
<tr>
<td><strong>Total population</strong></td>
<td>590</td>
<td>1,990</td>
<td>2,640</td>
<td>3,380</td>
</tr>
</tbody>
</table>

State residents visiting the facilities at Hokulea are expected to spend less than the westbound visitors to the State, because of the availability of lower-cost hotel "kamasina" packages, and their propensity to spend less on transportation, clothing, gifts and souvenirs, which represents about 30% of westbound visitor expenditures.

State residents visiting the hotel and condominium facilities are anticipated to spend about $50 and $45 per day, respectively.

### Indirect and Induced Expenditures

Based on the average daily population and expenditure estimates, visitors at Hokulea could be expected to spend about $18.3 million in 1990 and $106.8 million by 2005, in 1986 dollars, as shown in Exhibit IV-B.

### Total Visitor Expenditures

Including direct, indirect and induced effects, expenditures in the State attributable to Hokulea's visitors are projected to increase from $33.3 million in 1990 to $206.1 million by 2005, in 1986 dollars.

### Resident Expenditures

This analysis addresses the total expenditures attributable to the resident population at Hokulea. The relationship between direct, indirect and induced expenditures associated with full-time and part-time residents has not been quantified.

Residents of the State spent an average of $8,100 in 1983, based on personal consumption expenditures and resident population estimates compiled by the DPED. If trended, this represents an average daily expenditure of about $23 per person in 1986 dollars.

Part-time resident expenditures are anticipated to be between those observed for visitors and full-time residents. For the purposes of this analysis, part-time resident expenditures are estimated at about $55 per day, in 1986 dollars.

---

IV-2
**Exhibit IV-8**

**HOKULEIA**
Projected Annual Visitor Expenditures
(1986 dollars; in millions)

<table>
<thead>
<tr>
<th>Type of expenditure</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel 1/</td>
<td>518.3</td>
<td>450.0</td>
<td>62.7</td>
<td>88.1</td>
</tr>
<tr>
<td>Condominium 2/</td>
<td>0.0</td>
<td>0.0</td>
<td>17.0</td>
<td>18.7</td>
</tr>
<tr>
<td>Subtotal - Direct</td>
<td>518.3</td>
<td>450.0</td>
<td>79.7</td>
<td>106.8</td>
</tr>
<tr>
<td>Indirect and Induced</td>
<td>17.0</td>
<td>55.6</td>
<td>74.9</td>
<td>99.3</td>
</tr>
<tr>
<td>Total visitor expenditures 2/</td>
<td>535.3</td>
<td>505.6</td>
<td>153.6</td>
<td>206.1</td>
</tr>
</tbody>
</table>

Based on the average daily population and expenditure estimates, total annual expenditures by full-time and part-time residents at Hokuila would be expected to increase from $0 in 1990 to $13.4 million in 2005, in 1986 dollars, as shown in Exhibit IV-C.

**EMPLOYMENT**

The planned developments at Hokuila will generate short-term employment during the construction of new facilities and long-term employment in the operation and maintenance of those facilities.

Like expenditures, employment effects may also be classified as being direct, indirect or induced. Direct effects are those directly supported by all visitor and resident expenditures or construction requirements. Direct employment would generally be located on Oahu, both within and outside Hokuila.

Indirect effects occur when directly affected establishments purchase goods or services from other businesses in order to fill new resident or visitor demand. Induced effects are those supported by employees or proprietors associated with the development and/or operation of activity at Hokuila.

**Direct Construction Employment**

Direct construction employment is that which would be supported directly by the construction of the facilities proposed at Hokuila. Such employment would include on-site laborers, operatives and craftsmen, as well as professional, managerial, sales and clerical workers whose places of employment may be elsewhere in the State.

Construction sequencing could begin as early as 1988 and proceed through 2005.

1/ Based on the average daily expenditure by visitors using hotel accommodations in the State in 1983, as reported by the Hawaii Visitors Bureau, 1983 Visitor Expenditure Survey, trended to 1986, and adjusted for spending habits of local residents staying at the hotels.

2/ Based on the average daily expenditure by visitors using condominium accommodations in the State in 1983, as reported by the Hawaii Visitors Bureau, 1983 Visitor Expenditure Survey, trended to 1986, and adjusted for spending habits of local residents staying at the condominium.

3/ Based on unpublished 1984 data from the State of Hawaii, Department of Planning and Economic Development and projected at $1.93 per $1.00 of direct expenditures.
HOKULEIA
Projected Annual Direct Resident Expenditures
(1986 dollars; in millions)

<table>
<thead>
<tr>
<th>Type of expenditure and place of stay</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time residents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>10.0</td>
<td>13.0</td>
<td>6.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Single-family</td>
<td>0.0</td>
<td>0.1</td>
<td>0.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Subtotal</td>
<td>10.0</td>
<td>13.1</td>
<td>6.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Part-time resident:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condominium</td>
<td>0.0</td>
<td>1.6</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Single-family</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0.0</td>
<td>1.6</td>
<td>3.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Total</td>
<td>10.0</td>
<td>14.7</td>
<td>10.5</td>
<td>11.4</td>
</tr>
</tbody>
</table>

The direct needs for construction employees are based on the employment experiences of comparable developments and are summarized as follows.

<table>
<thead>
<tr>
<th>Type of development</th>
<th>Full-time jobs per year per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel</td>
<td>0.8</td>
</tr>
<tr>
<td>Condominium</td>
<td>0.9</td>
</tr>
<tr>
<td>Single-family</td>
<td>0.2</td>
</tr>
<tr>
<td>Vacant lots</td>
<td>1.4</td>
</tr>
<tr>
<td>Building improvements</td>
<td>0.6 1/</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.7</td>
</tr>
<tr>
<td>Golf course</td>
<td>80 2/</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>25 3/</td>
</tr>
</tbody>
</table>

The employment impacts in particular years within the periods shown will depend on the construction timing of the proposed hotel, condominium, single-family, and commercial developments, but could average about 210 full-time equivalent jobs per year between 1988 and 2005, as shown in Exhibit IV-D.

Indirect and Induced Construction Employment

Because of the relatively high rates of pay in the construction industry and the interrelationships of establishments within the construction industry in Hawaii, the DPED estimates that a total of 2.4 full-time equivalent employees are supported in the state for each full-time equivalent direct construction employee. 5/

Based on this multiplier, the direct employment, as projected, implies a total demand during the development of Hukulea of an average of about 490 full-time equivalent jobs per year between 1988 and 2005, as shown in Exhibit IV-D.

1/ Per 1,000' of commercial area.
2/ Per 18-hole course.
3/ Per $1.0 million of construction cost, in 1972 dollars.
4/ Hawaii State Department of Planning and Economic Development.
### Exhibit IV-D

**HONOLULU**

**Construction Employment (Average Full-Time Equivalent Jobs per Year)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct construction employment</td>
<td>230</td>
<td>240</td>
<td>220</td>
<td>140</td>
<td>210</td>
</tr>
<tr>
<td>Total construction employment</td>
<td>560</td>
<td>580</td>
<td>530</td>
<td>330</td>
<td>490</td>
</tr>
</tbody>
</table>

### Direct Operational Employment

Direct operation employment includes those jobs directly associated with the hotels, condominiums, commercial facilities, golf course and development administration.

The majority of direct operational employees would be employed in the proposed hotels. Hotels with similar characteristics to those planned for development at Mokuleia are found to employ between 0.6 and 1.6 full-time equivalent direct employees per hotel unit. The overall direct hotel operational employment at Mokuleia is projected at 0.9 full-time equivalent employees per unit.

Direct operational employment associated with the condominium projects are based on staffing requirements for similar properties, recognizing the level of employment resulting from the operation of vacation rental pools. Direct operational employment for the condominium projects at Mokuleia is estimated at 0.7 full-time equivalent employees per unit.

Based on a review of employment patterns for commercial facilities, 0.5 full-time equivalent jobs are projected to result from each 100% of commercial area at Mokuleia.

Employment at the golf course at Mokuleia is anticipated to increase from about 30 full-time equivalent employees for the initial 18-hole course to 50 full-time equivalent employees upon completion of the second 18-hole course.

Property administration includes employment associated with the broad operations of Mokuleia as a whole and includes maintenance, clerical, advertising, managerial, accounting and sales. Full-time equivalent employment is estimated to average about 50 jobs per year during the 15-year projection period.

Based on the development and employment characteristics, Mokuleia is projected to generate about 800 full-time equivalent direct operational employment positions by 1990 and about 2,700 by 2005, as shown in Exhibit IV-E.

---

*Footnote:

J Includes direct, indirect and induced construction employment.

Source: John Chil & Company, Inc.*

---

**IV-5**
### Hokuleia

#### Projected Direct Operational Employment

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel</td>
<td>450</td>
<td>990</td>
<td>1,440</td>
<td>1,890</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>120</td>
<td>230</td>
<td>440</td>
</tr>
<tr>
<td>Commercial</td>
<td>90</td>
<td>230</td>
<td>380</td>
<td>500</td>
</tr>
<tr>
<td>Golf course</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Property administration</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>620</td>
<td>1,440</td>
<td>2,150</td>
<td>2,730</td>
</tr>
</tbody>
</table>

#### Indirect and Induced Operational Employment

The direct operational positions created would also generate additional employment elsewhere in the State. Based on recent studies of the economic impacts of tourism by the DPED, the relationship between direct employment and indirect and induced employment is projected at the rates shown as follows: 1/2

<table>
<thead>
<tr>
<th>Location of direct employment</th>
<th>Multiplier per direct employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel and property administration</td>
<td>0.90</td>
</tr>
<tr>
<td>Condominium rental pool</td>
<td>0.30</td>
</tr>
<tr>
<td>Commercial facilities</td>
<td>0.60</td>
</tr>
<tr>
<td>Other (including golf course)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Based on these relationships, indirect and induced operational employment is projected to increase from 470 full-time equivalent positions in 1990 to 2,160 by 2005, as shown in Exhibit IV-E. Total operational employment resulting from the Hokuleia development is projected to increase from nearly 1,100 positions in 1990 to nearly 5,900 positions by 2005, as also shown in the exhibit.

### Resident Income

Hokuleia could be expected to have a significant impact on personal and household income for residents of the island and the State. Hokuleia would generate resident income through employee wages, salaries and fringe benefits and as income to proprietors.

#### Personal Income

Personal income is defined as the wages and salaries paid to the direct construction and operational employees of Hokuleia. Personal income is projected on the basis of average industry wages and salaries and the expected future levels of employment demand.

---

2/ Expressed as a percent of total indirect and induced employment.

Source: John Child & Company, Inc.
### Exhibit IV-F

**MOKULEIA**  
**Projected Indirect and Induced Operational Employment**

<table>
<thead>
<tr>
<th>Type of development</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel and property administration</td>
<td>410</td>
<td>890</td>
<td>1,700</td>
<td>1,700</td>
</tr>
<tr>
<td>Condominium</td>
<td>95</td>
<td>470</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>Commercial</td>
<td>50</td>
<td>160</td>
<td>210</td>
<td>300</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>570</td>
<td>1,110</td>
<td>1,080</td>
<td>2,160</td>
</tr>
</tbody>
</table>

*Estimated annual wage levels for 1986 are based on the 1984 average annual wages for each industry, as reported in the Hawaii State Department of Labor and Industrial Relations, 1984 Employment and Payrolls in Hawaii, 1985 and trended by the five-year compound growth rate in wages for the specific industry or based on wages observed at comparable facilities. Personal income for 1986 by employment type, is shown as follows.*

**Estimated Annual Personal Income**

| (1986) |  
|--------|--------------------------------------------------|
|        | Construction                                      | 9,000 |
|        | Hotel and property management                     | 14,500|
|        | Condominium                                       | 14,500|
|        | Commercial operations                              | 11,500|
|        | Golf course                                        | 12,000|

Annual personal income paid to Hawaii residents in the form of wages and salaries earned directly from establishments at Mokuleia or from its visitors may be expected to increase from 530.3 million in 1990 to 642.3 million by 2005, in 1986 dollars, as shown in Exhibit IV-G.

**Household Income**

Estimation of total household income effects based on the visitor expenditures permits a perspective on the benefits to statewide income associated with the development at Mokuleia.

Total household income generated by the expenditures from visitors at Mokuleia would include the fringe benefits and proprietor's income paid by establishments that sell goods and services directly to the visitors, as well as the wages and salaries noted previously. In addition, household income includes income generated through the multiplier effects of indirect and induced visitor expenditures.

The DPED reports the multiplier effects of visitor expenditures throughout the community have declined in recent years, but each $1.00 spent by visitors to the State in 1985 was estimated to have generated 50.70 in total income to households in the State.

Assuming a similar multiplier effect for the expected expenditures of visitors to Mokuleia, it is projected that Mokuleia could annually contribute an additional $12.6 million to total household income in 1990 and about $74.6 million by 2005, as shown in Exhibit IV-G.

1/ Excludes tips, where applicable.

Source: John Child & Company, Inc.
HOKULEIA
Projected Average Annual
Personal and Household Income
(1986 dollars; in millions)

<table>
<thead>
<tr>
<th>Type of employment</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal income:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>21.6</td>
<td>7.5</td>
<td>6.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Hotel and resort operation</td>
<td>7.3</td>
<td>13.1</td>
<td>21.6</td>
<td>28.1</td>
</tr>
<tr>
<td>Condominium</td>
<td>0.0</td>
<td>1.7</td>
<td>3.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Commercial operations</td>
<td>1.0</td>
<td>2.6</td>
<td>4.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Golf course</td>
<td>0.8</td>
<td>0.6</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Total personal income</td>
<td>30.3</td>
<td>27.5</td>
<td>36.7</td>
<td>62.3</td>
</tr>
</tbody>
</table>

Total State household income supported by direct visitor expenditures
$12.0  $25.2  $36.4  $76.8

V - FISCAL IMPACTS

The net fiscal impacts of HOKULEIA’s proposed developments may be evaluated by comparing the tax revenues and expenditures that could be expected to be incurred.

This section describes the expected fiscal impacts of the proposed developments in terms of revenues and expenditures to the City & County of Honolulu and the State of Hawaii.

REVENUES

Development at HOKULEIA would bring tax revenues to the County and State governments. County government revenues would be in the form of additional real property taxes from the new facilities planned for development. Revenues to the State government would be composed primarily of unemployment taxes, excise taxes, gross income taxes and personal income taxes.

The following sections project the revenues that could be generated for the County and State governments as a result of development at HOKULEIA.

COUNTY

Real property taxes in the County are currently $10.00, $9.00 and $6.75 per $1,000 of total assessed value for hotel and resort, commercial and golf course, and residential uses, respectively.

Development plans at HOKULEIA are conceptual. Plans and specifications outlining design and quality characteristics for the various components of the development are not available. It is impossible to accurately estimate the component values without such information. However, based on broad price levels observed for similar facilities on Oahu and the neighbor islands, possible value ranges are shown as follows.

Possible Value Estimates
(1986 dollars per square foot unless otherwise noted)

<table>
<thead>
<tr>
<th>Type</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel</td>
<td>$200</td>
<td>$250</td>
</tr>
<tr>
<td>Condominium</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Single-family home</td>
<td>75</td>
<td>125</td>
</tr>
<tr>
<td>Vacant lot</td>
<td>2</td>
<td>7.50</td>
</tr>
<tr>
<td>Improved property</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>Commercial (per square foot)</td>
<td>120,000</td>
<td>150,000</td>
</tr>
</tbody>
</table>

Note: Price per square foot of building area.
Based on current tax rates and the foregoing value ranges, and allowing for current real property taxes of $0.03 million, the planned facilities at Mokuleia could be expected to generate about $0.7 million in net real property taxes in 1990 and $4.3 million by 2005, in 1986 dollars, as shown in Exhibit V-A.

The majority of these revenues would be attributable to the property values of the hotel and condominium developments.

Additional property tax revenues would be generated by the alternative recreational facilities, but they have not been estimated due to the lack of information relating to their size and scale of development.

State

The tax revenue to the State government is estimated as a residual of total State and County government revenues less County government revenue as estimated in the previous section.

Results of the State of Hawaii Department of Planning and Economic Development’s (DPED’s) Input/Output Model indicate that the ratio of total tax revenues to direct visitor expenditures in Hawaii has ranged from 0.119 to 0.122 in recent years. These ratios indicate that for each $1.00 spent by visitors to the State, $0.12 was generated in the form of State and County government taxes.

At the anticipated future ratio of 0.12 total revenues per visitor dollar, total State and County tax revenues attributable to the development and operations of facilities at Mokuleia would amount to $2.7 million in 1990 and increase to $12.8 million by 2005, in 1986 dollars, as shown in Exhibit V-B.

Of this total, tax revenues to the State government are projected to increase from $1.5 million in 1990 to $8.3 million in 2005, in 1986 dollars, also shown in Exhibit V-B.

**Expenditures**

The visitors and residents at Mokuleia would necessitate expenditures of public resources in terms of:

- Public safety (such as increased needs for police and fire protection).
- Development and upkeep of highways, recreational facilities and natural resources.
- Health and sanitation measures.
- Cash capital improvements.

---

**Exhibit V-A**

**MOKULEIA**

Projected Development Impact on County Tax Revenue

(1986 Dollars, in Millions, Annual)

<table>
<thead>
<tr>
<th>Type of development</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel</td>
<td>$0.63</td>
<td>$1.28</td>
<td>$2.00</td>
<td>$2.63</td>
</tr>
<tr>
<td>Condominium</td>
<td>0.00</td>
<td>0.04</td>
<td>0.08</td>
<td>0.13</td>
</tr>
<tr>
<td>Single-family lots</td>
<td>0.00</td>
<td>0.09</td>
<td>0.19</td>
<td>0.25</td>
</tr>
<tr>
<td>Vacant</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Improved</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Golf course</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Projected real property tax revenue</td>
<td>0.69</td>
<td>2.18</td>
<td>3.57</td>
<td>4.49</td>
</tr>
<tr>
<td>Less current real property tax revenue</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Net real property tax revenue, rounded</td>
<td>$0.70</td>
<td>$2.20</td>
<td>$3.50</td>
<td>$4.50</td>
</tr>
</tbody>
</table>
**Exhibit V-8**

**NOXULEIA**  
Development Impact on State Tax Revenues  
(1986 Dollars; in Millions, Annual)

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Visitor Expenditures</th>
<th>State and County Tax Revenue Multiplier</th>
<th>State and County Tax Revenues</th>
<th>Less Net County Tax Revenues</th>
<th>Total State Tax Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>$18.3</td>
<td>0.12</td>
<td>2.2</td>
<td>0.73</td>
<td>5.3</td>
</tr>
<tr>
<td>1995</td>
<td>$48.8</td>
<td>0.12</td>
<td>5.9</td>
<td>2.2</td>
<td>8.3</td>
</tr>
<tr>
<td>2000</td>
<td>$80.5</td>
<td>0.12</td>
<td>9.7</td>
<td>3.5</td>
<td>12.8</td>
</tr>
<tr>
<td>2005</td>
<td>$106.8</td>
<td>0.12</td>
<td>12.8</td>
<td>4.5</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Residents necessitate public costs in all the aforementioned areas, and also in education, retirement and pension funds, public welfare and other government functions.

**County**

The various County government expenditures for fiscal year 1984 were analyzed with respect to the relevant service population for each government function. This analysis indicates that County government expenditures in 1984 totaled about $480 per resident and $270 per visitor, as shown in Exhibit V-C. These expenditures are projected to have increased by about 72 between 1984 and 1986.

Based on the trended County government outlays, public expenditures by the County government on behalf of Hoku lea’s visitors and residents could be expected to total about $5.2 million in 1990 and 5.7 million by 2005. In 1986 dollars, as shown in Exhibit V-D.

**State**

A similar analysis of State government expenditures and the relevant populations for the various services indicates that expenditures in 1984 totaled about $1,940 per resident and $330 per visitor, as shown in Exhibit V-E. These expenditures are projected to have increased by about 72 between 1984 and 1986.

Based on this analysis, State government public expenditures on behalf of Hoku lea’s visitors and residents are projected to total $5.2 million in 1990 and 5.7 million by 2005, in 1986 dollars, as shown in Exhibit V-F.

**REVENUE/EXPENDITURE ANALYSIS**

The net fiscal impacts of Hoku lea’s development to the County and State governments are estimated by comparison in the following sections.

**County**

Comparison of projected public revenues and expenditures indicates the County government may expect to net about $6.5 million in additional annual revenues in 1990 and $2.8 million by 2005, in 1986 dollars, as shown in Exhibit V-G.

The analysis also indicates that additional County government revenues generated by Hoku lea would be about 2.6 to 3.1 times the additional expenditures incurred by the County government, as also shown in the exhibit.

V-J
### Exhibit V-C

**HORULEIA**

Hawaii County per Capita Government Expenditures
1984

<table>
<thead>
<tr>
<th>Operating expenditure</th>
<th>Population</th>
<th>Annual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating expenditure</td>
<td>Base</td>
<td>Resident</td>
</tr>
<tr>
<td>General government</td>
<td>$50,236</td>
<td>$62.90</td>
</tr>
<tr>
<td>Public safety</td>
<td>97,801</td>
<td>$38.70</td>
</tr>
<tr>
<td>Highways</td>
<td>15,410</td>
<td>$10.00</td>
</tr>
<tr>
<td>Health and sanitation</td>
<td>37,351</td>
<td>$4.30</td>
</tr>
<tr>
<td>Public welfare</td>
<td>39,000</td>
<td>$10.00</td>
</tr>
<tr>
<td>Public schools</td>
<td>38,635</td>
<td>$33.50</td>
</tr>
<tr>
<td>Recreation</td>
<td>15,219</td>
<td>$3.90</td>
</tr>
<tr>
<td>Interest</td>
<td>16,511</td>
<td>$20.00</td>
</tr>
<tr>
<td>Bond redemption</td>
<td>33,241</td>
<td>$31.60</td>
</tr>
<tr>
<td>Economic/urban development</td>
<td>21,568</td>
<td>$27.00</td>
</tr>
<tr>
<td>Mass transit</td>
<td>37,180</td>
<td>$43.50</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>35,279</td>
<td>$41.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>507,417</strong></td>
<td><strong>$483.10</strong></td>
</tr>
</tbody>
</table>

### Exhibit V-D

**HORULEIA**

Development Impact on County Government Expenditures
(1986 Dollars; in Millions)

<table>
<thead>
<tr>
<th>Population or expenditure type</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents</td>
<td>0</td>
<td>340</td>
<td>750</td>
<td>940</td>
</tr>
<tr>
<td>Visitors and part-time residents</td>
<td>590</td>
<td>1,680</td>
<td>2,630</td>
<td>3,740</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>590</td>
<td>2,020</td>
<td>3,380</td>
<td>4,680</td>
</tr>
<tr>
<td>Government expenditures:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents</td>
<td>50.0</td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Visitors and part-time residents</td>
<td>0.2</td>
<td>0.5</td>
<td>0.9</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50.2</td>
<td>0.7</td>
<td>1.3</td>
<td>1.7</td>
</tr>
</tbody>
</table>

1/ For fiscal year ending June 30, 1994.
2/ Resident or de facto population estimates for Honolulu County as of January 1, 1994.

### Exhibit V-E

**State per Capita Government Expenditures**

**1986**

<table>
<thead>
<tr>
<th>Operating expenditure (000s)</th>
<th>Population base</th>
<th>Annual Expenditure</th>
<th>Resident</th>
<th>Visitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>General government</td>
<td>$ 128,131</td>
<td>$ 124.60</td>
<td>$ --</td>
<td>$ --</td>
</tr>
<tr>
<td>Public safety</td>
<td>72,704</td>
<td>65.00</td>
<td>65.00</td>
<td>65.00</td>
</tr>
<tr>
<td>Highways</td>
<td>49,061</td>
<td>42.50</td>
<td>42.50</td>
<td>42.50</td>
</tr>
<tr>
<td>Natural resources</td>
<td>17,172</td>
<td>15.20</td>
<td>15.20</td>
<td>15.20</td>
</tr>
<tr>
<td>Health and sanitation</td>
<td>72,341</td>
<td>64.40</td>
<td>64.40</td>
<td>64.40</td>
</tr>
<tr>
<td>Hospitals and institutions</td>
<td>114,557</td>
<td>111.40</td>
<td>111.40</td>
<td>111.40</td>
</tr>
<tr>
<td>Public welfare</td>
<td>328,000</td>
<td>319.30</td>
<td>319.30</td>
<td>319.30</td>
</tr>
<tr>
<td>Education</td>
<td>696,297</td>
<td>677.00</td>
<td>677.00</td>
<td>677.00</td>
</tr>
<tr>
<td>Recreation</td>
<td>12,627</td>
<td>12.30</td>
<td>12.30</td>
<td>12.30</td>
</tr>
<tr>
<td>Utilities and other</td>
<td>76,970</td>
<td>68.20</td>
<td>68.20</td>
<td>68.20</td>
</tr>
<tr>
<td>enterprises</td>
<td>213,253</td>
<td>177.30</td>
<td>177.30</td>
<td>177.30</td>
</tr>
<tr>
<td>Debt service 3/</td>
<td>126,006</td>
<td>104.70</td>
<td>104.70</td>
<td>104.70</td>
</tr>
<tr>
<td>Pension and retirement 3/</td>
<td>24,856</td>
<td>20.70</td>
<td>20.70</td>
<td>20.70</td>
</tr>
<tr>
<td>Employees' health and</td>
<td>18,173</td>
<td>17.70</td>
<td>17.70</td>
<td>17.70</td>
</tr>
<tr>
<td>hospital insurance 3/</td>
<td>11,619</td>
<td>11.30</td>
<td>11.30</td>
<td>11.30</td>
</tr>
<tr>
<td>Employment compensation</td>
<td>72,111</td>
<td>72.30</td>
<td>72.30</td>
<td>72.30</td>
</tr>
<tr>
<td>Grants-in-aid to counties</td>
<td>9,007</td>
<td>9.70</td>
<td>9.70</td>
<td>9.70</td>
</tr>
<tr>
<td>Urban redevelopment and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash capital improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,027,673</strong></td>
<td><strong>1,940.80</strong></td>
<td><strong>329.80</strong></td>
<td></td>
</tr>
</tbody>
</table>

1/ For fiscal year ending June 30, 1986.
2/ Resident or de facto population estimates for the State as of January 1, 1986.
3/ Expenditures allocated to residents and visitors in proportion to total per capita expenditures.

### Exhibit V-F

**Projected Development Impact on State Government Expenditures**

(1986 Dollars; in Millions)

<table>
<thead>
<tr>
<th>Population or expenditure type</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visitors and part-time residents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government expenditures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents 4/</td>
<td>$0.0</td>
<td>$0.7</td>
<td>$1.6</td>
<td>$2.0</td>
</tr>
<tr>
<td>Visitors and part-time residents 5/</td>
<td>$0.2</td>
<td>$0.6</td>
<td>$1.0</td>
<td>$1.3</td>
</tr>
<tr>
<td>Total</td>
<td>$0.2</td>
<td>$1.3</td>
<td>$2.6</td>
<td>$3.3</td>
</tr>
</tbody>
</table>

4/ Government expenditures for residents estimated at $1.940 per capita and trended to 1986.
5/ Government expenditures for visitors and part-time residents estimated at $330 per capita and trended to 1986.
### Exhibit V-G

**HONOLULU**

*Projected State and County Revenues and Expenditures*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>County:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New revenues</td>
<td>$0.7</td>
<td>$2.2</td>
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**State**

Comparison of the revenues and expenditures as projected indicate the State government could be expected to net about $1.1 million in 1990 and $3.9 million by 2005, in 1986 dollars, as shown in Exhibit V-G. This indicates a revenue/expenditure ratio averaging about 2.3:1 during the forecast period, as also shown in the exhibit.
QUALIFICATIONS OF JOHN CHILD & COMPANY, INC.

John Child & Company, Inc. is a professional real estate service corporation which specializes in real estate appraisal and consulting. Founded in 1937, John Child & Company, Inc. is one of the largest and oldest real estate appraisal and consulting companies in Hawaii.

PROFESSIONAL STAFF

The Company's professional staff has a wide range of real estate experience and hold designations earned from the major professional organizations. Our professional staff members include:

- Robert J. Vernon, MAI, CRE, Chairman
- Theodore Uchel, SREA, ASA, President
- Karen Charn, MAI, Executive Vice President
- Craig T. Smith, ASA, Appraiser
- Uyen Y. Bewart, ASA, Appraiser
- Paul D. Cool, Appraiser
- Darlene Ariola, Research Assistant
- Cheryl Emery, Research Assistant

SCOPE OF PROFESSIONAL SERVICES

The Company's real estate appraisal and consulting practice includes:

- Appraisal of real estate
- Highest and best use studies
- Market and financial feasibility analyses
- Arbitration.

Our studies cover a variety of real estate properties and interests such as:

- Mixed use developments
- Office buildings
- Shopping centers and retail facilities
- Hotels and resort facilities
- Industrial properties
- Residential rental apartments
- Residential condominiums
- Single-family subdivisions
- Special purpose properties.

We have assisted both private and public clients in Hawaii, the mainland states, Guam, American Samoa, and Singapore.

Our professional services are used to assist clients in internal management and decision making, negotiations with other parties, and for obtaining financing.

TYPICAL CLIENTS

Our clients include both private and public organizations. Typical clients are:

- Amfac Financial Corp.
- Amfac, Inc.
- Bank of America
- Bank of Hawaii
- B.P. Bishop Estate
- Estate of James Campbell
- Castle & Cooke, Inc.
- Hilliard Town, Inc.
- Oceanic Properties
- Chaminade College
- Citibank, N. A.
- City & County of Honolulu
- Department of Housing & Community Development
- The Equitable Life Assurance Society of the United States of America
- Federal Home Loan Bank Board
- Finance Realty
- First Federal Savings and Loan Association
- First Hawaiian Bank
- Hawaiian Electric
- Hawaiian Telephone
- Honolulu Federal Savings and Loan Association
- NOKOR Development Company
- Loyalty Development
- Loyalty Enterprises
- Loyalty Finance Co.
- Pacific Construction Co., Ltd.
- Realty Mortgage investors of the Pacific (RAMPAC)
- Security Pacific Mortgage Corp.
- Service Pacific Inc.
- Stark Development Company, Ltd.
- State of Hawaii
- Department of Land & Natural Resources
- Department of Transportation
- U.S. Army
- U.S. Navy
KAREN CHAR, MAI
Executive Vice President

Education
Panahuna School, 1967.
Various courses sponsored by the American Institute of Real Estate Appraisers.

Professional Associations
- Member, American Institute of Real Estate Appraisers (MAI designation).
  - Vice Chairman, National By Laws Committee (1986).
  - Member, National By Laws Committee (1985); National Admissions Committee (1982-1984).
  - President-elect and Vice President (1985), Secretary (1984), Honolulu Chapter No. 13.
  - Grader, National Board of Examiners (1982-1983) - Responsible for grading business reports and demonstration appraisal reports submitted for credit towards MAI designation.
  - Admissions Chairman, Southwest Region (1983).

- Member, Panel of Arbitrators of the American Arbitration Association.

Professional Experience
- Executive Vice President, John Child & Company, Inc. (1984 to present).

Court Testimony
- Qualified as an expert witness in the valuation of real property in the Courts of the State of Hawaii.

Certification
The American Institute of Real Estate Appraisers conducts a voluntary program of continuing education for its designated members. MAIs and SRA's who meet the minimum standards of this program are awarded periodic educational certification. Karen Char, MAI is certified under this program.

Paul D. Cool
Appraiser

Education
B.B.A. Business Economics And Quantitative Methods, University of Hawaii, 1980.
Various courses, workshops, and seminars by the American Institute of Real Estate Appraisers, International Society of Real Estate Appraisers, and the American Society of Appraisers including:
  - Society of Real Estate Appraisers, Course 101, "An Introduction to Appraising Real Property".
  - Society of Real Estate Appraisers, Course 201, "Principles of Income Property Valuation".
  - Society of Real Estate Appraisers, Course 202, "Applied Income Property Valuation".

Professional Experience

Court Testimony
Qualified as an expert witness in the valuation of real property in the Courts of the State of Hawaii.
APPENDIX C

Final Social Impact Assessment
For Proposed Mokuleia Recreational/Resort Community
Mokuleia, Oahu, Hawaii

Prepared for
Mokuleia Development Corporation

Prepared by
Community Resources, Inc.

July 1986
# Final Social Impact Assessment

## For Proposed Mokuleia Recreational/Resort Community

--- June 1986

Prepared for: Mokuleia Development Co.

Prepared by: Community Resources, Inc.

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1.0 INTRODUCTION

1.1 Background and Purpose

Mokuleia Development Corp., a subsidiary of Northwestern National Life Insurance Company, is seeking government approval for a proposed Mokuleia recreational community with resort component on 1,018.75 acres — including 34 acres of waterway. All included in the requested approval are approximately 2,000 additional acres of hills and valleys whose the proposed recreational community; this 1,018.75 acres property may, however, present hiking and camping opportunities which could augment the recreational/residential development below.

The bulk of the 1,018.75 acres consists of 896 contiguous acres of Farrington Highway. The remaining 122.75 acres are distributed over four noncontiguous beachfront parcels, each of the highway.

Upon completion, the development would include 3,300 hotel and resort condominium units; 700 residential lots; a 33-acre retail commercial complex; and 36 holes of golf. Other potential recreational areas within the study include substantial agricultural activities, tennis facilities, a track-and-field athletic complex, a multi-media complex within the commercial complex, and the previously mentioned possible hiking and/or camping opportunities on the adjacent 896 acres.

The proposed project would require a number of government land use approvals, including several which would trigger requirements for an Environmental Impact Statement (EIS). The purpose of this report is to assess social impacts of the project in conjunction with the larger EIS effort. The full report is intended as an appendix to the EIS, with summaries of findings to be included in appropriate sections of the full EIS text.

1.2 Concepts on Methods and Assumptions

Social impact assessment requires a variety of methods, from relatively firm forecasts of quantifiable impacts (e.g., population) to highly speculative discussion of less tangible potential impacts (e.g., lifestyle or social structure).

Principal methodological techniques would include: [1] statistical analysis of both existing and proposed conditions; [2] qualitative input obtained from interviewing knowledgeable community and government agency 'key' informants; and [3] analysis of social outcomes of similar resort development in comparable rural Hawaii areas.

Several important assumptions affect the overall thrust of this report:

(1) While there may be some in-hosbye impacts in terms of economics or South Shore recreational activities which
attract persons from outside the region, the primary
impact area will be the North Shore, with secondary
impact on Roslindale and Walpole.

(2) It is assumed that the population guidelines of the
City and County General Plan, as reflected in the
limited supply of residential land in the Development
Plan for the North Shore and surrounding areas, will
result in place.

(3) For many types of social and socio-economic impacts,
marginal outcomes may be more important and sometimes
earlier to address than predicting them. This is
particularly true in regard to employment of area
residents.

1.3 Scope and Structure of Report

The concept of "social impact" is a broad one, and certain
topics may be judged by some people but not by others to fall
within this category. The scope of this report excludes certain
topics which are, however, being addressed for the EIR by other
consultants. These include:

- Detailed analysis of on-site employment and population
impacts;
- Impacts on traffic, infrastructure, and public services;
- Archaeological and historic sites.

The remainder of this report is organized into three broad
sections:

1) Section 2.0 addresses existing socio-economic condi-
tions, ranging from a recent data-based description of
the present population to a presentation of current
community issues and concerns relevant to the project.

2) Section 3.0 provides a context for social impact fore-
casts: forces for change with or without the project;
key social characteristics of the project; and alterna-
tive futures for the project site.

3) Section 4.0 discusses potential impacts and allevia-
tions, with particular emphasis on social aspects of
employment, current on-site human activities, recrea-
tional and substantive impacts, qualitative
social concerns (e.g., lifestyle), and indicators of
social stress or harmony (e.g., crime).

2.0 EXISTING SOCIO-ECONOMIC CONDITIONS

2.1 Introduction

The purpose of this section is to provide an overview of the
geography, history, and socio-economic character of the area
immediately adjacent to the project site and the surrounding
region. This region is divided into a "primary," "secondary," and "tertiary" study areas, as shown on Figure 2.1 which also
shows the project location on Pabst and described below.

a The "Primary Study Area" consists of the U.S. Census
Department's "Walpole Division" (census tracts 99.01,
99.02, and 99.03), although this area will generally be
referred to as the "North Shore" to differentiate it from
the community of Walpole.

b It should be noted that the City's North Shore-
Development Plan Area (and North Shore Neighborhood Board
boundaries) extends to include a portion of census tract
101, in the Roslindale Division. This additional area
shown in Figure 2.2 - includes the areas known as
Whitehead, Walpole, and Naylor. These communities
will sometimes be included with the "Primary Study Area"
in narrative purposes, but some discussions of overall
community figures would not include them.

c The "Secondary Study Area" includes the two census
divisions bordering the North Shore to the east (Roslindale Division, consisting of tracts 101, 102, and
102.01, and 102.02) and the south (Walpole Division, consisting of tracts 99 through 99.05). The Walpole Division, also
to the south of the Primary Study Area, is not included
because of the lack of paved transportation links
between Roslindale and Walpole.

d The "Tertiary Study Area" includes the Central Ohio
community of Pabst, Walpole, and surrounding
subdivisions (tracts 77.01 through 77.03).

Most discussion in this document will focus on the Primary
Study Area (particularly the communities closest to the project
site - Roslindale, Walpole, and Walpole). The Secondary and
Tertiary study areas are noted here because they are potential
sources of labor supply.

2.2 Project Site

Figure 2.3 indicates both the project site and nearby land
uses along Harrison Avenue Highway. (Not included on Figure 2.3,
however, are the approximately 2,000 acres area south of the
project site.)

The small parcel marked "State of Boonville" in the middle of
the project site is a former military weapons storage site.
relocated to the State following World War Two. It is not currently used for any public purpose.

As noted in Section 1.1, the project area proposed for recreational development totals 1,018.75 acres, of which 856 acres are in a single contiguous, inverted-L-shaped parcel located immediately adjacent to the highway and the larger parcel. The remaining 162.75 acres are distributed among three separate, uninhabited beachfront parcels (27, 0.75, and 12 acres, respectively) further west on Farrington Highway. The distance along the highway from the easternmost edge of the 12-acre beachfront parcel to the westernmost edge of the 27-acre parcel is approximately 14,000 feet.

These lands—now known as "Kokkulei Ranch"—were originally owned by the wealthy Honolulu Dillingham family, who used them for a vacation retreat and ranching purposes. The monks at Koko Head Monastery and the current landowners, Northwestern Mutual, primarily for cattle and horse grazing. A portion of the property is also used for a hospital and related activities, and the site was later developed into "Kokohead Ranch," although it is not actually an independent ranch or business entity. The landowner considers all these uses to be temporary, and they are not economically viable.

The 27-acre beachfront parcel is now primarily used for grazing. The remaining 162.75 acres are leased to the Hawaii Polo Club for weekend polo games during part of the year. At present, this site is the major center of polo activities for all Hawaii.

The remaining three beachfront parcels are all primarily used for recreational purposes, and are designated on the City's North Shore Development Plan as intended for public development. The 12-acre parcel adjacent to Kokohead Beach Park is designated for public recreation, and the 27-acre parcel immediately north of the park is designated for the Episcopal Church's recreational "Camp Kokkulei" complex and contains a few scattered houses.

Current project-site uses and activities will be further discussed in Section 1.2 ("Impacts on Current On-Site Human Activities"). The immediate surrounding area will be further described in the following Section 2.3.

2.3 Overview of Complete Study Area

This discussion will provide a mostly qualitative overview (albeit with some selected quantitative indicators) of the study area, while following subsections will present detailed reason data.
2.3.1 Primary Study Area

According to the U.S. Census, the North Shore (Wailuku Division) had a 1990 population of 3,819, only about 500 more than were counted in 1970. However, the estimated July 1981 population had increased to 10,531 (Hawaiian State Census Statistical Areas Committee, 1985), primarily due to residential construction in the Palani and Wailuku areas.

NOTE: In 1980, an additional 2,212 persons lived in the Sunset/Kalawai/Pupukea communities. As earlier noted, these communities -- and other lands within the triangle shaded area on Figure 2.2 -- are not in the North Shore "Wailuku" Census Division but are in the City and County's North Shore Development Area.

For this reason, some discussions of population in this report will combine the two areas. Table 2.1 on the following page provides an analysis of the 1980 populations for the various areas -- census divisions vs. Development Plan Areas -- as well as the major communities within each.

Detailed demographic breakdowns of U.S. Census data will be provided in following sub-sections. Briefly, however, the census data indicate the predominant ethnic groups as of 1980 in the Wailuku Division were Filipinos (33%) and Japanese (13%), although different communities feature greatly different ethnic mixes. Compared to islandwide averages, the median age on the North Shore was slightly lower; the proportion of foreign-born individuals slightly higher; and average educational levels were significantly lower.

Remaining discussion will focus on individual communities:

2.3.1.1 Makaha (and Waimanalo Beach)

Makaha is the community surrounding the project site. It is a rural area, with pockets of homes and apartment units but no public facilities (except beach parks) or retail areas, extending for about one mile along Farrington Highway. The windward side of the highway is largely taken up by Makaha Beach (the proposed project site). Castle and Cooke sugar cane land, and the Makaha Golf Club. Other activities on the windward side in addition to the residential pocket include the Episcopal Church's Camp Makaha, the City and County's Makaha Beach Park, the Makaha Town Center, and -- toward the end of the road -- the HNL's Camp Erdman.

It is to some extent a matter of opinion and personal definition as to whether the "Makaha" community is confined to the town along Farrington Highway or whether it also includes the area along Pali Highway which becomes Waimanalo Beach Road as one travels east toward Waimanalo.

Table 2.1: Distribution of 1980 Population Over Various North Shore and Koolau Communities

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>% of Census</th>
<th>% of Development</th>
<th>% of Plan Area</th>
<th>% of Combined Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wailuku CDP</td>
<td>1,051</td>
<td>11.2%</td>
<td>31.0%</td>
<td>16.0%</td>
<td></td>
</tr>
<tr>
<td>Makaha CDP</td>
<td>2,412</td>
<td>24.5%</td>
<td>18.5%</td>
<td>10.0%</td>
<td></td>
</tr>
<tr>
<td>remainder of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>north Koolau</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiman River</td>
<td>3,376</td>
<td>34.4%</td>
<td>25.9%</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>from Waiman River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to Sunset Ridge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sunset/Waiman/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupukea)</td>
<td>3,212</td>
<td></td>
<td></td>
<td>24.0%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Total in Census</td>
<td>9,849</td>
<td>100.0%</td>
<td>(75.1%)</td>
<td>(31.0%)</td>
<td>(11.0%)</td>
</tr>
<tr>
<td>Div. excl.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunset etc. 1</td>
<td>13,061</td>
<td>(132.6%)</td>
<td>100.0%</td>
<td>(51.3%)</td>
<td></td>
</tr>
<tr>
<td>Total in DP Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incl. Sunset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc. 1</td>
<td>11,815</td>
<td>100.0%</td>
<td>(129.3%)</td>
<td>(59.0%)</td>
<td></td>
</tr>
<tr>
<td>Total in Census</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Div. Incl.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunset etc. 1</td>
<td>10,985</td>
<td>(117.1%)</td>
<td>100.0%</td>
<td>(45.7%)</td>
<td></td>
</tr>
<tr>
<td>Combined Total</td>
<td>21,011</td>
<td></td>
<td></td>
<td></td>
<td>100.0%</td>
</tr>
</tbody>
</table>

NOTE: "DP" - Census Designated Place
The Riviera Project is bordered on the south and east by extensive agricultural land. Adjacent to the southeast, Dillingham Airfield features a 5,000-acre recreational area where gliders, radio-controlled cars, and small aircraft can be flown. The airfield is used for various activities, including scouting, and the project site is surrounded by mountains, which provide a scenic and quiet environment.

Some of the early residents of the area lived in tents and makeshift shelters. The town was officially incorporated in 1941, and the population grew rapidly with the influx of military personnel and their families. The Riviera Project was completed in 1943, and the town was officially known as the Riviera. The town continued to grow, and by 1950, it had a population of 10,000. Today, Riviera is a thriving community with a diverse population and a rich history.

The Riviera Project is a unique example of a planned community that was built to accommodate the needs of military personnel and their families. The project was designed to provide a safe and comfortable environment for its residents, and it continues to be a popular destination for those seeking a peaceful and scenic lifestyle.
of today's site was constructed shortly after 1908, following the purchase of property by Emily & Ender, and merger with land
used by the John Wainum and Land Company (owned by Billingham). The merger resulted in formation of Wainum, Agriculture, Ltd.,
and the success of sustained production of sugarcane.

The mill camp, which had developed around the mill, expanded with the immigration of Japanese to the 1920's. In response to these needs, some
Filipino laborers, who were located in the fields, and several
in the town. But, at its peak, the company employed more than 3,000 workers. Employment is currently 150, with no significant change expected for at least
the next two years (personal communication, John Madrid, personnel director, Wainum Sugar Co., Napal, 1980). Although
sugarcane will not yet dominate the Wainum sugar,
residential, commercial, and service
in the community. In date, Wainum has not yet shared in the transition to a tourism-oriented economy, as a transition
town is occurring in other parts of the North Shore and Kauai.

The central mill and surrounding areas are also
remain a key determinant of Wainum's physical character. Many
of the town's residents are employed at the mill and live in
dense, single-family residential areas within several blocks of the
plantation offices and mill. Most of these housing units are
older and in a more moderate-price range. In more recent
years, some commercial and public facility developments such as a
small convenience shopping shopping center and the Wainum Recreation Center adjacent to the elementary school - along with construction
of the Pa Kau subdivision and additional residential
units along Hanalei Highway -- have somewhat modernized the
city's character.
Kualoa Beach: Beyond Waimea Bay lies Kualoa Beach, which is very similar in its coastal strip character to Waimea and nearby Sunset Beach. However, if the former outlying plantation camps make of the hillside is included, the area has a higher proportion of long-time and/or non-Neighborhood residents.

Waipouli/Sunset Beach: To the east along Kualoa Ridge lies beyond Kualoa Beach lies Waipouli, overlooked by the hillside communities of Papohaku. Papohaku differs from the usual communities in having a more "local" population, containing several expensive homes with dramatic views from the gulf, and also featuring numerous small agricultural lots. A supermarket at the base of Papohaku road is the town's main commercial attraction. Beyond the Waipouli/Sunset area is an area known as Sunset Beach, a strip of residential development extending approximately two miles along the highway. As previously noted, these communities are technically in Kualoa, and their combined population was approximately 2,200 in 1980.

### 2.3.2 Secondary Study Area

#### 2.3.2.1 Kualoa Division

The Kualoa Census Division is adjacent to the north shore, and contains the northern third of Oahu's Windward side. Its 1980 population was 14,195 (including Sunset Beach, etc., or 16,383 excluding these communities). The full population was predominantly Caucasian (33.1%) and Hawaiian or part-Hawaiian (22.1%), with different ethnic mixes in different communities. Major employers are the Turtle Bay Hilton to the northwest of Sunset Beach with between 400 and 500 jobs and the Polynesian Cultural Center with near 1,200 employees.

In geographic terms, Kualoa consists of two coastal plains, situated between the shoreline and the Kualoa Mountain Range. These coastal plains vary in width from a few thousand feet to approximately one mile. Excluding Sunset Beach, etc., the area contains six principal residential communities (Kaaawa, Kahana Valley, Waianae, Kaunakakai, Lala, and Kualoa) which are loosely defined and almost contiguous between each other along the region's single arterial road, Kualoa Highway. The area's major communities are Kualoa, Lala, and Waianae.

### 2.3.2 Waianae Division

With a 1980 population of 11,502, and given its proximity to the North Shore, the Waianae Census Division must be considered a major potential source of labor for any large development on the North Shore.

Waianae town proper, with a 1980 population of 16,911, has an economy based on the nearby pineapple fields and on several surrounding military installations. The largest of these is Schofield Barracks, with a separate 1980 population of 10,851. The population of Waianae and the nearby military base has been relatively stable in recent decades, with the prospect of continued stability at least for the near future.

As will be discussed further, Waianae is characterized by various unemployment and poverty problems, some of these associated with low-income military dependents.

### 2.3.3 Tertiary Study Area

The communities within what is defined as the "Tertiary Study Area" are discussed in this report as a very limited fashion, and only because the residents of these communities may be potential sources of labor for North Shore developments, and because these communities are located on the 8-2 corridor to the North Shore.
### Table 2.3:  
Primary Communities of the Study Area

<table>
<thead>
<tr>
<th>Community</th>
<th>Area Description</th>
<th>Population Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Study Area (North Shore)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makati</td>
<td>Business district with large office buildings and hotels.</td>
<td>A few hundred in 1930; predominantly Filipino.</td>
</tr>
<tr>
<td>Makati</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marikina</td>
<td>Suburban residential area.</td>
<td>Projected 1,000 by 1960.</td>
</tr>
<tr>
<td>Rizal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tandang Sora</td>
<td>Small residential area.</td>
<td>Projected 1,400 by 1960.</td>
</tr>
<tr>
<td>Tandang Sora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Study Area (Southwest)</td>
<td></td>
<td>About 900 residents in 1980. New arrivals from Vietnam; predominantly Filipino.</td>
</tr>
<tr>
<td>Las Pinas</td>
<td>Residential area with modern hotels and condominiums.</td>
<td>About 1,600 residents; large number of Japanese and Chinese students.</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>Residential area with modern hotels and condominiums.</td>
<td>About 1,000 people; half of them part-time resident.</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary Study Area (Central)</td>
<td></td>
<td>In 1980, about 7,000 residents in modern apartments; predominantly Filipino.</td>
</tr>
<tr>
<td>Paranaque</td>
<td>Residential area with modern hotels and condominiums.</td>
<td>Projected 21,000 by 1980.</td>
</tr>
<tr>
<td>Paranaque</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taguig</td>
<td>Suburban residential area.</td>
<td>Projected 25,000 by 1980.</td>
</tr>
<tr>
<td>Taguig</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3.3.1 Hillman

- A population of 21,000 in 1980.
- Highest point in the Philippines.

Despite the impressive growth and development, population pressure and urban sprawl are significant concerns. The study area is at risk of being overwhelmed by urbanization and industrialization, which could potentially lead to environmental degradation and loss of agricultural land.
<table>
<thead>
<tr>
<th>Table 2.4(b): Population and Demographic Characteristics: City and County of Residency and Various Parts of Study Area, 1970 and 1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITY AND COUNTY OF RESIDENCE</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>TOTAL POPULATION</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ETHNICITY</td>
</tr>
<tr>
<td>Japanese</td>
</tr>
<tr>
<td>Japanese</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Hawaiian</td>
</tr>
<tr>
<td>Hawaiian</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>SEX</td>
</tr>
<tr>
<td>Less than 5 yr.</td>
</tr>
<tr>
<td>5 - 17 yr.</td>
</tr>
<tr>
<td>18 - 64 yr.</td>
</tr>
<tr>
<td>65 yr. and over</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>TOTAL POPULATION</td>
</tr>
<tr>
<td>ETHNICITY</td>
</tr>
<tr>
<td>Japanese</td>
</tr>
<tr>
<td>Japanese</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Hawaiian</td>
</tr>
<tr>
<td>Hawaiian</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>SEX</td>
</tr>
<tr>
<td>Less than 5 yr.</td>
</tr>
<tr>
<td>5 - 17 yr.</td>
</tr>
<tr>
<td>18 - 64 yr.</td>
</tr>
<tr>
<td>65 yr. and over</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Notes: 1 Figures based on 1% sample; numbers represent estimates.
2 Including persons born in U.S. territories, and persons born abroad but at sea in American waters.
3 "U.S." = 1970 census or census "getomatic" in 1980; 1970 Census kept a "non-response" category, while 1980 Census eliminated nonresponses in other categories.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CITY AND COUNTY</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

The table above shows the population growth in different cities and counties from 1950 to 2000. The population has consistently increased over the years, with the highest growth rate occurring between 1960 and 1970. This trend suggests a strong urbanization process, with people moving to cities in search of better job opportunities and living standards. The population data for 1990 and 2000 indicate a slight decline, possibly due to the impact of economic downturns or other external factors. Overall, the population growth has been significant, reflecting the dynamic nature of urban societies.
### Table 2-1:41:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>POPULATION IN FAMILIES</td>
<td>778</td>
<td>681</td>
<td>154</td>
<td>154</td>
<td>154</td>
<td>154</td>
</tr>
<tr>
<td>as percentage of total population</td>
<td>91.8%</td>
<td>96.5%</td>
<td>85.5%</td>
<td>97.1%</td>
<td>5.7%</td>
<td>5.8%</td>
</tr>
<tr>
<td>GENDER OF FAMILIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male/household</td>
<td>83.6</td>
<td>83.0</td>
<td>68.1</td>
<td>73.5</td>
<td>78.3</td>
<td>78.3</td>
</tr>
<tr>
<td>Female only</td>
<td>7.1</td>
<td>9.8</td>
<td>10.8</td>
<td>12.9</td>
<td>12.9</td>
<td>12.9</td>
</tr>
<tr>
<td>MOTHER OR CHILD (12 MTH UNDER 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male head</td>
<td>68.6</td>
<td>77.6</td>
<td>77.6</td>
<td>77.6</td>
<td>77.6</td>
<td>77.6</td>
</tr>
<tr>
<td>Female head</td>
<td>31.4</td>
<td>22.4</td>
<td>22.4</td>
<td>22.4</td>
<td>22.4</td>
<td>22.4</td>
</tr>
<tr>
<td>RURAL POVERTY LEVEL</td>
<td>5.0</td>
<td>7.9</td>
<td>15.2</td>
<td>9.2</td>
<td>17.9</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2-1:41:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-FAMILY HOUSEHOLDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as percentage of total population</td>
<td>184</td>
<td>116</td>
<td>124</td>
<td>119</td>
<td>119</td>
<td>119</td>
</tr>
</tbody>
</table>

**Notes:** All figures refer to "Population in Families" and "Non-Family Households" based on USS sample data. Numbers represent estimates. "N/A" or "DS estimates."

**Sources:** U.S. Bureau of the Census. 1973 Census of Population and Housing: County Projections, General, PCH(1)-68; 1980 Summary Tape Files 1st and 2nd State of Hawaii. 1977, GENERAL POPULATION (1) TABLE.
### Table 2.3(b):

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Salt Lake City</th>
<th>Salt Lake County</th>
<th>Salt Lake Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Year-Round Housing Units</strong></td>
<td>1,099</td>
<td>1,139</td>
<td>720</td>
</tr>
<tr>
<td>vacant (total)</td>
<td>N/A</td>
<td>2.2%</td>
<td>N/A</td>
</tr>
<tr>
<td>vacant for sale</td>
<td>N/A</td>
<td>0.1%</td>
<td>N/A</td>
</tr>
<tr>
<td>vacant for rent</td>
<td>N/A</td>
<td>0.1%</td>
<td>N/A</td>
</tr>
<tr>
<td>vacant for other use</td>
<td>N/A</td>
<td>2.1%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total Year-Round Housing Units</strong></td>
<td>1,023</td>
<td>1,103</td>
<td>697</td>
</tr>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Select Housing Status</strong></td>
<td>6.1%</td>
<td>6.6%</td>
<td>19.9%</td>
</tr>
<tr>
<td><strong>Persons per Household</strong></td>
<td>3.3</td>
<td>3.4</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Persons per Room</strong></td>
<td>1.66</td>
<td>1.69</td>
<td>2.31</td>
</tr>
<tr>
<td><strong>Select Case Type</strong></td>
<td>970</td>
<td>994</td>
<td>900</td>
</tr>
<tr>
<td><strong>Family Income</strong></td>
<td>10.9%</td>
<td>10.7%</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>Select Year</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977-1980</td>
<td>870,900</td>
<td>970,300</td>
<td>1,007,600</td>
</tr>
<tr>
<td><strong>Select Monthly Income</strong></td>
<td>8,000</td>
<td>8,500</td>
<td>9,000</td>
</tr>
<tr>
<td><strong>Select Year</strong></td>
<td>1,1</td>
<td>1.4</td>
<td>3.1</td>
</tr>
</tbody>
</table>

**Notes:**
- For 1980, median values are for NONCONSUMER HOMING UNITS.
- Figures based on 15% sample; percent represents estimates.

### Table 2.8:

<table>
<thead>
<tr>
<th>Occupied 1980 Housing Units by Type of Ownership</th>
<th>City and County of Residence</th>
<th>North Zone</th>
<th>South Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Occupied</td>
<td>Solaris</td>
<td>3,246</td>
<td>3,414</td>
</tr>
<tr>
<td>Solaris</td>
<td>32.4</td>
<td>32.4</td>
<td>32.4</td>
</tr>
<tr>
<td>Solaris</td>
<td>20.4</td>
<td>20.4</td>
<td>20.4</td>
</tr>
<tr>
<td>Solaris</td>
<td>19.9</td>
<td>19.9</td>
<td>19.9</td>
</tr>
<tr>
<td>Solaris</td>
<td>9.2</td>
<td>9.2</td>
<td>9.2</td>
</tr>
<tr>
<td>Solaris</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Solaris</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**Notes:**
- All figures based on 15% sample; percent represents estimates.
2.5.1 Site, Participation Rates, and Commuting

Tables 2.1(a) and (b) provide 1970 and 1980 U.S. Census information on labor force size and characterization for the Study Area. For this discussion, the "Territorial Study Area" (the minted Mint-Mohave area -- i.e., remainder of the Central Basin Development Plan Area, in addition to Mohave) will also be included, since this area represents a peripheral but potentially large labor pool for the proposed Mohave project.

In 1980, the potential labor force for the overall Study Area (i.e., residents aged 16 or greater numbered 46,131), of which only 8,121 (17.5%) lived in the Primary Study Area of the North Shore. The bulk of this potential labor force resided in the Mohave Census Division (29,037, or 63.0%) and Mineral/Mohave (10,091, or 21.5%).

However, much of the potential labor force was either not in the labor force or was in the armed forces. Most of the armed forces personnel lived in the Mohave area, but it should be noted that 12% of the North Shore labor force and 21% of the Mohave/fringes labor force consisted of military personnel.

The actual civil labor force in 1980 totalled about 15,000 for the overall Study Area. When armed forces personnel are excluded, the civilian labor force participation rates would differ from those indicated in Tables 2.1(a) and (b). The adjusted labor force participation rates are given in Table 2.8.

There are two important conclusions to be drawn from Table 2.8:

1. At the present time, the bulk of the potential labor force for any major new employment center on the North Shore could be people from areas adjacent to or within reasonable commuting time of the North Shore, not just from within the area itself. This conclusion would of course be tempered by the recognition that nearby residents are usually "more likely" employers than are more distant residents, since nearby residents may be more motivated to work close to home and since they are more likely by reason of proximity to be aware of job opportunities in their own areas.

2. Civilian labor force participation rates in some parts of the study area -- particularly the North Shore and Mohave -- are significantly lower than islands in the labor force participation rates. If these participation rates increase in the future, the potential labor pool in the areas closest to Mohave could increase.

In the latter regard, it may also be noted from Tables 2.1(a) and (b) that more than one out of every four employed residents on the North Shore had to commute 15 minutes or more to their workplaces in 1980. (This is similar to the 1980 census data.) These individuals...
| Table 2. (Ita1)  
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KUALAPUU CDP</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>TOTAL LABOR FORCE</strong></td>
</tr>
<tr>
<td><strong>Households</strong></td>
</tr>
<tr>
<td><strong>Occupations</strong></td>
</tr>
<tr>
<td><strong>Total, all industries</strong></td>
</tr>
<tr>
<td><strong>Service</strong></td>
</tr>
<tr>
<td><strong>Construction</strong></td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
</tr>
<tr>
<td><strong>Forestry, fishing</strong></td>
</tr>
<tr>
<td><strong>Retail trade</strong></td>
</tr>
<tr>
<td><strong>Personal, entertainment</strong></td>
</tr>
<tr>
<td><strong>Public administration</strong></td>
</tr>
</tbody>
</table>

**Notes:** **All figures based on 100 sample cases, number represents percentage.**

are in one sense not part of the current effective labor pool for North Shore projects but could become so if attractive alternative employment is developed within the area.

2.5.2 Occuption and Industry

Tables 2.7(a) and (b) also provide profiles of employed civilians in the Study Area for 1970 and 1980. The North Shore population declined only slightly from 1970 to 1980 -- primarily a result of the increased number of civilians employed in the manufacturing industry, reflecting increases in the workforce in the neighboring communities. However, 26% of employed North Shore residents -- and 10% of those in neighboring communities -- were still employed in either manufacturing or agriculture in 1980.

Koolauloa's profile, however, shifted dramatically from 1970 to 1980, due to the total shutdown of sugar operations at Kalakaua, coupled with the opening of a major hotel at Kahilina and some expansion at tourist-oriented activities at the Koolauloa Cultural Center. While this sort of shift which theoretically could occur on the North Shore if sugar operations were to cease, the proposed Kalakaua project seems unlikely.

Looking at 1980 occupational profiles in these tables, it can be observed that the share of employed civilians employed in jobs which occupied most labor -- "farming, fishing, forestry," or "findings, crafts, repair" or "operators, mechanics, laborers." However, on the North Shore, the share of people employed in the fishing sector, which has begun the transition into a service economy, the total was just 2.8%, up from 5.0% in 1970.

2.5.3 Unemployment

Table 2.8 provides a comparison of 1980 civilian unemployment rates. The rates on the North Shore and in Koolauloa equaled or only slightly exceeded the Islandwide rate of 4.7%, while unemployed workers were located primarily in Wildwood/Makaha and in other Black Group 9 residents. However, on the North Shore, the highest unemployment rate was in Wildwood/Makaha area, the unemployment rate exceeding the Islandwide rate for the Island.

Wildwood/Makaha's unemployment rate was the highest in the Study Area. The rate was 5.0% in 1980, up from 3.9% in 1970 for the Island. However, the rate was still below the 6.0% rate in 1980 for the Island.

A more detailed analysis of the causes of unemployment is provided in Table 2.9, which shows the percentage distribution of unemployed workers in the Study Area by occupation.

2.6 Existing Economic Activities and Employment

Within the Primary Study Area, the major potential economic activities are the sugar operations at Wainiha and diverse retail activities in the Waianae area.

Of those employed in the Primary Study Area, 42% were employed in the sugar operations at Wainiha, while 25% were employed in diverse retail activities in the Waianae area.

Table 2.5 provides the estimated 1980 study area employment figures by occupation.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
<td>210</td>
<td>5.1%</td>
</tr>
<tr>
<td>Koolauloa</td>
<td>358</td>
<td>5.5%</td>
</tr>
<tr>
<td>Wildwood/Makaha</td>
<td>970</td>
<td>9.3%</td>
</tr>
<tr>
<td>Wildwood/Makaha</td>
<td>1,518</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

Source: Hawaii State Department of Labor and Industrial Relations, unpublished data.

The apparent finding of low, at least measured unemployment rates in the North Shore and Koolauloa area must be tempered by the previously-discussed finding of low labor force participation rates. "Hidden unemployment" may occur when individuals are discouraged from entering or remaining in the labor force. The low labor force participation rates of residents in the North Shore Division may be due to the relatively high unemployment rates in these areas. In 1980, 5,000 people were employed in the Waianae/Waikele census tract, 9.9% of whom were employed in the sugar operations. This combined total of 2,000 jobs in the North Shore Division may be compared to the 3,837 persons in the civilian labor force of the area (Table 7.1).
The nature of available employment in the Molokai/Haleakula census tracts of 1980 differed greatly from the jobs held by persons in the Molokai area and remainder of the North Shore census division. In Table 2.10, some 35% of Molokai/Haleakula jobs appear to be agriculture and/or sugar-related (since the major "manufacturing" activity in the area is in the sugar mill). In Molokai, the job private is much more heavily weighted toward retail and white-collar activities.

Table 2.10: Primary Study Area Jobs by Industry, 1980

<table>
<thead>
<tr>
<th>Industry Category</th>
<th>C.T. 99.01 Molokai</th>
<th>C.T. 99.02, 100 (rest of North Shore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL JOBSITE</td>
<td>2,014</td>
<td>1,167</td>
</tr>
<tr>
<td>Selected Industry Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3</td>
<td>2.7</td>
</tr>
<tr>
<td>Agriculture/Forestry/Fishing/Logging</td>
<td>21.1</td>
<td>12.6</td>
</tr>
<tr>
<td>Construction</td>
<td>10.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Personal, Entertainment, &amp; Recreation Services</td>
<td>1.3</td>
<td>5.8</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>2.1</td>
<td>27.5</td>
</tr>
<tr>
<td>Finance, Insurance, and Real Estate</td>
<td>0.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Professional and Related Services</td>
<td>8.0</td>
<td>25.2</td>
</tr>
<tr>
<td>Public Administration</td>
<td>1.6</td>
<td>11.7</td>
</tr>
</tbody>
</table>


Gaps in the urban transportation planning package data make it difficult to provide exact 1980 jobcounts for Kailua and Windward Oahu. However, as previously noted in Section 2.3, Kailua's major economic activity is tourism, with some 550 jobs at Kailua's Turtle Bay Hilton and Country Club and about 1,000 jobs (not part-time and/or for students) at the Polynesian Cultural Center in Laie. The Molokai area is largely dependent on military support activities and pineapple cultivation.

The 1980 jobcount for the Territory Study Area (Molokai and Kailua) was about 3,500 (Hawaii State Department of Planning and Economic Development, 1986, p. 330), including military personnel. These would include both pineapple and sugar workers, as well as various retail and service-industrial positions in both Waipahu and Kailua.

2.7 Community Issues and Concerns

The purpose of this section is to identify major community concerns which may be directly or indirectly relevant to this project. The focus here will be on general needs and issues, as well as issues pertaining to the visitor industry in general.

2.7.1 General Needs and Issues

2.7.1.1 Islandwide

In the most recent Hawaii State Plan Survey (1984 Research, 1984), residents were asked to choose what 11 societal goals represented the most important subject of governmental action. Most frequent responses among the Hawaii sample were (1) "improving education in public schools" (23%); (2) "getting more jobs and industry for Hawaii" (18%); and (3) "cutting out crime" (14%).

A subsequent question explored residents' attitudes regarding the jobs vs. lifestyle issue by asking for agreement or disagreement with the statement: "We should provide more jobs through economic development, even if it changes our island ways and lifestyles." On Oahu, 55% agreed; 33% disagreed; and 12% had no opinion.

Public concern over jobs and economic development made this the most-often mentioned issue in the Honolulu Advertiser's 1986 statewide poll (Ko, 1984), followed closely by traffic, government infringement, crime, education, and housing.

2.7.1.2 Primary Study Area

Prospects are limited in the North Shore because there have been no recent published public opinion surveys with adequate sample sizes in Kailua or Molokai since the City's Development
Preliminary surveys (1976 Research, 1976a), which are now eight years out of date. (NOTE: The Mahwah Neighborhood Board conducted a mail-out survey in March 1976, but no results are yet available. The Millburn Neighborhood Board also conducted a mail-out survey in 1985, but questions had little direct relevance to the proposed Nakleman project.)

The North Shore Neighborhood Board conducted mail-out surveys in 1982 and 1981. Relatively high numbers of responses were obtained in both years (nearly 1,000 in 1982 and about 750 in 1981). However, it should be noted that mail-out survey results are not necessarily representative of overall public opinion since respondents are self-selected rather than randomly selected.

In the more recent survey -- results of which were reported in the Board's June/July 1985 Newsletter -- the topic area judged "most important" to the North Shore was crime, followed by education, and then by land use. Traffic congestion was not an option on this list, although it had been the number one concern on the 1974 Development Plan survey for the North Shore (1985 Report). There was 58% opposition in 1981 to a four-lane road from Mahwah to Ballantine, although this had received 51% support in the preceding 1982 survey.

Additional findings from the 1981 survey included:

- 65% stating that the maximum building height for the North Shore should be one to two stories;
- 65% feeling "very strongly" about the need for full-time maintenance service; and
- 70% agreement that "there are an adequate number of parks and campgrounds in our area."

In the earlier 1982 survey results of which were not published but were recorded at the City Neighborhood Commission, 57% majority opposed expansion of the proposed sanitary landfill, whereas 58% favored continued promotion of tourism (supported by 34%) if a choice could be made. Otherwise, however, 95% said that maintaining an economically healthy visitor industry was either "very important" or "extremely important." And 96% agreed (in a 22.7% disagreement with the statement "Tourism is still our best bet, even though some of its jobs may be part-time and may not pay as well.

A 1982 University of Illinois statewide mail-out survey on perceived tourism impact (Eck and Vot, 1981) found that 75% of the respondents agreed that tourism had brought substantial economic benefits (more jobs, growth outside income, and a higher standard of living) and some types of social benefits (i.e., variety of entertainment and of cultural activities). There were at least 58% of the respondents (40% on the same) that tourism had increased crime (with the exception of prostitution, led to more drug use, exploited native populations, impaired "cultural identity," and overextend local beaches or parks. Public perception was more mixed as to whether tourism had significantly affected cost of living, traffic congestion, and general environmental/landscape quality.

2.1.2.2 Primary Study Area

The 1981 North Shore Neighborhood Board Survey did not ask about resort or the visitor industry in general. It did, however, ask about potential resort expansion at Kilimanjaro Island, although the question somewhat understated the actual number of proposed new units. Some 51% were in favor and 36% were opposed.

2.1.2.3 Isola Verde

The most recent Island State Plan Survey (1981 Research, 1981) indicates substantial support for tourism among the islanders, although 51% did prefer diversification of the economy rather than continued promotion of tourism (supported by 33%) if a choice could be made. Otherwise, however, 95% said that...
3.0 CONTEXT FOR IMPACT ASSESSMENT

The preceding section profiled existing conditions and issues in the study area, while the section after this will discuss potential social changes which may be generated by the proposed project. The purpose of this intermediary section is to establish a logical framework for the impact assessment to come.

3.1 Forces for Change With or Without Project

The standard model for socio-economic impact assessment is to make two separate forecasts of likely future conditions — with the proposed project and without it — and then compare the differences between the two scenarios.

The ability accurately to predict conditions 20 years in the future is naturally limited. Some of the key factors would include (1) land use and population growth factors, as well as general economic conditions of the market. In the Primary Study Area, the future market for space will account for many changes in the physical and social character of the area. If the market for space declines, causing a loss of economic viability for businesses and land owners, then proposals for alternative uses of the land would likely occur. City and County government plans and policies (i.e., the General Plan and Development Plans), which will ultimately determine future development policies, may also be influenced by market forces. Existing city plans, however, do provide some degree of certainty and a basis for estimating conditions in the various study areas in the future.

This subsection is intended to provide an overview of basic forces for socio-economic change in selected areas and subunits. These changes, some of which may already be in process, should generally be expected to occur whether or not development takes place in Hanalei.

Topics to be discussed include:

(1) population trends and policies;
(2) future major public facility construction; and
(3) other potential economic/fund use changes.

3.1.1 Primary Study Area

3.1.1.1 Population Trends and Land Use Policies

Table 3.1 shows 1950 - 1980 population levels and growth rates for the North Shore (Wainiha) Division, as well as Kauai Island County Division, Wainiha, and Millivani/Balzenu. Also shown are figures for the combined North Shore/Hanalei area. These are given in order to facilitate comparison with City General Planning

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
<td>7,906</td>
<td>9,571</td>
<td>9,819</td>
<td>1.0272%</td>
</tr>
<tr>
<td>Wainiha</td>
<td>5,223</td>
<td>10,562</td>
<td>14,165</td>
<td>1.0300%</td>
</tr>
<tr>
<td>Combined North Shore/Hanalei</td>
<td>13,129</td>
<td>19,733</td>
<td>24,984</td>
<td>1.0209%</td>
</tr>
<tr>
<td>Wainiha</td>
<td>17,263</td>
<td>31,329</td>
<td>41,562</td>
<td>1.0108%</td>
</tr>
<tr>
<td>Millivani/Balzenu</td>
<td>N/A</td>
<td>30,251</td>
<td>59,391</td>
<td>1.0608%</td>
</tr>
</tbody>
</table>

Plan population guidelines, which pertain to Development Plan areas. As indicated in Section 2.4, the individual North Shore and Hulalali Development Plan areas differ slightly from the census divisions, but their combined areas are identical.

The table shows strong consistency in growth rates for the short term (1970 to 1980) compared to the long term (1950 to 1980), for both the combined and separate North Shore and Hulalali areas.

Utilizing these stable growth rates to project future population, the number which would be forecast for the year 2005 would range from 39,500 to 44,600 residents for the combined areas, depending on exactly what projection technique is used.

However, the City's General Plan calls for the population of these areas to be held to a figure between 2.0% and 3.5% of the total Islandwide population in the year 2005 (11.5% to 1.8%) for the North Shore Development Plan area and 1.3% to 1.5% for the Hulalali Development Plan area. Applying these percentages to the current Islandwide total of 354,300 for the year 2005, the combined Hulalali/North Shore populations would be held to a number substantially lower than 10,000 - i.e., approximately three-quarters the number which would be expected from historic growth rates.

The estimated 1981 combined area population was already 26,000 (Hawaii State Census Statistical Area Committee, 1985), a figure below at the lower boundary of the General Plan guideline for the year 2005. Furthermore, the City's most recent analysis of residential-owned population capacity (City and County of Honolulu, Department of General Planning, 1985) suggests that only 100 acre housing units could be required in each of the above Development Plan areas to attain a projected year 2005 population of 28,000.

These figures strongly indicate that, given current City policies and land demand on the North Shore and in Hulalali, a significant amount of the land which has already been developed and sold for residential use will be utilized more efficiently than previously expected. The expected result would be a slower increase in housing cost throughout both areas.

The situation is likely to become intensified in these areas because the City's current methodology for estimating "residential capacity" causes vacation homes to be allocated a large amount of the land. The 1980 Census data show that only 2.9% of units Islandwide were held for occasional use, but the figure was 9.3% for the North Shore/Hulalali area (2.1% in the North Shore Division, 5.8% in Hulalali). Thus, the effective population "cap" for these areas would be even lower than indicated by City guidelines, and pressure for full-time housing units would be even greater.

Beachfront areas such as Hulalali and Waialua Beach may be expected to appreciate particularly rapidly, for two reasons:

- beach-front residential land is rapidly becoming of interest to an international real estate market; and
- there are particularly high percentages of units in these areas already being held for occasional use.

Consequently, property taxes will rise in these areas, and there will be economic pressure for higher returns. Thus, even without the proposed Hulalali project, there is a good likelihood that the current patterns of residential development will be expanded and replaced with newer, higher-priced units. Residential multi-family characteristics could shift accordingly.

An exception could be the few single-family homes on Preservation-designated land west of Hulalali Beach Park (see Figure 2.3 on page 51); these unassuming homes could not be upgraded or replaced.

The proposed resort beach-front parcels west of Camp Hulalali are also designated Preservation at the present time. Thus, the current City land use policy for all beach-front areas west of Camp Hulalali along Farrington Highway is to become or remain in open space.

City planners and the Department of General Planning and the Department of Development and Utilization were unable to document the exact reason for the "Preservation" designation. However, they noted that the entire Hulalali community is considered to have high historical and cultural value and that the Hulalali area is unique in the preservation of 500 acres of wetland and forest.

Also, as discussed in Section 1.8, the City's long-range policy is to acquire Northwest Hulalali's Beach, as 20-acre parcels east of Hulalali Beach for ultimate park expansion. Also, the City is planning to acquire a substantial number of acres within the Hulalali area, including the entire beachfront property at the 20-acre parcel location for a new beach park.

Some additional changes which may be expected in the Hulalali/Waialua area, given current City land use policies, would include:

1. Limited further high-rise apartment construction in the current multi-family area along Waialua Beach.
2. Gradual conversion of some homes (perhaps "gentlemen's rentals") in the recently-approved Hulalali multi-family subdivision.
3. At least some additional structures on the Episcopal Church's Camp Hulalali. As will be discussed in more detail in Sec. 1.2, the Church owns three acres and leases an additional six from Northwestern Natural. The Church's Habitat Plan for camp improvement requires continued use of all nine acres, although the future of the six-acre parcel is still under discussion.
However, the Honolulu City Council in the past year approved a Special Use Permit for the proposed new structures called for in the Master Plan.

3.1.1.2 Major Future Public Facilities

The future of the public facilities with the greatest implications for the Prineville Study Area will be the State Highway Department's plans for the area. This would alleviate traffic congestion in the town and permit more orderly growth and development of commercial facilities. Without a nearby resort area, however, it could also affect the current trend toward tourist-oriented retail operations.

Other potential projects, although without committed funding, could include further improvements on Highway 131, as well as the previously-mentioned beach park projects.

3.1.1.3 Other Potential Economic/Land Use Changes

Issues discussed here are speculative in that they are not reflected in current City land use policies, but they could, nonetheless, have major implications for the Study Area's future.

The most significant economic uncertainty facing the area involves the future of sugarcane production in general and the Wahiawa Sugar Plantation in particular. With its PEP program, it is still the North Shore's largest single employer and is the thread which currently binds together the Wahiawa community.

Given the overall precarious economic condition of Hawaii's sugar industry, relatively slight shifts in national or international market conditions could affect the plantation's production levels. Additionally, about half the employees are transfers from the Oahu plantations and those leases will expire in the year 2000. The current situation requires optimism about the future, simultaneously pointing out that some of the sugar lands could be converted to pineapple production if the sugar industry drowns.

The future of the plantation is not clear, and both Castle and Cooke are interested in developing new uses for portions of the former sugar lands, possibly including residential development. Castle and Cooke recently assembled a new citizens' advisory committee, comprised of community leaders from the North Shore area, to provide input on developing a new plan for the company's properties in this area.

Another speculative economic prospect for the North Shore would be further development of agriculture-related operations, such as the development of a new sugar mill.

Development of a larger airport has been proposed for the Waimanalo area. This would appear to be more likely without the proposed project than with it.

3.1.2 Secondary Study Area: Wahiawa

3.1.2.1 Population Trends and Land Use Policies

The population situation for Wahiawa is only briefly discussed in the previous section in conjunction with the North Shore area. Wahiawa is essentially an outgrowth of the nearby town of Wahiawa, which is developing from an agricultural community into a more residential area.

Perhaps the most significant project in the area is the proposed development of the Wahiawa Plantation, which would include the development of a new residential area. It is estimated that this project will provide about 1,000 new full-time residential jobs.

3.1.2.2 Major Future Public Facilities

The only major project with current funding is the infrastructure for the Wahiawa Village project.

3.1.2.3 Other Potential Economic/Land Use Changes

Zions Securities Corp., the development arm of the Zions Savings and Loan Association, has proposed several versions of a residential development on the North Shore area. The most recent Development Plan amendment proposal (for 1986 - 87) was approved on May 11, 1986, and included 225 single-family units and 100 multi-family units on 65 acres.

3.1.3 Secondary Study Area: Kahuku

3.1.3.1 Population Trends and Land Use Policies

No data is available for this area, but it is expected that the population will continue to grow as new developments are planned.

Another speculative economic prospect for the North Shore could be further development of agriculture-related operations.
Central Urban Development Plan area, there are no General Plan population guidelines for this community alone. However, the Development Plan maps indicate a limited future residential growth in and around Whalmon.

3.1.3.2 Major Future Public Facilities

Projects with current funding include some improvements to the water system and the recreation center. These are unlikely to have any significant overall effect on long-term development patterns.

3.1.3.3 Other Potential Economic/Land Use Changes

Whalmon's major economic groups are pineapple and the military, both of which appear stable at the present time. There has been some speculation that political instability in the Philippines could lead to relocation of air force units to Hawaii and probably to Whalmon. The probability of this cannot be assessed at the present time, nor the magnitude of any such relocation.

3.1.4 Tertiary Study Area: Milliman/Walpiha

3.1.4.1 Population Trends and Land Use Policies

As indicated in Table 3.1, the Milliman/Walpiha area (i.e., the lower part of the city's Central Urban Development Plan area) has been a major focus of growth in recent years, primarily due to the steady expansion of Milliman Town and several subdivisions such as Walpiha and Village Park (Village Park and Walpiha-Century). Estimated 1981 population for the census tracts containing these communities was 71,165, up from the 1970 figure of 37,169.

The City's Development Plans permit a major new subdivision on Walpiha land at Walpiha, between Village Park and Walpiha-Century, although zoning approval is still required. Second City Council actions would permit limited expansion of the Village Park and Milliman Town area (Walpiha and 300 units, respectively) as well as an initial 300-unit increment for a proposed major new subdivision at Walpiha, on the eastern side of the H-2 freeway above Walpiha.

Also approved on the Development Plans, but still awaiting zoning, is the proposed Milliman Technology Park above Milliman. According to the Landowner's consultant (SRK International, 1981), this "high-tech" industrial subdivision could provide more than 11,000 on-site jobs, although it should be pointed out that the economic feasibility of high-technology manufacturing has yet to be established for Milliman.

3.1.4.2 Major Future Public Facilities

Facilities with the greatest overall potential impact for the area would be highway or other transportation improvements. However, other than a new lane for the H-1/2 crossing of Milliman and a planned new interchange on the H-1 at Walpiha, these are in the planning stage. Recent public speculation has focused on the possibility of diverting federal funds originally earmarked for the main H-2 project to Central Urban transportation improvements.

3.1.4.3 Other Potential Economic/Land Use Changes

The recent Council approval for Village Park, Milliman, and Walpiha represents only a fraction of the original proposals for each project. In 1981, Council indicated the partial approval was all which could be allowed under current General Plan population guidelines for Central Urban. At the same time, the Council rejected a proposal to amend the General Plan by allowing the permitted population capacities for H-1 and Central Urban, which would have permitted more development in Central Urban.

However, the General Plan is subject to periodic review and updating. In 1987, and this is writing, some Council members have indicated a desire to see the General Plan revision program moved forward and completed by the latter part of 1988. Whether these full projects in turn receive approval, there would be significant implications for the future population and land use patterns in the Tertiary Study Area. The complete Village Park and Milliman Town area population would increase to about 10,000 persons; the additional Milliman Town area would house about 25,000 persons; and the full Walpiha project could accommodate more than 30,000 persons. (Note: It is uncertain whether all these projects, particularly Walpiha, which would require substantial new infrastructure, could hold out to those full-capacity levels by the year 2005.)

Thus, the future population in the Tertiary Study Area could be significantly revised upward in the next several years, from a maximum of 50,000 persons by the year 2005. However, given the speculative nature of these projections, the possible additional population will not be considered in the labor supply analysis of the following Section 3.1.
the Waimea valley site. The proposal has become controversial, and ultimate approval is not assured.

The uncertain future of the sugar industry is also a major concern in Waimea, headquarters of Waimea Valleys Co. All of this plantation's land is leased from the Robinsons and/or Campbell Parks, and these leases expire in the mid-1980s. Given the proximity to air terminals and shipping facilities, it is possible that some diversified agriculture operations might relocate from the Neighbor Islands to make sugar lands if that plantation is forced to close.

3.2 Alternative Uses for the Project Site

While much of the property is now in ranching or equestrian use, the current property owners maintain these uses are not profitable and are not feasible for long-term continuation.

The owners have indicated an intention to put the property on the market if the current requested approvals are not granted. It is a matter for speculation if (1) a purchaser can be found for lands which have demonstrated economic value, and some of which are designated for "preservation"; (2) the property would be sold in lots to one purchaser or piecewise to several; and (3) any purchaser would prove more successful than Northwestern in securing government approvals for development.

It is possible that all current leases and uses of the land could be terminated to provide clear title in the event of sale or potential sale.

Thus, short-term alternative uses of the land are uncertain but would range from temporary continuation of current uses to a total conversion of all such uses. The long-term alternative uses currently cannot be forecast at all.

4.0 IMPACTS AND MITIGATION

Major topics to be discussed in this section include:

- Impacts on current on-site human activities;
- Recreational and subsistence activities;
- Social aspects of employment, including adequacy of labor supply and potential mitigations;
- Lifestyle impacts, including physical elements of "rural character" and social/political structure;
- Indicators of social stress or harmony (crime, family cohesion, individual stress);
- Social mitigations.

4.1 Impacts on Current On-Site Human Activities

This subject matter involves what is usually known as "displacement." However, in this case, such impacts are subject to three significant qualifications:

(1) Displacement would be primarily of human activities rather than human residents.

(2) For many of these activities -- e.g., polo -- it has not yet been determined whether the project would actually mean termination or simply relocation and possibly even expansion; these possibilities are being actively explored.

(3) Some activities could possibly be terminated if the project is go! approved. For example, if the property is sold rather than developed, dairy cattle and non-employee residential leases might be ended to provide clear title for the new owners.

Under these conditions, it becomes more appropriate to consider the impacts as consequences for existing activities rather than as total "displacement."

4.1.1 Residents

There are currently nine tenant households on the property. Six of these are for ranch employees, who are provided free housing as part of their compensation, and the current population
in these households is approximately 24. Three other houses are rented on a month-to-month basis to non-employees, and the current population in these households is approximately seven.

Most or all of these households would be displaced by the project, although some of the employee households might be either unaffected or relocated. The three non-employee tenants would possibly be displaced whether or not the project is approved, since sale of the land in the event of non-approval might result in lease terminations prior to sale (to assure clear title) or at the sale by new owners. All tenants have been notified of the community's intent to develop the property and the likelihood of eventual lease terminations.

4.1.2 Cattle and Horseraising Operations

The Rubleia Ranch manager and nine employees now graze approximately 500 animal units on all parts of the property except the Crocker Ranch (see next subsection), steep areas, and dairy cattle pasture. Most of these 'animal units' (counting calves and colts as one-half units) are beef cattle. Some horses are also grazed on the property as brood stock for ranch work purposes or occasionally sold to outsiders.

Varying amounts of pasture land are also leased on a month-to-month basis to dairy operations. The number of dairy cattle has ranged from 200 to 1,000 in recent years.

These animal-raising ranch operations have been profitable for the landlord. While their eventual termination would be assured by project development, their continuation is questionable even if development does not take place.

4.1.3 Polo and Other Equestrian Activities

Crawbar Ranch: The "Crawbar Ranch" is actually a department within the overall ranch operations, rather than an independent entity. It provides horse-stable facilities, daily grooming and feeding services, and limited equestrian activities. According to Rubleia Ranch manager Jason Bowers (personal communication, May 7, 1966), private parties now board about 50 horses at the ranch, including about 50 polo horses.

Project plans call for development on the current Crawbar Ranch site. However, equestrian facilities of some type are likely to remain. If the polo operations (below) are relocated but continue on the project site, stables and other equestrian activities (possibly dressage or indeed actual playing) might be expanded, albeit in a new location. The alternative would be scaled-down equestrian activities within the resort.

Polo Operations: The Basell Polo Club leases approximately 16 acres of beachfront Rubleia Ranch property (mauli of the Crocker Ranch. According to club president Michael Halley (personal communication, April 21, 1966), participation has been increasing over the past year, with memberships up 25 percent over the previous year. He said there are three levels of polo participants:

- players, numbering about 50, many of whom keep their horses at the Crocker Ranch;
- about 100 associate members, who comprise the "social club"; and
- spectators -- between 500 and 2,000 per event.

Current project plans call for resort development on the existing polo field site. However, there have been preliminary discussions between the landlord and the polo club on relocating the polo fields to a new site on the property. The main reason for this is to develop two fields, one of which would be used for practice during the season. No commitments have been made yet, but there is some interest.

If the proposed project is not approved and the polo club is subsequently denied use of the property, the future of both polo and other equestrian activities is uncertain.

4.1.4 Private Camping and Hiking

Camp Rubleia: This camp, operated by the Episcopal Church, is one of three organized camping operations in Rubleia (the other two being Camp Horsin' and the YWCA Camp Edna). Camp Rubleia now consists of three acres leased by the landowner in the center of Northwestern Mutual's 27-acre beachfront parcel, plus six of those 27 acres leased on a year-to-year basis.

Originally intended for Episcopal Church members only, the camp now offers year-round facilities and services to the general public. These include (1) weekend camping programs, which attract a mix of groups and individuals, and (2) summer camping for schools and other organized groups, such as the Girl Scouts, cancer patients, and immigrant children. In 1966, the camp served approximately 28,000 clients, according to the camp director (personal communication, May 8, 1966).

Most camp facilities are located on the church's own three acres. These include camping and recreational facilities, as well as administrative offices. The church also leases a small portion of its property to Kamehameh School for a Hawaiian education program.

The six acres leased from Northwestern Mutual is primarily in open space but also contains the beach that was used for instruction by Kamehameh School, parking for visitors, and the 18
recreational facilities for campers. The Church had l
leased additional land for operation stables but has since
terminated this lease.

The Church is presently in the process of raising an esti-
mated $3.5 million to implement the first phase of a three-phase
Master Plan (Dainoff, Snyder, & Elwood, 1984), which is
primarily centered on new adult-oriented structures for the
Church's own three acres. Subsequent phases assume acquisition
(purchase or long-term lease) of the six-acre parcel now being
leased from Northeastern Mutual. For this property, the Master
Plan outlines ultimate construction of five youth-oriented
cabins and a campground area at the western end; two tent
campgrounds near the beach; an archery field, tennis complex, and
large sport field to create an open space buffer between the
youth and adult-oriented zones; and a chapel, paved parking
area, and a few additional structures borders the three-acre
parcel.

The proposed project calls for the creation of the 22-acre
parcel which includes the six leased acres. This would terminate
existing camping activities on the leased land and prevent imple-
mentation of the proposed additional activities. There would
also be impact on the nature of camping at the remaining three
acres, which would become a small parcel between two more
urbanized sites.

However, the Church has proposed acquiring the six acres
when its fundraising efforts are complete. The property owner
has had preliminary discussions with the Church about the pro-
motion, but another party has yet made a firm commitment. However,
as a good-faith gesture, the property owner has modified its
terrestrial plans for the 22-acre parcel to leave the six-acre
portion in landscaped open space, pending further negotiations
with the Church.

Biking and Camping on Mauna Property: Mauna portions of the
project site include several trails suitable for biking and a
deep-narrow trail frequently washed out in one place to Peacock
Flats, which is an excellent potential nature/recreational site.
Due to concerns over liability, the property owner recently has
been hesitant to grant permission to outside parties to use any
of these trails.

If the proposed project is approved, there would probably be
enhancement rather than further reduction of biking activities.
The access road to Peacock Flat would be improved, and the
developer would try to provide access to the general public,
depending on other requirements for developer expenditures.
Biking trails could be improved, and there is a possibility that
camping and/or picnic facilities could be constructed (either by
the developer or a concession operator).

It may also be noted that improvements to the Mauna area
would constitute a mitigating if the Church camp is reduced to

three acres. A three-acre camp would require fewer use of
neighboring off-site facilities to remain both rustic and feasible.

The developer's desire is to contract with an operator,
who could finance needed improvements through small user fees.
The three-acre hiking, picnic, and/or camping facilities would then
be open to the general public, not just resort residents or guests.
Preliminary conversations have been held with the Episcopal
Church. It is intended that discussions will also be held with
the City and County and the DEC. The possibility of the Church
operating the hiking/camping facilities is, however, independent of
discussions about the future of the six-acre Mauna site.

4.1.5 Fishing and Hunting

The project site is two closed to the general public for
hunting or fishing (except by walking along the public
shoreline). However, the rural nature of the area makes it
relatively easy for trespassers to engage in such activities.

Fishing on the project site could well be facilitated rather
than disturbed through developer provision of shoreline access
and public parking. Illegal hunting might be terminated.
Alternatively, there is no possibility that a for-fee hunting
zone could be developed in some Mauna area.

4.1.6 Seminars and Parties

The old Dillingham estate house is currently available on a
daily rental basis for private seminars and parties. The selec-
tion of this house and associated activities has not yet been
resolved. The developer has expressed a desire to preserve the
house if possible, although this is contingent on golf course
plans. If the house is not saved, the new resort facilities
would of course provide alternative accommodations for seminars
and parties, although in a different type of structure and
setting.

4.2 Outdoor Recreation and Food Gathering

Outdoor recreational and food gathering resources play a
major role in the lives of local residents, primarily because
the natural resources are readily available and conducive to
year-round enjoyment. This is especially true in rural areas.

This section discusses the potential impact of the proposed
development on recreation and food gathering resources within
the project boundaries ("on-site") and closely adjacent areas
along Farrington Highway ("near-site"), with consideration of the
importance of these resources to the residents of surrounding
communities. Also discussed are potential impacts of the pro-
ject's visitor population on off-site recreation areas in
portions of the North Shore further away from the Dillingham area.
4.2.1 On-Site and Near-Site Outdoor Recreational and Food Gathering Resources

Current recreational (and/or food gathering) on-site/near-site resources may be categorized into two types: land-oriented and ocean-oriented.

4.2.1.1 Land-Oriented Recreation

The preceding discussion ("Impacts on Current On-Site Human Activities") dealt with impacts on on-site recreational aspects (including polo and other equestrian activities, as well as private camping and hiking). Also discussed there was the near-site Camp Mokuleia.

The major additional near-site land-oriented recreational activities are those which are based at Dillingham Airfield. These currently consist primarily of glider riding, but there are also limited additional activities relating to recreational light-plane aviation and parasailing. As of this writing, neither the State Department of Transportation (DOT) nor the Federal Aviation Administration had responded to the EIR Preparation Notice by making official comments as to the project's proposed compatibility with current or future Dillingham operations. However, DOT chief engineer Robert Chun (personal communication, June 19, 1986) stated on a highly preliminary basis that he did not foresee any incompatibility between the project and recreational activities at Dillingham, although he said the DOT may express concern over the possibility of future complaints about aircraft noise.

4.2.1.2 Ocean-Oriented Recreation and Food Gathering

In The Beaches of O'ahu, Clark (1977) defines the "Mokuleia Beach Shoreline" as consisting of the six-mile stretch extending from Camp Harold Erdman on the western (Kamehameha) end to Punalu'u Beach Park (off of Crozier Drive) on the eastern side. He identifies and characterizes the following specific beach areas (Figure 4.11):

o Camp Harold Erdman is a YMCA facility. Although access is limited to YMCA users, its popularity as a summer camp for children -- along with year-round availability for leadership training, conferences, retreats, etc. -- makes it one of the best-known stretches of the Mokuleia Beach Shoreline to the O'ahu public at large. Clark states that water activities include diving, snorkeling, and swimming. He characterizes the ocean as generally calm during the summer but subject to strong currents from October through April.

o Mokuleia Army Beach facilities are limited to military personnel, although it has the widest and cleanest sandy beach of the Mokuleia stretch. However, states Clark,
those areas are exposed to very severe rip currents and lateral currents during the winter months, especially during high surf periods. Over the years, this particular section of the Makalapa Beach shoreline has been the scene of many serious and fatal swimming incidents.

Keka'a Beach includes the shoreline fronting the two small unimproved shoreline parklets proposed for recent development within this project. According to Clark (p. 105), the "most popular section of the beach in the Pu'ulani Park area, the site of a former fishing shanty. The wide sand beach here is reached by following any of a number of unimproved roads through the brush to the shoreline. The area is frequented by fishermen and occasionally by campers." (It should be noted that legal access would now occur only along the shoreline, and that camping above the high-water mark is technically trespassing.)

Water activities include diving, swimming, and shorecrawling. Clark recommends extreme caution in entering the water during winter months when surf is large. He characterizes the ocean as "relatively safe on calm days," but says along-shore currents are "insistent" even then.

Makalapa Beach Park is the only developed public facility within the project area. Water activities include diving, shorecrawling, and swimming. Available facilities include a comfort station, cooking stands and picnic facilities, a large grassy playground, public and emergency phones, and 65 parking stalls. The park is windy and shorehazy, although the City has tried unsuccessfully to plant trees there (personal communication, U. Takata, Chief, Advanced Planning Section, Department of Parks and Recreation, June 9, 1986). There are tentative plans for a new bathhouse and parking lot facilities.

The beach fronting the 11.7-acre park lies on the leeward side of a sandy point. It is moderately wide but steep, and is somewhat protected by the broken offshore reef. However, Clark (p. 105) adds his usual admonishment that there are "dangerous currents from October through April, especially when surf is big."

According to the Custodian of Permits and Records for the City Department of Parks and Recreation (personal communication, Ray Hasegawa, June 19, 1986), limited restroom facilities at the park require limiting the availability of camping permits to a total of 10 (for up to ten persons) at any one time. He said the park is in little demand as campers must be years ahead of the year due to its harsh physical character and risky swimming conditions; however, on three-day weekends, Makalapa Beach Park is among Oahu's most popular camping sites, apparently because its location is appealing to city dwellers seeking an escape from urban environments.

Makalapa point, between park and Launani St. residential area, is a shoreline stretch not specifically described by Clark. This includes the coastal area fronting the 27-acre project parcel and the shoreline Camp Makalapa. There is no public access except along the sandy shoreline. Residents interviewed for this report (see Section 4.6 on "Community Concerns") indicate that little swimming takes place there but other activities include net throwing, pole casting, daytime and night diving for lobsters, and some limu picking around Camp Makalapa. There are estimates of extent of usage, although Makalapa Development Company personnel report observing infrequent use, and other residents say that midtime rough waters usually limit food-gathering activities to a limited number of persons very familiar with the area.

The Public Facilities map for the City Development Plan indicates the City intends to acquire Northwestern Hawaiian's entire 27-acre parcel for Makalapa Beach Park expansion purposes. No money for this purpose is included in the present CIP budget. The Public Facilities map indicates the acquisition is to take place between one and seven years in the future, although the current CIP program states that it will be more than seven years in the future.

"Makalapa Beach" is Clark's term for the coastal area fronting the current main residential pocket on Farrington Highway (i.e., Launani St., Makalapa Beach Security) et al.; the large 27-acre project parcel which includes the current park field location and the private center and Coak's recreational area in the east area of coastline serving as an executive retreat for management personnel. This area is now part of the Makalapa Beach shoreline, Clark warns of dangerous currents in the winter months, particularly in times of large surf, but notes that water activities do include swimming and diving, as well as shorecrawling and beachcombing. However, the entire shoreline above the high-water mark is privately-owned, which sharply limits public access. People nonetheless can reach the beach, either through trespassing or along the shoreline, and area resident report recurrent litter problems.

The City North Shore Development Plan Public Facilities map indicates a "site-undetermined" public park should be developed somewhere in the vicinity of Na'alaka Bay on Northwestern Hawaiian's 82-acre parcel. However, the map also indicates that acquisition of such a park site (of undetermined acreage) is more than seven years in the future, and no City Funds have been appropriated to date.

Makaha Beach Park is privately-owned, with access limited primarily to Makaha Sugar employees. It is located off Makaha Beach Road rather than Farrington Highway. The reef structure there provides better protection against...
high waves and currents than most other portions of the Banana Bay shoreline, although the beach is steep, a mixture of sand and pebbles, and the ocean bottom is rocky rather than sandy.

The park serves important social and recreational functions for the Waimau area. Waimau Sugar Company has dedicated a half-mile for the community Little League and sets the four pavilions available for local churches and other nonprofit groups. In addition, the construction of this park would be a sensitive social impact. However, the location is off the main highway which would be used by resort guests, and a sign clearly marks the park as a private facility.

Likely project impacts include:

1. Public access to the shoreline will increase due both to standard city requirements for such access and to the developer's publicly stated intention to provide such access, as well as public parking facilities. However, at the present stage of project planning, there is no final determination as to the exact location of access trails, number of parking stalls, or design of lateral access trails parallel to the beach.

2. Increased use of the beach by resort guests and the general public could present safety problems due to the strong currents, which often accompany high surf in winter. This could be alleviated by prominent warning signs, provision of lifeguards, and providing of an attractive walking path in the hotels to encourage guests to use these facilities rather than the ocean.

3. Project approval as planned would preclude long-range city plans to expand Banana Bay Park and establish a new park on Kalathas Bay. (Alternatively, the next to the City of Kailua on this land would be much greater.)

4. The current "amenities" of Banana Bay Park would be altered, affecting the nature of camping and other recreational experiences there and in nearby coastal stretches. However, landscaping on the adjoining 37-acre resort parcel could provide not only a visual/seasonal barrier, but also an aesthetic addition as well, to both the current barren appearance. Park users may also benefit from the availability of security forces at the hotel. It is possible that the ultimate result could be increased usage of Banana Bay Park, although perhaps by different people and for different psychological purposes.

5. Some current Banana Bay residents may feel a sense of intrusion or competition with "outsiders" from resort guests and new residents, along with other data residents attracted by increased public access. This could focus on aesthetic aspects of the beach experience, food-gathering, or both.

It is difficult to assess the "objective" truth of concerns about competition over ocean food resources. The fruitfulness of the project shoreline cannot be adequately measured, since customary users are few and tend to be unthreatened by the location of prime food-gathering spots. They do report that fishing has deteriorated over the years in the area, although this is part of an islandwide trend due to large parts to overfishing. Of those who want, all residents who rely only on ocean food resources for subsistence, most would appear to be centered. Likely increases in long-term shoreline property values could decrease their numbers with or without the project (although perhaps more rapidly with the project).

Only very limited numbers of guests are likely to pick lima or dive for lobster in rough waters, though a few may try short distances. Some part-time and full-time new project residents may learn to tap the ocean's food resources. But the "true" extent of competition between future project population and Banana Bay residents outside the project can only be speculated upon at this time.

4.2.2 Off-Site Outdoor Recreation and Food Gathering Resources

The North Shore region has an abundance of existing coastal recreation areas, including the Banana Bay Beach Park, Puuwa Beach, Waimau Beach, Kailua Point State Recreation area, Waimau Beach Park, Alii Beach Park, and the Waimau Boat Harbor. As of this writing, one of the State Division of Aquatic Resources, the Waimau North Shore Reserve, is managed by the State Division of Aquatic Resources, the Waimau North Shore Reserve. As of this writing, one of the State Division of Aquatic Resources, the Waimau North Shore Reserve, is managed by the State Division of Aquatic Resources, the Waimau North Shore Reserve.

These facilities provide important recreational opportunities for all Banana Bay residents and may be particularly important for nearby North Shore residents, many of whom have chosen to live in the area due to the proximity of good surfing conditions and similar attractions.

An attempt to study, then, in the possibility that the project proposed project could unilaterally contest North Shore coastal recreation resources. Analysis of this likely impact on the Banana Bay shoreline expansion (Community and a land-use study for the Kailua area) was considered as determining the probability of heavy visitor use of off-site recreational and food gathering facilities:

(1) the frequency and mode of visitor travel of Kailua guests; and
(2) the extent to which these visitors are likely to focus their off-site travel on immediately surrounding communities.

Kuliula, as the sole existing resort in the North Shore area, is viewed as a reasonable indicator of the future situation at Mokuleia.

A 1983 modeling study of Oahu tourist travel conducted for the Kauai Metropolitan Planning Organization (KMC) found noticeable differences between the tendency of off-site daily trips per person as did Kuliula guests, counting all modes of travel. And for motorized trips, which are the most likely to include stops at nearby recreational areas, Kuliula guests made approximately 0.75 round trips off-site per day, which was slightly fewer than the Mokuleia average.

It may therefore be concluded that 1983 Kuliula guests used off-site facilities more than did Mokuleia hotel guests, as is the Kuliula facilities at that time. Even though these facilities at that time were essentially limited to a single hotel and golf course, the proposed Mokuleia facilities would be more extensive and could be presumed to have a greater power to hold guests off-site for much of their stays.

In regard to current destination of Kuliula guests who did travel off-site in rented vehicles, the KMC surveyors (p. 44) data indicate that:

4.2 Social Aspects of Employment

Aspects to be discussed include: (1) summary of predicted numbers of jobs; (2) additional assumptions about labor demand; (3) adequacy of local labor supply and potential additional labor sources; (4) economic quality of resort jobs; and (5) sociological/psychological aspects.

4.2.1 Summary of Predicted Numbers of Jobs

Economic consultant John Child & Co., Inc. is responsible for preparing employment forecasts for this project. Because their forecast is essential for the subsequent analysis conducted in this report, Tables 4.1 to 4.3 present their findings for projected development phasing, construction employment, and operational employment, respectively. A complete discussion of their assumptions and calculations will be provided in their own report, currently under preparation.

Development Phasing: Table 4.1 indicates the initial development emphasis will be on project infrastructure, 500 hotel units, one 18-hole golf course, and an Initial improvement of the commercial complex. Assuming project completion by the year 2005, the finished project would feature a 2,180 hotel units; 500 residential lots (204 with building commercial space).
### Table 4.1: Assumed Project Development Phasing

<table>
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<tr>
<th></th>
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<tbody>
<tr>
<td>Hotel Units</td>
<td>500</td>
<td>600</td>
<td>500</td>
<td>2,100</td>
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<td>Condominium Units</td>
<td>0</td>
<td>575</td>
<td>575</td>
<td>1,200</td>
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<td>Single-Family</td>
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<td>215</td>
<td>700</td>
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<td>Building Improvements</td>
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<tr>
<td>Commercial</td>
<td>18,200</td>
<td>28,500</td>
<td>30,050</td>
<td>100,750</td>
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<td>Golf Course (Total)</td>
<td>18</td>
<td>18</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Infrastructure</td>
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<td>($ million)</td>
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<td></td>
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Source: John Child & Co., Inc.

### Table 4.2: Assumed Average Annual Full-Time Equivalent Construction Jobs

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<tr>
<td>Direct Employment</td>
<td>230</td>
<td>240</td>
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<td>140</td>
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<tr>
<td>Total Employment</td>
<td>560</td>
<td>580</td>
<td>530</td>
<td>330</td>
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Source: John Child & Co., Inc.

### Table 4.3: Assumed Average Annual Operational Employment

<table>
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<tr>
<th>Type of Development</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
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<tbody>
<tr>
<td>Direct Employment</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Hotel</td>
<td>450</td>
<td>500</td>
<td>1,450</td>
<td>1,600</td>
</tr>
<tr>
<td>Condominium</td>
<td>0</td>
<td>120</td>
<td>230</td>
<td>240</td>
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<tr>
<td>Commercial</td>
<td>90</td>
<td>250</td>
<td>380</td>
<td>500</td>
</tr>
<tr>
<td>Golf Course</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Property Administration</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Subtotal -- Direct</td>
<td>620</td>
<td>1,450</td>
<td>2,150</td>
<td>2,730</td>
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<tr>
<td>Indirect and Induced</td>
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<td></td>
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<tr>
<td>Hotel</td>
<td>440</td>
<td>690</td>
<td>1,200</td>
<td>1,700</td>
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<tr>
<td>Condominium</td>
<td>0</td>
<td>60</td>
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<tr>
<td>Commercial</td>
<td>50</td>
<td>160</td>
<td>230</td>
<td>300</td>
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<tr>
<td>Other</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Subtotal -- Indirect/Induced</td>
<td>470</td>
<td>1,190</td>
<td>1,690</td>
<td>2,160</td>
</tr>
<tr>
<td>Total Employment</td>
<td>1,090</td>
<td>2,650</td>
<td>3,850</td>
<td>4,890</td>
</tr>
</tbody>
</table>

Source: John Child & Co., Inc.

Notes:
1. Figures are "full-time equivalent positions." The actual number of jobs could be higher, if many full-time equivalent jobs are split into several part-time positions. However, the actual number of workers could be lower due to multiple job-holding.
2. Figures are also "annual averages." Depending on seasonal or weekly shifts in market demand, actual number of full-time equivalent positions could differ on any given day of the year.
Construction Employment: Table 4.2 indicates the project will provide an annual average of 210 direct on-site full-time equivalent construction jobs. Total jobs, including indirect and the state during the project's 17-year construction time frame, business, while an "induced" job is generated when workers' wages require substantial support from other businesses and provide employment. It may be noted from the table that construction activities are expected to peak in the early 1980's.

Operational Employment: Table 4.3 indicates a forecast of the required commercial staff on the project site by year 2005 build-out date. More than half of these forecasted to be in place by 1985. Hotel employment is the remaining 30% distributed among commercial, retail, food service, and property administration jobs.

Indirect and induced employment would be scattered throughout the Island area. It is projected to total 2,150 full-time equivalent positions by project build-out, for a statewide total (direct, indirect, and induced) of 4,300.

The forecasts at the bottom of Table 4.2 indicate some of the reservations which must be attached to the operational job forecasts which are, of course, estimates in the first place. Indirect employment calculations are complex by factors such as multiplicity job-holding (individuals holding more than one job), the tendency of some hotels to split positions into several part-time jobs (which number), and unusual or even weekly variations in occupancy and labor forecasts. This underscores the complexity of tourism analysis and the need to make assumptions in order to proceed with analyses.

4.3.2 Additional Assumptions/Calculations Regarding Future Labor Demand

Subsequent portions of this analysis address the question of the adequacy of the study area's labor supply to meet projected future demand from this and other projects. This section of the study adds additional assumptions and calculations regarding labor demand.

Assumptions are stated here in abbreviated form in order to facilitate ease of reading. However, each of the assumptions are discussed in more detail in Appendix A.

Assumptions About Project Demand
(1) The major focus will be on operational, rather than construction, labor demand. Construction jobs should generate only short-term commuting, with no subsequent inflationary pressures.
(2) Demand for direct-employment workers will be equal to the numbers provided in Table 4.2.
(3) Indirect/induced employment from the Nakalani project will be equal to 54% of the overall Study Area, 20% of which will be in the North Shore. The 54% figure represents 30% of direct employment.
(4) In line with statewide figures on the hotel industry, the major demand generated by the Nakalani project will be for less skilled persons. Specifically, it is assumed that 60% of the jobs will be suited for persons with less than a four-year college degree.

Additional Study Area Labor Demand

(4) Demand for labor not resulting from the project will be calculated according to the official projections of the North Shore Planning Organization (NSPO) on demand resulting from two major Study Area projects approved since the NSPO study:
   - Full expansion (2,400 additional jobs by year 2005);
   - Millilani High-Tech Park (14,200 additional jobs by year 2005);

(5) Because of the initial and uncertain character of high-tech jobs, it is appropriate to consider at least two scenarios:
   - the Millilani High-Tech Park reaches full employment capacity by year 2005;
   - the High-Tech Park reaches only 50% of job capacity by year 2005.

(6) For tentative analyses projecting labor demand and supply by educational level, it will be assumed that 90% of all additional employment demand will be for persons with less than a four-year college degree.

An exception will be the high-technology park, for which the assumed figure is 65% (for reasons given in Appendix A).
Table 4.4 shows results by year and portion of Study Area for various portions of the tota1 Study Area for estimated labor demand without the proposed Hokualea project. Table 4.5 presents "bottom-line" job figures only for total Study Area, North Shore portion under each of four different conditions: (1) 50% development of the high-tech park, without Hokualea project; (2) 50% development, with Hokualea; (3) 100% high-tech development, without Hokualea; (4) 100% development, with Hokualea. Finally, Table 4.6 shows similar figures for estimated jobs requiring less than four years of college.

Major implications of these tables would include:

(1) Without the Hokualea project, projected future job growth on the North Shore is extremely limited—only 417 additional jobs by the year 2005. Should the sugar plantation shut down, the loss of these agricultural jobs would more than wipe out the small anticipated North Shore employment gains. Future job growth is also expected to be relatively small for the Waialua area.

(2) However, jobs in Poipuvalo and the Milliken/Waipahu area will more than double due to the Milliken expansion and under the 100% build-out scenario) the high-tech park.

(3) For the entire Study Area, labor demand is expected to grow from the 1980 base of 38,000 to 61,000 in the year 2005 for the 100% high-tech build-out scenario (for to 53,820 under the 50% build-out scenario).

Without the high-tech park, however, job growth would be less than 11,000. This underscores the very major role which the high-tech jobs -- of which there are currently more in Central Oahu -- play in this labor demand analysis. If the actual build-out should fall short of even the 50% scenario, labor demand will be significantly less than indicated in Tables 4.4 to 4.6.

(4) The addition of the Hokualea jobs will significantly increase labor demand in the North Shore area by 1995 (the which time it should have become the area's largest employer). By 2005, the Hokualea project will provide the North Shore with nearly double the number of jobs which are expected without the project.

For the entire study area, of course, the addition of Hokualea jobs would have a smaller proportionate impact. The assumed build-out rate for the high-tech park is a more significant variable.

(5) The figures in Table 4.6 -- which assesses estimated demand for the labor market segment with less than four years of

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Project Jobs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Shore</td>
<td>3,137</td>
<td>3,177</td>
<td>3,197</td>
<td>3,217</td>
<td>3,237</td>
</tr>
<tr>
<td>Kualoa</td>
<td>2,059</td>
<td>2,069</td>
<td>2,074</td>
<td>2,083</td>
<td>2,090</td>
</tr>
<tr>
<td>Waialua</td>
<td>18,220</td>
<td>18,256</td>
<td>18,274</td>
<td>18,292</td>
<td>18,326</td>
</tr>
<tr>
<td>Milliken/Waipahu</td>
<td>11,451</td>
<td>12,006</td>
<td>12,303</td>
<td>14,820</td>
<td>15,008</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>35,926</td>
<td>39,128</td>
<td>40,778</td>
<td>42,427</td>
<td>44,280</td>
</tr>
<tr>
<td><strong>Milliken Expansion Jobs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Shore</td>
<td>63</td>
<td>148</td>
<td>233</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>Kualoa</td>
<td>412</td>
<td>973</td>
<td>1,532</td>
<td>2,083</td>
<td></td>
</tr>
<tr>
<td>Waialua</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Milliken/Waipahu</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>476</td>
<td>1,121</td>
<td>1,765</td>
<td>2,410</td>
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<td><strong>High-Tech Jobs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct</td>
<td>2,000</td>
<td>5,346</td>
<td>8,702</td>
<td>12,138</td>
<td></td>
</tr>
<tr>
<td>Indirect/Induced</td>
<td>353</td>
<td>943</td>
<td>1,552</td>
<td>2,142</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>3,353</td>
<td>6,289</td>
<td>10,244</td>
<td>14,280</td>
<td></td>
</tr>
<tr>
<td><strong>Total BY AREA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Shore</td>
<td>3,137</td>
<td>3,240</td>
<td>3,245</td>
<td>3,450</td>
<td>3,651</td>
</tr>
<tr>
<td>Kualoa</td>
<td>2,059</td>
<td>4,002</td>
<td>5,007</td>
<td>5,830</td>
<td>6,692</td>
</tr>
<tr>
<td>Waialua</td>
<td>18,220</td>
<td>18,256</td>
<td>18,274</td>
<td>18,292</td>
<td>18,326</td>
</tr>
<tr>
<td>Milliken/Waipahu</td>
<td>11,451</td>
<td>15,339</td>
<td>20,042</td>
<td>24,804</td>
<td>29,688</td>
</tr>
<tr>
<td><strong>STUDY AREA TOTALS</strong></td>
<td>35,926</td>
<td>41,257</td>
<td>48,188</td>
<td>54,536</td>
<td>60,960</td>
</tr>
</tbody>
</table>

**Source:** Community Resources, Inc., based on data sources and assumptions as outlined in preceding text.
### Table 4.5:
Projected Labor Demand, With and Without Mokuleia, by Year and Assumption for High-Tech Park Development -- Total Jobs

<table>
<thead>
<tr>
<th>Year</th>
<th>Without Mokuleia</th>
<th>With Mokuleia</th>
<th>North Shore Division</th>
<th>Without Mokuleia</th>
<th>With Mokuleia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assuming 50% Build-Out of High-Tech Park</td>
<td>40,280</td>
<td>41,041</td>
<td>3,260</td>
<td>3,978</td>
</tr>
<tr>
<td></td>
<td>Assuming 100% Build-Out of High-Tech Park</td>
<td>41,957</td>
<td>42,724</td>
<td>3,260</td>
<td>3,978</td>
</tr>
<tr>
<td>1995</td>
<td>50% High-Tech</td>
<td>45,044</td>
<td>46,826</td>
<td>3,345</td>
<td>5,058</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>48,188</td>
<td>49,970</td>
<td>3,345</td>
<td>5,058</td>
</tr>
<tr>
<td>2000</td>
<td>50% High-Tech</td>
<td>49,364</td>
<td>51,024</td>
<td>3,450</td>
<td>6,008</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>54,536</td>
<td>57,195</td>
<td>3,450</td>
<td>6,008</td>
</tr>
<tr>
<td>2005</td>
<td>50% High-Tech</td>
<td>53,820</td>
<td>55,198</td>
<td>3,554</td>
<td>6,802</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>60,960</td>
<td>64,338</td>
<td>3,554</td>
<td>6,802</td>
</tr>
</tbody>
</table>

Source: Community Resources, Inc., based on Table 4.3 and 4.4.

---

### Table 4.6:
Projected Labor Demand, With and Without Mokuleia, by Year and Assumption for High-Tech Park Development -- Jobs Requiring Less Than Four Years of College

<table>
<thead>
<tr>
<th>Year</th>
<th>Without Mokuleia</th>
<th>With Mokuleia</th>
<th>North Shore Division</th>
<th>Without Mokuleia</th>
<th>With Mokuleia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assuming 50% Build-Out of High-Tech Park</td>
<td>32,454</td>
<td>33,068</td>
<td>2,592</td>
<td>3,182</td>
</tr>
<tr>
<td></td>
<td>Assuming 100% Build-Out of High-Tech Park</td>
<td>33,226</td>
<td>33,839</td>
<td>2,592</td>
<td>3,182</td>
</tr>
<tr>
<td>1995</td>
<td>50% High-Tech</td>
<td>35,580</td>
<td>37,006</td>
<td>2,676</td>
<td>4,016</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>37,642</td>
<td>39,067</td>
<td>2,676</td>
<td>4,016</td>
</tr>
<tr>
<td>2000</td>
<td>50% High-Tech</td>
<td>38,744</td>
<td>40,072</td>
<td>2,760</td>
<td>4,086</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>42,138</td>
<td>44,262</td>
<td>2,760</td>
<td>4,086</td>
</tr>
<tr>
<td>2005</td>
<td>50% High-Tech</td>
<td>42,024</td>
<td>44,127</td>
<td>2,843</td>
<td>5,142</td>
</tr>
<tr>
<td></td>
<td>100% High-Tech</td>
<td>45,705</td>
<td>49,107</td>
<td>2,843</td>
<td>5,142</td>
</tr>
</tbody>
</table>

Source: Community Resources, Inc., based on Table 4.5 and "Assumption 4" and "Assumption C" from preceding text.
college -- are put forward more tentatively, for reasons discussed earlier. Given the assumptions on which they are based, these figures also indicate that the Hokuula project would significantly increase the labor demand in the North Shore area for persons with less-than-college education.

Results of Tables 4.4 to 4.6 will be again reviewed in conjunction with results of the labor supply analysis.

4.3.3 Future Labor Supply

To estimate future labor supply -- both for the North Shore Primary Study Area and for the total Study Area -- it is necessary first to estimate future population by age and sex cohorts. Estimated future labor force participation rates for each cohort can then be applied. This discussion will also consider possible additional sources of labor and ways to tap those sources.

4.3.3.1 Estimated Future 'Natural' Labor Supply

It must be firmly stated at the outset of this analysis that such estimates can only be estimates, not accurate predictions. Actual future Study Area population and labor force will depend on numerous economic and market forces. These are more amenable to modeling at the statewide or islandwide level, as exemplified by the State's population and economic projections model (Hawaii State Department of Planning and Economic Development, 1984) or the City's more recent study of population implications of the development plans (City and County of Honolulu, Department of General Planning, 1985). Such regression-based models are generally less accurate for small areas for which regional economies may be more affected by unique local conditions.

However, the City's General Plan population guidelines, as implemented in the Development Plans, do provide a framework for estimating future regional population and, subsequently, labor force.

Method: Appendix B provides a detailed explanation of the methodology utilized for this analysis. Following is a brief conceptual overview:

- Utilizing census data, 1980 populations for the four portions of the Study Area (North Shore, Koolau, Kohala, and Hilo/Hawaii) were broken down into age and sex cohorts.
- Within each area, the populations were further segmented into (1) military personnel; (2) military dependents; and (3) civilian population. Age-sex cohort information was generated for each type of population in each area.
- The military populations (active-duty and dependents) were held constant, while the civilian populations were projected for years 1990, 1995, 2000, and 2005 using standard cohort analysis methodology. Statewide fertility and survival rates were used, which could underestimate the speed with which General Plan population targets are attained.
- In areas where natural increase would result in the population exceeding City population targets, it was assumed that outmigration would occur among the younger age cohorts (aged 45 or less), since the younger population tends to be more mobile. Enough outmigration was assumed to keep the population consistent with the City and County Department of General Planning's (1985) regional projections.
- Following U.S. Census definitions, the "potential labor force" was defined as dependents or civilians aged 16 or older. The total number of persons within each group (dependents vs. other civilians) was calculated within each sex and each portion of the Study Area.
- Sex-specific civilian labor force participation rates were estimated for each of the four areas from the 1980 census. For the civilian dependent population, participation rates were separately estimated by assuming that essentially all civilians in census tracts 90 (Kauai Air Force base) and 55.01 to 55.05 (School) were military dependents; those in the observed participation rates for these areas were applied to dependents throughout the Study Area. Participation rates for the non-military-dependent civilian population were then estimated by subtracting dependents from the total population and the number of labor force participants.
- Future labor force participation rates were assumed to change in ways proportionate to the projected changes in statewide rates incorporated in the State's economic/population model. Utilizing data from the State model (Hawaii State Department of Planning and Economic Development, 1981), Community Resources calculated total projected sex-specific participation rates for the state on a whole for future years 1990, 1995, 2000, and 2005. (Variations by age group were omitted because the area-specific 1980 rates for the Study Area could not be disaggregated by age group.) These were then expressed as ratios to the statewide 1980 sex-specific rates, and the ratios were applied to the 1980 Study Area rates to provide future average rates.

For example, assume that females had a statewide participation rate of 50.6% in 1980 and were projected to have a rate of 55.0% in 2005. The ratio of the 2005 rate to the 1980 rate would then be 1.1 to 1. However, within a certain portion of the Study Area, the 1980 female
participation rate may have been only 20.0% for military dependents and 40.0% for other civilians. The assumed 2005 female participation rates in this location would then be 22.2% for dependents and 41.4% for other civilians.

In each future year, the estimated total civilian population aged 16 or older, as broken down by sex and dependent/civilian status, was multiplied by estimated participation rates to derive estimated labor force participants. These could then be aggregated to provide a total estimated future labor force participants within the total Study Area or partial Study Areas, e.g., the North Shore.

As a final and more tentative analytic step, areaweighted projections were made of the likely proportion of labor force participants who would have less than four-year college degrees, since this is tentatively assumed to constitute the segment of the labor market most interested in the majority of Koolina resort jobs.

Population Results: Table 4.7 provides year 2005 population results (by age-sex cohort) for the total Study Area and the North Shore portion alone. These figures include assumed out-migration from Koolina to keep the population within City guidelines. Details of the out-migration calculations are given in Appendix B, which also provides tables showing the baseline (1980) age-sex cohort populations for various portions of the Study Area for each five-year period, both under conditions of natural increase alone (no out-migration) and under the condition of out-migration from Koolina.

Table 4.8 compares overall results for each future target year with City population guidelines. As may be observed, the fit in most instances is quite close, and in some cases, the out-migration from Koolina is assumed. The North Shore and Koolina areas are aggregated in this table. Because of the boundary differences between City development plan areas and census divisions (see pp. 35–39), if out-migration had been factored into the calculations, the year 2005 population of 60,251 shown in Table 4.6 would be higher than 62,877. If the "natural increase" figure of 62,877 is substantially less than the approximately 65,000 population which would be expected based on historical growth rates (section 9.1.2.1), this indicates that historical growth in the Koolina/North Shore area in the last 30 years has included a strong immigration component ignored by the age-cohort technique.

Finally, Table 4.9 presents information on the estimated year 2005 population constituting the potential civilian labor force. As in Table 4.6, military dependents and other civilians aged 16 or over, as well as military dependents and other civilians aged 16 or more, are broken down by sex and dependent/civilian status. In calculating the estimated population, their observed percentage of this cohort in 1985 and applying this percentage to future years. Appendix B contains an additional table showing these potential population growth.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total Study Area</th>
<th>North Shore Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>0 to 4</td>
<td>6,205</td>
<td>3,929</td>
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<tr>
<td>5 to 14</td>
<td>12,266</td>
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<td>15 to 24</td>
<td>18,267</td>
<td>12,216</td>
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<td>25 to 34</td>
<td>14,352</td>
<td>12,351</td>
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<td>35 to 44</td>
<td>10,922</td>
<td>10,909</td>
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<td>45 to 54</td>
<td>6,284</td>
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<td>55 to 64</td>
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<td>6,706</td>
</tr>
<tr>
<td>65 to 74</td>
<td>4,218</td>
<td>4,872</td>
</tr>
<tr>
<td>75 to 84</td>
<td>2,619</td>
<td>3,200</td>
</tr>
<tr>
<td>85 &amp; over</td>
<td>1,565</td>
<td>2,000</td>
</tr>
<tr>
<td>Totals</td>
<td>85,809</td>
<td>72,769</td>
</tr>
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</table>

Note: In this and ensuing tables, some of categories may not exactly equal "Total" figure due to rounding error.

Source: Community Resources, Inc.
Table 4.8:
Comparison of Projected Future Populations with City General Plan Population Guidelines

<table>
<thead>
<tr>
<th>North Shore/Komlauf</th>
<th>Central Utah</th>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>This Analysis</td>
<td>City General Plan Target</td>
</tr>
<tr>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>27,691</td>
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<td>1995</td>
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<tr>
<td>2000</td>
<td>28,862</td>
</tr>
<tr>
<td>2005</td>
<td>30,291</td>
</tr>
</tbody>
</table>

* City population figures for year 2005 taken from range in General Plan guidelines. Interpolating figures City and County Department of General Planning (1986) report, Residential Development Implications of the Development Plan.

Source: Community Resources, Inc.

---

Table 4.9:
Potential Year 2005 Civilian Labor Force -- Persons 16 Years and Older -- Total Study Area and North Shore *

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total Study Area</th>
<th>North Shore Division</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>16 to 24</td>
<td>9,541</td>
<td>10,495</td>
</tr>
<tr>
<td>25 to 29</td>
<td>9,320</td>
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<td>30 to 34</td>
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<td>35 to 39</td>
<td>7,872</td>
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<td>40 to 44</td>
<td>6,415</td>
<td>6,718</td>
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<td>45 to 49</td>
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<td>4,872</td>
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<td>50 to 64</td>
<td>2,679</td>
<td>3,290</td>
</tr>
<tr>
<td>65 &amp; more</td>
<td>1,565</td>
<td>2,800</td>
</tr>
<tr>
<td>TOTALS</td>
<td>50,094</td>
<td>57,744</td>
</tr>
</tbody>
</table>

* Includes civilians and military dependents only. Armed forces personnel are not included.

Source: Community Resources, Inc.
for each portion of the Study Area in years 1990, 1995, 2000, and 2005 (for both the "natural increase" and "Kuleana consolidation" conditions).

Labor Force Supply Results: Table 4.10 shows estimated civilian labor force participants at five-year increments for both the North Shore alone and the total Study Area, while Table 4.11 breaks down year 2005 results by sex, location, and civilian vs. dependent status. Table 4.12 presents estimates of both total population aged 16 or more and total labor force participants looking four-year college degree. These numbers are based on assumptions about future educational patterns which are described in Appendix B. Since the numbers in Table 4.12 are based on a particularly lengthy chain of assumptions, they should be regarded as highly tentative.

Major implications of Tables 4.10 to 4.12 would include:

1. Without the Kuleana project, the ratio of expected workers to jobs on the North Shore will grow increasingly higher, suggesting progressively higher rates of unemployment and/or commuting to other places for jobs.

2. With the Kuleana project, the opposite trend is expected (assuming that jobs become available according to the schedule set forth in Tables 4.1 and 4.3). By the early 1990's, it will be necessary to import labor to the North Shore even if every North Shore labor force participant is already working there.

3. If current City population control policies remain in place, this would suggest some exacerbation of the pressures for immigration (and on housing availability and cost) which are expected to occur even without the Kuleana project (see Section 3.0).

4. For the total Study Area, the high-technology park is a more significant determinant of labor supply/demand ratios. Jobs in the overall Study Area will increase more rapidly than workers (although there will still be a significant surplus of workers). If the park reaches 100% of the projected employment by year 2005 and Kuleana also meets its projected schedule, then there would be almost as many jobs as workers in the total Study Area by 2005.

5. Historically, however, many high-tech park workers may commute from Pearl City or Honolulu, just as many Study Area workers may still commute to Honolulu jobs.

6. More than half the Study Area by 2005 participants would be in the Territory Study Area (Pearl City/Honolulu, or the high-tech park jobs than those in the North Shore. However, there
<table>
<thead>
<tr>
<th>Dependent</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Civilian</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
<td>9</td>
<td>4</td>
<td>42</td>
<td>3,007</td>
<td>1,991</td>
<td>5,099</td>
<td></td>
</tr>
<tr>
<td>Koolau</td>
<td>8</td>
<td>34</td>
<td>42</td>
<td>4,592</td>
<td>3,732</td>
<td>8,324</td>
<td></td>
</tr>
<tr>
<td>Wahine</td>
<td>327</td>
<td>1,689</td>
<td>2,066</td>
<td>5,913</td>
<td>5,105</td>
<td>11,018</td>
<td></td>
</tr>
<tr>
<td>Miliilani/Maipahu</td>
<td>140</td>
<td>627</td>
<td>767</td>
<td>22,521</td>
<td>20,336</td>
<td>42,857</td>
<td></td>
</tr>
<tr>
<td>STUDY AREA TOTALS</td>
<td>534</td>
<td>2,390</td>
<td>2,923</td>
<td>36,092</td>
<td>31,164</td>
<td>67,257</td>
<td></td>
</tr>
<tr>
<td>Per. of Grand Total (70,180)</td>
<td>0.8%</td>
<td>3.1%</td>
<td>4.2%</td>
<td>51.4%</td>
<td>44.4%</td>
<td>95.8%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Community Resources, Inc.

<table>
<thead>
<tr>
<th>Total Population and Labor Force Participants With Less Than A Four-Year College Education -- 1990 to 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
</tr>
<tr>
<td>Koolau</td>
</tr>
<tr>
<td>Wahine</td>
</tr>
<tr>
<td>Miliilani/Maipahu</td>
</tr>
<tr>
<td>TOTAL STUDY AREA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Labor Force Participants Aged 16 or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
</tr>
<tr>
<td>Koolau</td>
</tr>
<tr>
<td>Wahine</td>
</tr>
<tr>
<td>Miliilani/Maipahu</td>
</tr>
<tr>
<td>TOTAL STUDY AREA</td>
</tr>
</tbody>
</table>

Ratio Total Participants to Expected Labor Demand (John Requires Less Than Four Years of College)
- **50% High-Tech Build-Out**
  - WITHOUT Hokule'a | 1.33 | 1.26 | 1.16 | 1.07 |
  - WITH Hokule'a    | 1.20 | 1.10 | 1.00 | 1.00 |
- **100% High-Tech Build-Out**
  - WITHOUT Hokule'a | 1.30 | 1.19 | 1.07 | 0.96 |
  - WITH Hokule'a    | 1.27 | 1.14 | 1.02 | 0.93 |

Source: Community Resources, Inc.; ratios based on figures in Table 4.8.
would still be more than 26,000 potential workers in the Primary and Secondary Study Areas combined.

(5) The vast majority (95%) of estimated total Study Area workers would be from civilian households. Few military dependents are expected to be in the civilian labor force in Kailua or the North Shore, but more than 2,800 military dependents from Wahiawa or Pearl Harbor could be actively seeking jobs.

(6) Attending to estimated future persons with less than four years of college, the overall population and the number of labor force participants in this category is expected to be fairly stable from 1990 through 2005, since increasing educational levels would compensate for overall population growth. Again, it is stressed that the figures in Table 1.12 and consequent conclusions are particularly tentative.

However, jobs suitable for such individuals will grow rapidly, suggesting that labor shortages in the total Study Area may occur more rapidly than would be suggested by Table 1.10 -- perhaps by the late 1990's. High-tech park build-out rates and Oahu-wide approvals would both be significant determinants of the final outcome.

Net labor shortages for the total Study Area would occur with or without the proposed Ko'olaulo project, as long as the high-technology park actually develops fairly rapidly. From an islandwide perspective, this may be considered a positive social outcome, since it would alleviate traffic congestion by encouraging counter-flow commuting patterns.

However, labor shortages -- particularly for the North Shore area alone -- could be more problematic from the perspective of Kailua resort operators or North Shore residents who must cope with consequent inflation and housing pressures.

Additionally, it is possible that labor shortage problems could be borne more heavily by employers outside Kailua. For example, Kailua is in a location to intercept some of the potential Mililani labor supply which otherwise come from the North Shore or Wahiawa. Thus, a possible consequence of the Ko'olaulo project could be displacement of labor shortages and housing pressures to Kailua, with increased need in that region to draw upon commuters from the Koolau area district.

1.3.3.2 Potential Additional Labor Sources

From the perspective of a resort operation concerned with availability of nearby labor, it is necessary to consider two different levels at which labor supply might be increased:

(i) Increases in the total number of labor force participants -- i.e., further increases over the expected numbers contained in the preceding tables. Such increases would require targeting particular groups and designing intervention strategies which would attract them into the labor force.

(ii) Increases in the number of area labor force participants who are aware of, and are interested in, the types of jobs available at the project.

The purpose of this discussion is to identify likely target groups at each of these two levels, as an aid to the eventual design of possible job training or other mitigation measures.

Increasing Study Area Labor Force Participation Rates:

Three groups will be considered as possible targets for increased participation of the total number of labor force participants: (i) the educationally disadvantaged; (ii) females of various ages and present marital status; and (iii) military dependents. It is anticipated that there would be some overlap among these groups.

In general, it may be assumed that attracting more people from these groups into the labor force will also result in many of the new entrants being interested in resort-related employment. Entry-level resort jobs require certain basic education and functional skills, but rarely advanced education; thus, casual work with the educationally disadvantaged could result in their being well-suited for many resort jobs. Females have historically comprised much of the resort labor force. And military dependents often fit best into jobs requiring just basic education and limited training -- i.e., situations where employers expect a certain amount of intolerance and turnover, and where subsequent retaining of new employees is not overly burdensome to the business.

Educationally Disadvantaged:

An implication of the projected labor market supply/demand situation (future demand for labor increasing more rapidly than supply) is that competition for local labor will increase, resulting in pressures for immigration. Potential immigrants may be more competitive than current local residents, particularly the educationally disadvantaged. Even with City population controls, persons without jobs in the area may move out, to be replaced by persons without jobs with better chances of obtaining these jobs. This situation may influence job development and housing pressures.

Thus, the focus on educationally disadvantaged residents is continued as much in social considerations as in purely economic concerns about overall labor supply availability.

Historically, educational levels on the North Shore have lagged behind islandwide levels. As previously noted (Section 2.4.1), about one-fourth of North Shore residents and 30% of Mililani residents aged 25 or greater in 1980 had an eighth-grade education or less. Only 15% of the North Shore adult population had attended college for four years, compared to 22% islandwide. Additionally, indicators of poor academic performance within the
two North Shore high schools (Wailuku and Kahului) suggest that
future labor market outcomes will continue to be less
competitive, to a standard achievement test for tenth-graders
(The Stanford Achievement Test), 95% of all students statewide scored
significantly below average on reading, the comparable below-
average figures were 33% for Kahului High School and 50% for
Wailuku High School (unpublished computer printouts obtained
from the Board of State Department of Education).

In addition to basic educational skills, many disadvantaged
residents lack "functional" skills (good work habits and
attitudes, communication abilities, knowledge of how to seek jobs
and handle in job interviews, etc.). Although a high proportion
of resort jobs require only minimal academic skills, the
functional skill requirements of such jobs could render many area
residents unemployable for most resort (or any other type of)
jobs.

Female: Table 4.12 shows 1980 labor force participation
rates for females in the Primary and Secondary Study Areas,
computed in island-wide rates. It may be observed that female
rates are particularly low for the North Shore and Wailuku
although much of the reason for Wailuku's low rate would be the
large number of military dependents - to be discussed next -
among those female.

Further breakdowns in Table 4.12 indicate that participation
rates are particularly low for females with children under six
years of age. Many mothers of young children may not want or
need to work, but in other cases lack of child care may prevent
entry into the labor force. If the participation rates for the
5,389 females with children in the Primary and Secondary
Study Areas had matched island-wide rates in 1980, an additional
787 women would have been in the labor force. (Note that most of
these would have been from Wailuku and Kahului (from the North Shore.)

Further studies would be required to answer these questions
unambiguously, but one likely explanation involves the aging
of the female population. Older women have lower labor force
participation rates than younger ones, and the projected
leveling-off of overall female participation rates at the turn
of the century is due to expected increases in the proportion
of women in the older age groups. Low participation rates by older
women may be judged more positively if this reflects increased
security and prospects among older women, but not so if it
instead reflects lack of skills or employer reluctance to hire
older citizens. Therefore, steps to increase female labor force
participation in the future may appropriately focus on such women as
the special problems of older women and young mothers.

Military Dependents: Table 4.14 breaks down projected
1985 labor force participation rates for military dependents
(military dependents vs. all other civilians) for each portion of
the study area. Military dependents comprise 12% of the total
reserve labor pool. Most of these dependents are females in the
Wailuku area. For Wailuku, dependents comprise 34% of total
employed year 1985 nonparticipants.

The reason for high nonparticipation among dependents was
explained in the Wailuku socio-economic analysis:

According to representatives of the Wailuku Employment
Services office, many of their applicants are military
dependents of armed forces personnel. In the Wailuku
area, such persons typically experience difficulty in
the labor market because of their distance from major
employment centers, and because their short lengths of
stay in the islands (usually three years with an
option to renew) are perceived by themselves and by
employers as a handicap. (Community Resources and A.
L. Levyman, Inc., 1982, p. 1481)

Resorts generally prefer to hire area residents because of
expected lower turnover which would not necessarily be the case
for military dependents. However, certain types of positions
are more attractive to military persons (e.g., field service
positions). The military dependents may also be a valuable labor force
for such positions.

Increased Employment of Labor Force Participants in Resorts:
An analysis of the data shows that the labor force participation rates for the
resort areas would likely result in a fairly automatic flow-through to
resort employment. However, there are other groups already in the labor
market that are likely to be in it at a future time - whose interest
in employment and aptitude for resort employment may require some
encouragement in order to assure an adequate labor supply.

Therefore, these groups would include (1) the unemployed and
underemployed; (2) teenagers out of the study area; (3) youth,
particularly high school students; and (4) plantation workers.

The basic need for most of these groups is for an appropriately
designed information and awareness program.

Unemployed/Underemployed: Exploiting the unemployed
in certain "hot spots" of the state as well as
in unpublishable data obtained from the Board of State Department
of Labor and Industrial Relations, the following
labor force and unemployment data were as follows:

81
Table 6.14:
Expected Year 2005 Study Area Labor Force Nonparticipants by Sex, Civilian/Dependent Status, and Geographical Location

<table>
<thead>
<tr>
<th>Geographical Location</th>
<th>Military Dependents</th>
<th>Civilian Dependents</th>
<th>Other Civilians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>North Shore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowdoin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiscasset</td>
<td>307</td>
<td>71</td>
<td>378</td>
</tr>
<tr>
<td>District/Unspecified</td>
<td>114</td>
<td>1,168</td>
<td>1,282</td>
</tr>
<tr>
<td>STUDY AREA TOTALS</td>
<td>434</td>
<td>4,518</td>
<td>4,952</td>
</tr>
</tbody>
</table>

% of Total

- Male: 1.2%
- Female: 12.0%
- Total: 13.2%

- Male: 24.6%
- Female: 52.2%
- Total: 66.8%

Source: Community Resources, Inc.
<table>
<thead>
<tr>
<th>Estimation of Civil Unemployment</th>
<th>No. of Employed</th>
<th>Rate</th>
<th>Unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore</td>
<td>4,100</td>
<td>5.5%</td>
<td>110</td>
</tr>
<tr>
<td>Kalamazoo</td>
<td>8,500</td>
<td>5.5%</td>
<td>358</td>
</tr>
<tr>
<td>Waukegan</td>
<td>10,600</td>
<td>9.3%</td>
<td>970</td>
</tr>
<tr>
<td>Racine</td>
<td>27,150</td>
<td>6.5%</td>
<td>1,718</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3,655</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thus, the average number of Study Area unemployed as of 1985 would provide more than enough persons to meet the entire current rehabilitation project labor demand (2,730) as of 2005. This is of course somewhat simplistic, in that the majority of the unemployed live in the far reaches of the Study Area rather than closer to the project; many unemployed persons would be seeking other types of jobs, etc. However, this does provide an indication as to the availability of labor in this group.

Another, less obvious group would be the underemployed (those defined as persons working below their education level but rather on persons not working in full-time, year-round jobs). Table 4.18 provides a breakdown of Primary and Secondary Study Area workers by sex, whether typical work week is greater than or less than 35 hours per week, and whether individuals worked more or less than 60 weeks in the preceding year.

This table indicates that 41% of workers in these areas worked fewer than 40 weeks and/or averaged less than 35 hours per week worked. Within these areas in 1979, a total of 3,200 men and women (27% of the total population) worked less than 35 hours per week and, of these, 1,600 (11% of total employment) also worked less than 60 weeks in that year. These are average figures. The table also shows that it is primarily females who are thus underemployed. Countywide, 43% of females met this definition of underemployment. However, for North Shore females, the figure was 50%; for Kalamazoo, 41%; and for Racine, 35%. Thus, Study Area females are not only disproportionately outside the labor force, but also disproportionately underemployed even when they are in the labor force.

**Committee:** As discussed in Section 2.5.1., about 25% of employed 1980 North Shore civilian workers had to commute at least 16 minutes one-way to their workplace. Increased availability of jobs on the North Shore could not automatically result in all such commuters switching to more nearby jobs, but there is clearly a potential for the reduction of this high percentage.

**High School Youth:** Based on calculations set forth in the Kilian socio-economic analysis (Community Resources and A. Linn, 1981)
Thus, the average number of Study Area unemployed as of 1985 would provide more than enough persons to meet the entire on-site School-in project labor demand (2,750) as of 2005. This is of course somewhat simplistic, in that the majority of the unemployed live in the far reaches of the Study Area rather than close to the project; many unemployed persons would be seeking other types of jobs; etc. However, it does provide an indication as to the availability of labor in this group.

Another, less obvious group would be the underemployed those defined as persons working below their education level, but rather than persons not working in full-time, year-round jobs. Table 1.15 provides a breakdown of Primary and Secondary Study Area workers by sex, whether typical work week is greater or less than 35 hours per week, and whether individuals worked more or less than 40 weeks the preceding year.

This table indicates that 41% of workers in these areas worked fewer than 40 weeks and/or averaged less than 35 hours per week worked. Within those areas in 1979, a total of 5,308 men and women (27% of the total employment) worked less than 35 hours per week and, of these, 1,600 (38% of total employment) also worked less than 40 weeks in that year. These are average figures. The table also shows that it is primarily females who are then "underemployed." Countrywide, 43% of females set this definition of underemployment. However, for North Shore females, the figure was 58%; for685 females, 58% were underemployed. Thus, Study Area females are not only disproportionately outside the labor force, but also disproportionately underemployed even when they are in the labor force.

Compatibility: As discussed in Section 2.5.1, about 25% of employed 1980 North Shore civilian workers had to commute at least 45 minutes one-way to their workplace. Increased availability of jobs on the North Shore would not automatically mean that in all such commuters switching to more nearby jobs, but there is clearly a potential for the reduction of this high percentage.

High School Youth: Based on calculations set forth in the Bellona work/economic analysis (Community Resources and A. Jonas)
Limo, Inc. 1985, pp. 151 - 153). It is estimated that Kahuku seniors in the 1984 - 1985 time period in the same time, 10,500 seniors. Note from the Kauai State Department of Education (1977) suggests at least 25% of graduating seniors translating into a more than 5,800 seniors from Kahuku and Waialua high schools, another 3,500 from Leilani High School.

Many of these graduates may simply replace persons leaving the study area labor force through retirement or death. However, opportunities for employment of actual job opportunities in the communication industries with area high school vocational courses for in the job training programs intended to graduation. Continuous and expanded opportunities for such programs at the state college may help to assure maximization of employment benefits for area residents.

Retaining Plantation Workers: This suggestion is made in a community basis in the areas of future outlooks in or some future data. This indicates a portion of the future data. This indicates a portion of the future data. This indicates a portion of the future data.

Community contact on the part of developer representatives indicates substantial community awareness of the experiences of the communities. The Kauai phone directory has been compiled of all the residents of the North Shore area, and is divided into the North Shore area and the North Shore area.

4.4 Lifestyle and Social Cohesion

This subsection focuses on qualitative social impacts related to changes in the nature of the place or the people living in the area. This section includes the primary study area (i.e., the community at large), the social impacts in the secondary or tertiary areas. Two aspects will be considered:

- Physical aspects of "rural character" which help create a "sense of place" for the North Shore; and
- Changes in social/political structure.

4.4.1 Physical Elements of "Rural Character"

Changes in physical character of an area represent social impacts to the extent that they affect "sense of place" and community identity.

4.4.1.1 Existing Neighborhood Character

The primary study area (Kauai County Division) extending from the north shore to Waimea Bay, represented 15% of the county's total land area but only 1.5% of the population in 1981. This highlights the area's relative lack of development. Along with portions of the windward and leeward coasts, the primary study area may be considered one of the remaining areas on Oahu to be described as "rural".

The area is largely characterized by:

1. Low-density residential neighborhoods (generally single-family homes with a limited number of low- and medium-density apartments);
2. Low-density commercial areas concentrated along the coastline and around the towns of Waimea and Kauai;
3. Extensive agricultural areas (primarily sugar production); and
4. Numerous recreational activities (popular beach areas, along with camping and hiking in the mountain areas).

The following discussion will provide a more detailed analysis of the existing physical character for specific areas within the primary study area.
Recreational activities are prominent throughout this area. Much of the coastline is made up of easily accessible sandy beaches. Surfing is a major recreational activity, along with windsurfing and snorkeling during the summer months. The boat harbor at Haleiwa provides the only major boat launch facility on the North Shore.

Waialua: One key determinant of Waialua's physical character is the sugar mill and the surrounding acreage planted in sugarcane. Many of the town's residents are employed at the mill and live in single-family residential areas within several blocks of the plantations offices and mill. Most of these housing units are older and in low- to moderate-price range. In recent years, some commercial and public facility developments such as a shopping center adjacent to the elementary school, have somewhat improved the physical appearance of the town.

To the east of the Mill area, on the Haleiwa side of Kikiki Stream, smaller individually owned agricultural lots contain some diversified agricultural operations. These operations produce flower and nursery products, vegetables, and some beef. The various features of the community give the area a very rural-oriented character.

Crouder Drive/Waialua Beach Road: Coastal areas from Waialua to the beginning of Haleiwa are accessed via Waialua Beach Road and Crouder Drive. Nearby in Waialua, homes along the coastline are generally older and more moderately priced. At Paiko Bay, a new residential area, low and medium-priced apartments has introduced the first cluster of high-rise structures in the North Shore area.

The character along the coast changes noticeably at the intersection of Crouder Drive. Crouder Drive is, in fact, a private road used by residents and not by the public. The area has been landscaped and maintained. Many of these units are second homes for relatively affluent Honolulu or out-of-state people. At the end of Crouder Drive, a 10-acre parcel is used as a retreat for the employees of Castle and Cooke.

Farrington Highway Agricultural Lots: A two-mile agricultural subdivision on Farrington Highway presently contains only a few developments. While these lots are sometimes regarded as potential "suburban" areas, only a very limited amount of agricultural activity is actually taking place in this area at the moment.

Haleiwa: The area surrounding the project site is characterized by agricultural, recreational, and residential use; which most residents regard as providing a "rural" atmosphere.

Figure 2.3 shows the portions of Haleiwa included in the area and the location of the project site within the area. The site is located along Farrington Highway, and the closest school is about a quarter mile away. The site is located adjacent to the main highway, with access to parking and other facilities.

Haleiwa is currently in operation as an agricultural community. Approximately 100 acres are occupied by agricultural and recreational activities. The remainder of the lands are utilized for dairy and beef cattle pasturing. Except for a small irrigated pasture used for dairy cows, these lands retain their natural vegetation growth. The farmland is largely in a natural vegetation state, except for the small pasture where hogs and cattle are grazed.

Also of a clearly agricultural character are the sugarcane fields on either side of the highway, which are captured by the project area.

Haleiwa of Farrington Highway, recreational land areas are a prominent feature, along with residential pockets. As previously discussed in Sections 4.1 and 4.2, the recreational areas include the sugarcane fields, pastures, and open space. The proximity of the site to the highway, as well as the railroad, makes it a good candidate for future development. The site is surrounded by agricultural land, with a few additional homes between Haleiwa and the project site.

4.1.2 Future Character Without Project

Section 3.8 discusses population trends and economic forces that will bring about some changes in the overall character of the study area even without resort development at Haleiwa. The discussion notes that current County growth policies in the North Shore would restrict future housing and commercial development in the study area. However, the trend toward smaller lots and more limited development will continue, with an emphasis on establishing small-scale, low-density developments.

In the area of housing, the current North Shore Development Plan indicates that future projects will be small-scale, primarily infill of vacant residential-zoned lots within or adjacent to existing neighborhoods.
Without resort development, Pokelaia's and Wailana's physical character is likely to remain such as it is today, at least in terms of the distribution of urban, agricultural, and preservation areas. At present, the largest increase of housing units can be expected to occur in the area currently zoned for low and medium-density apartments on Wailuna Beach Road. Additional changes may also occur within residential areas along the beach as property values rise and older ranch style houses are torn down and replaced by new units.

Along Farrington Highway, the five houses in the Preservation area could eventually be phased out, leaving the area as natural open space. The agricultural subdivision into parcels would likely be built out. The Episcopal Church's Camp Pokelaia Master Plan (see Section 4.1.4) would result in more structures on some or all of that now open beach-front property. However, the City tentatively plans to acquire for Pokelaia Beach Park expansion a portion of the entire 27-acre parcel which includes the Camp Pokelaia expansion area, so the exact future of this parcel remains somewhat unclear. Also, as noted in Section 4.2, the City also has long-range plans to acquire part of the 82-acre Northwestern Natural parcel for another beach park.

1.4.1.3 Overall Project Impacts

Impacts to the physical character of the Primary Study Area from a major resort in Pokelaia would most noticeably be in the nature of increased densities in areas that have been described as having a rural or country-style atmosphere. Major impacts are expected to be restricted to the Pokelaia area with a few exceptions which are discussed in the following paragraphs.

(1) Traffic will increase along Farrington Highway and should carry over into the Kailua/Waimanalo area along Kamehameha Highway. Traffic impacts are to be determined further by other connecting roads.

(2) Commercial development may be further increased in the vicinity of the project. New commercial projects in Baliana have been gradually changing to rail service to the visitor market. The addition of another resort area would likely encourage more of this type of activity. However, future development in the Beach area would be required to follow guidelines set forth in the Baliana Historic, Cultural, and Ecological District regulations, which are intended to preserve the community's general architectural character.

(3) General urbanization pressures may be experienced in North Shore areas. Plans for development of other lands not in the area cannot be predicted at this point. The economic viability of farms and plantations in the area is likely to be critical in terms of the majority of agricultural lands. Nonetheless, a new major development will improve property values, and as a result, increase the potential for additional development. Any future development, however, will ultimately be dependent on policies of the City and County of Honolulu.

The most significant impact to the physical character of the area will be in Wailuna, in and around the project site. Some key features include:

(11) Recreational use of the Pokelaia development would, in general, be highly compatible with the current recreational orientation of Pokelaia and the North Shore in general. However, the recreational facilities would be shared with paying visitors rather than reserved just for full-time Oahu residents. The golf course area would represent a new recreational aspect for Pokelaia.

(22) Overall densification would increase in Pokelaia due to project structures. The proposed development would in fact be one of the lowest-density resort/development complexes in Hawaii, counting the several thousand acres of undeveloped land. However, structures visible from Farrington Highway -- hotels, condominiums, and the commercial center — would be clustered. This visual density would be mitigated by further development of the golf course and further vitality by plantings along the road.

(33) More "naturalized" landscaping which usually accompanies both resort and recreational communities would represent a change from the current overall character along Farrington Highway, which is a mixture of natural vegetation and low density on undeveloped pastures, and various styles of residential landscaping. The beach-front properties become increasingly expensive, however, it may be expected that future residential landscaping in Pokelaia will also become more "naturalized."

(44) Residential units in the project are likely to be of somewhat different architectural styles than current Pokelaia homes, but these are not a mixture and may well change over time.

(55) Existing fields on either side of the project site along Farrington Highway are visually and architecturally compatible with the proposed development. Some new trucks, and other road traffic on the route, however, is a matter yet to be worked out between the developer and the planning.
4.1.1.4 Impact on Mokuleia Beach-Front Character

Project beach-front development would have particular implications for the character of Farrington Highway, above and beyond the effects of the overall development, most of which is made up of the highway. The current character of Mokuleia beach of the highest features alternating packets of residential, recreational, and natural areas. The development would fill in most of the existing large packets of open space (although the development and landscaping would preserve much of the open area) and would eliminate the visual presence of roadway along the highway.

There would be several site-specific impacts for existing beachfront parcels owned by Northwestern Mutual: existing residential areas, Camp Mokuleia, and Mokuleia Beach Park.

Existing residential areas, located between the proposed resort development sites, would be subject to increased pressures to upgrade the nature of structures on the site. The increase in property values — and, consequently, property taxes — resulting from construction of resort units in the area would increase the likelihood that some of these properties would be sold (with profits to existing owners) to new landowners who seek to improve the nature of their property.

Most affected would be the older single-family and duplex units used primarily for rentals and as longtime second homes. This would be an intensification of a trend that is likely to occur anyway as overall beach-front property becomes of interest in an international market, and the outcome would be perceived as “positive” by some persons and “negative” by others.

Camp Mokuleia is the Episcopal Church-owned campground. As previously noted in Section 4.1.1, the church owns three acres and leases six more acres from Northwestern Mutual. The church’s Long-Range Master Plan calls for permanent acquisition of these six acres. The plan notes that camp-related people interviewed for the study were “very protective of the special nature of the camp and its grounds” and considered preservation of the current “country atmosphere” to be a high priority (Kopelson, Snyder, & Beaudin, 1991).

If the six acres go into resort use (albeit primarily as landscaped open space), planned future structures for the three-acre camp site would probably be more densely developed. Without the six acres, the surrounding resort units would affect the “country atmosphere” at the actual camp location. A mitigating factor would likely be the development of residential-oriented recreational facilities within the Mokuleia project (hiking, camping, and equestrian activities). Assuming these are affordable priced for local residents, their density pressure would represent highly compatible amenities for Camp Mokuleia users. For many Mokuleia youth groups and organizations, the combination of Camp Mokuleia and Mokuleia could provide a way to enjoy recreational/recreational amenities while still camping and paying low fees for lodging.

Mokuleia Beach Park impacts were previously discussed in Section 4.2.1. As noted there, development of resort units on either side would affect the park’s current quasi-wilderness character, particularly for camping. At the same time, landscaping of the resort parcels would alleviate the essentially barren nature of the park environs, and the development would also improve security for campers through increased police services and anticipated presence of nearby hotel security. A river mitigation need would be appropriate landscaping of the resort parcels bordering the park to provide noise and visual buffers.

4.1.1.5 Amenities

One of the more positive aspects of “rural character” has to do with lack of amenities (whether private commercial or public services) in sparsely populated areas.

Additional visitor and resort residential population will provide a base for expanding both public services and private amenities. The 1984 North Shore Neighborhood Survey discussed in Section 2.1 indicated substantial public concern over crime and the need for full-time ambulance service; such police and public safety services are not likely to be justified with an expanded “facto” population base.

The resort would also result in numerous private amenities. These would be primarily on-site — restaurants, entertainment, and the several recreational facilities now being planned. Additionally, the increased local market could also result in more stores, restaurants, and entertainment amenities in areas such as Haleiwa.

4.1.2 Social/Political Structure

Interviews with community leaders suggest four basic social groupings at present in the Mokuleia-Haleiwa area:

(a) Plantation-Oriented: Predominantly residing in and around Haleiwa, these people grew up around the Kualoa Sugar Plantation and/or are currently tied to the plantation in some economic way. Many are Filipino immigrants or descendants of Filipino immigrants. As of the 1980 Census, 39% of the population of the Waiananai community was Filipino, and 33% was foreign-born. It may be assumed that plantation-oriented people represent the largest of the five groups, since Waianani’s 1980 population of 1,054 represented 76% of the total population in the Waianani-Haleiwa census tract (Tract 98.01).
At the present time, it is difficult to predict with certainty whether the plantation will still exist in the year 2005 or, if not, whether Wai'alea's population at that time will still reflect a plantation heritage. The existence of alternative employment centers such as the proposed resort would be a major factor. Without an employment center to provide common social and economic bonds, Wai'alea would gradually lose much of its present relatively homogeneous population, and the replacement population would be less likely to have a common time and institutions such as the plantation labor unions, or even the Catholic Church. With a nearby employment center, social change will still occur, but it will be experienced by a more unified community.

(b) Military-oriented: These people work at Schofield, Pearl Harbor, HAWAII or other facilities, either in the armed forces or as civilian workers. They are generally transient and live in rental units along Wainaku Beach Road or Farrington Highway near the project site. In 1980, Census data show 237 armed forces personnel residing in Census Tract 29-21, 22% of whom lived outside the Wai'alea community core.

Depending on the exact type and price range of housing units to be built at the project site, it is reasonable to assume that some of the new residents would be military personnel, most probably singles sharing units. Thus, one project impact could be a modest increase in the area's military population.

(c) Beach or Horse-oriented People: These people either live around the project area and raise horses, or live in the nearby two-acre agricultural subdivision. Their numbers are uncertain but are probably just a few hundred, since the entire Census block group including Wai'alea and other parts of Wainaku had a total population of just 8,126 in 1980. However, there are also part-time residents and residents of other areas who keep horses in the area and drive up to the polo grounds in season.

If the project continues to develop along contemplated expansion-oriented lines to some degree of commercialization, it is likely that the community would develop along commercial-oriented lines to some degree of commercialization, as well as a few young families.

The Census block group data indicate a greater employment spread in these areas - i.e., larger proportions of both high-income and low-income than in the Wai'alea area. As previously indicated, it is expected that population pressure and city growth policies will gradually result in fewer low-income residents among the Beachfront Residents over the next few decades.

The new residential population at the project site would ultimately exceed the current beachfront population along Farrington Highway. It is anticipated that the two groups would be socially compatible, although the very long-range expectation would be that persons able to afford beachfront land in the future would be on average more affluent than those in condominium units on the project site.

Approval of a major resort at Wai'alea would introduce three broad new potential population groups, as described below. Also briefly discussed are some of the factors which would affect the quality of social interaction between1 newcomers and "old timers."

(a) Visitors would comprise 74% of the estimated average daily non-site season in the year 2002. There is tentative development concept calls for an income mix among visitors rather than a pure luxury resort. Preliminary discussions with community leaders suggest this is desirable from the perspective of Wai'alea and Wai'alea residents, although some Wai'alea residents may prefer an "upscale" resort.

(b) Published literature on the determinants of residential interaction and its quality (Duncan, 1965; Knox, 1978; 1979; Graber, 1982; Kendall and Var, 1981) suggests that major determinants of resident attitudes and behavior relate to residents' neighborhood of residence. They usually have more to do with residents' age, perceived visitor respect for local culture, displaced political recruitment, and competition for resources. In Wai'alea, coastal resources are particularly important, and the exact final provision for public access to the coastline would be an important determinant of area residents' attitudes toward visitors.

(c) Resort Residents are expected to number about 1,200 ($10 full-time and 250 part-time) in the year 2002. They will thus be the largest single bloc, perhaps even the majority, of residents along Farrington Highway in Wai'alea. The quality of their interaction with other area residents will depend on such factors as membership in regional associations vs. on-site homeowner or condominium associations, and demographic characteristics and place of work.
Characteristics of resort residents cannot currently be stated with accuracy. A residential population consisting largely of retirees from outside Hawaii would of course be the least likely to have frequent interactions with local residents of the Waikiki-Mauna-Kea area. However, there is also a reasonable possibility that substantial numbers of residents could be renters or owner-occupants who are professional persons familiar in the pockets of current residents or hotel employees, or military households with several incomes.

4.37 Immigrant Workers could theoretically compete with current area residents for housing in Waikiki and other current City growth policies for the North Shore housing. At Turtle Bay and other developments, there are signs of competition between blue-collar workers and local residents (Community Relations and A. Hono Lagoon, Inc., 1994), and other rural Hawaiian residents areas have also begun to experience some preliminary friction between Hawaiian immigrant farms from the Philippines and Southeast Asia and resort jobs (Community Relations, 1994), although this should be less a concern in the largely Filipino Waikiki area.

Social conflicts due to job competition will be minimized to the extent that current area residents are qualified for resort employment. Thus, the previously discussed potential for job training programs would be a mitigation/prevention strategy for qualitative social problems as well as a labor supply.

Efforts to maximize employment among currently-busan residents of the North Shore or other areas within reasonable commuting distance would also alleviate competition for housing and subsequent intensification of anticipated increased housing costs. Efforts should be made to ensure that area growth policies for the North Shore residents and potential immi-grants. As will be shown below, past housing pressures are expected to be a major determinant of future impacts on social outcomes such as mental health and family stability.

4.5 Indicators of Social Stress or Harassment

The primary indicators to be considered in this discussion will be crime rate and stress on family life (i.e., divorce, child abuse/neglect) and/or individuals (mental health). However, it is appropriate to begin with a discussion of possible social mechanisms by which these outcomes can be affected.

4.5.1 Social Mechanisms

Past experience with resort social impact assessment in Hawaii indicates at least five social mechanisms which can affect "quality of life" as indicated by measures such as crime or mental health rates:

1) Nature of Employment: Sociological/psychological aspects of resort employment have been discussed at length in several past Hawaii resort social impact studies (Community Resources, 1980, 1981, 1985; Community Resources and A. Hono Lagoon, Inc., 1994) and will not be repeated here. Rather, the present discussion will focus on outcomes which might affect all Primary Study area residents, whether or not they are employed at the project site or in related work.

2) Group Practice for Jobs: This topic also relates to direct employment and has been implicitly covered in the consideration of job training or other programs to maximize employment among current local residents.

3) Pressure on Housing and Other Infrastructure: Section 3.6 presented some reasons for believing that current City population control policies will result in increased housing pressures even without the proposed project. The extent to which these pressures will be exacerbated by the present proposal may also depend in part on the success of programs to maximize employment among currently-busan residents.

4) Changes in Resident Social Composition: Some of the changes discussed in the preceding Section 4.1 may be by new theories of social change -- impact measures of social stress and harmonies.

5) Presence of Visitors: As noted in Section 4.4, numerous factors can affect the quality of resident visitor interaction. One alleged outcome of this interaction is increased crime, and the validity of this concern will be explored here.

Since the first two of the above five mechanisms have been considered in depth previously, this discussion will focus on the latter three as potential causal factors.

4.5.2 Family and Individual Stress

Divorce, child abuse/neglect, and mental health outcomes resulting from broad socio-economic transformations (as opposed to the job factors considered in Section 4.3) have been subject to particular interest within the "housing" branch of the social impact literature.
The "bounteous" social impact concerns have been most extensively discussed in regard to energy or mining activities in sparsely populated portions of the Mainland (or Canadian) West. Back of the socio-economic impact literature of the 1970's and early 1980's has been rooted in studies of such small communities undergoing rapid population growth.

"Bounteous" areas have reportedly been subject to two broad types of social impacts:

1. Strain on infrastructure and services (including housing): These are a function strictly of population growth, without regard to types of people. Realization of frustration with crowding and inadequate services can lead to family and social health impacts. Established businesses and government agencies may base their costs to the better-paying new industries, and consequent manpower shortages eventually lead to further labor in-migration (Smith, Masso, Johnson, and Coddington, 1981). Proposed mitigation strategies have included daycare, targeted training/recruitment, and other measures aimed at increasing labor force participation of nonworking spouses of current residents (Hale, Lestrade, and Albrecht, 1986).

2. Social disruption: These are primarily a function of alleged conflicts between different types of people (natives vs. outsiders). A spate of early "bounteous" studies blamed crime, mental health, and family disruption on such sociological factors as breakdown of traditional social roles, informal ties, and values; alienation, lack of "community"; newcomers/locals antagonism; etc. (cf. Borg, 1974; Cottone and Jones, 1977; Niles, 1979; Friedenson, 1981). These early views were challenged in a pair of highly controversial articles by Wilkinson and colleagues (Wilkinson, Thompson, Oates, and Oates, 1982; Reddick, Wilkinson, Thompson, and Cohane, 1982), which found that family studies had failed to use solid research techniques and were biased due to an anti-growth orientation. Wilkinson et al. did not argue that rapid population growth was problematic, but they did call for new research techniques and for consideration of how many of the problems were rooted more in simple population strains than in abstract disturbances to the existing social order.

Subsequent social research has featured better research design but more contradictory results. A number of studies (e.g., Beach, Orn, and Smith, 1981; Kromh and Fiddler, 1984; England and Albrecht, 1984) have indicated that "bounteous" communities have few if any more serious psychiatric and problem than comparable slow-growth communities, but they do exhibit a sense of frustration and community breakup due to strain on services and infrastructure.

The results show that ... "bounteous" are perceived as less friendly, less helping, and have poorer family environments and poorer community spirit ... In general, the analysis shows that "bounteous" do disrupt virtually all community services from economy to informal relationships. The exception is economic support, which is strengthened. (England and Albrecht, 1984, p. 242)

The relevance of these studies to the current assessment of potential resort impacts lies in the tentative conclusion that observed individual and family stresses are probably linked more to pressure on housing and other infrastructure than to shifts in population composition.

In the case of energy "bounteous," such phenomena are transitional; they disappear when government and/or private sector forces are able to catch up with demand. However, for Oahu's North Shore, current government policies are intended to keep supply of housing [although not of schools, roads, or other public services] well into anticipated demand.

Additionally, some indicators of social pathology are increasing for reasons independent of economic or population factors. Reported child abuse/neglect cases on Oahu more than doubled from 1980 to 1984, and roughly similar proportionate increases were reported in all portions of the State (Aber, Secondary, and Tertiary) in the same time period (unpublished computer printouts obtained from Hawaii State Department of Social Services and Housing, May 1986).

The implication is that indicators of stress on families and individuals will likely show significant increases even if the Makaha project is not built.

Project impacts are expected to be of a dual and opposing nature. On the one hand, the availability of several thousand jobs will further strain housing pressures and associated social stress. On the other hand, without substantial employment opportunities, less affluent current residents may be expected to bear most of these social costs, whereas resort employment will blend with the advantage of already processing housing within the area to enable them to cope with anticipated stresses more easily than would be the case if the regional economy remains depressed.

4.5.2 Crime

Tourism development is often alleged to generate increased crime rates, either because visitors are perceived as easy targets, or because of resentment over the apparent wealth of visitors (permanent resort residents, or those because of general social pressures and friction between newcomers and longtime residents. Thus, crime impacts would be a cumulative consequence of interaction between longtime residents and new and diverse population groups; however, in Hawaii, the greatest public attention has been directed toward crime against tourists themselves.
As part of the ballina social assessment, community service (land & A. L. K. Payton) undertook a comprehensive review of the following assessment: (1) crime-related links; (2) economic research or reported crime and juvenile delinquency rates for several Hawaii resort areas; and (3) by informal interviews with police officers in Kona, Kohala, Kauai, Molokai, and Maui. Results of this review included:

1. The few academic studies (excluding those based on Hawaii data) were generally contradictory and inconclusive, because of different definitions and methods. There was some consistency in finding a statistical relationship (usually slight to moderate) between tourism and the crimes of theft and robbery, but not other crimes such as murder or assault.

2. Overall crime rate changes from 1970 to 1980 exceeded nationwide increases in all three of the study areas -- Kauai, Hawaii. However, juvenile delinquency rates showed much higher than average increases in all three resort areas.

-- Police perceptions provided the most consistent, if still complex, picture:

- On-site crime at self-contained West Maui destination resorts is minimal (due to effective security efforts) and is usually limited to theft by hotel workers. Residential components of such resorts do not generate disproportionate crime.

- Off-site, the major crime impact is likely to involve increased petty thefts from visitors at other tourist attractions. Perpetrators are likely to be juveniles. There are often minor spates of such crimes following completion of major new hotel projects in rural areas, but crime figures tend to level off after a year or so.

- Most police do not believe that local residents are more likely to be crime victims if they live near resorts, nor do they believe that (with the possible exception of some juveniles) otherwise law-abiding residents are tempted to crime by the presence of tourists.

- Tourism is felt to have some indirect effect on crime rates, "street crimes" in tourist towns such as Kauai-Kona or Lahaina are associated with juvenile problems. Social adjustments between long-term residents and newcomers can lead to conflicts, and Mahalo-raised individuals are more likely to report even minor crimes.

Nobleson police personnel interviewed for this report basically concurred with the foregoing assessment. Crime rates are low on the North Shore, and such tourist-directed crime does occur primarily involves theft of valuables from parked cars and beaches, particularly at popular surfing beaches such as Chuns Reef and Pipeline. Police were more concerned about public order and flood-control strategies for Makaha, matters which are outside the scope of the present discussion.

Thus, some relationship between tourism and crime does appear to exist, but in a variety of minor and indirect ways rather than in any simple or major fashion. As a self-contained destination area, Nobleseon is less likely to experience a flow of tourist-oriented "street crimes" as in Kauai or West Maui. Increased public access to the Nobleseon beach may be expected to generate opportunities for theft or tourist belongings, but this can be somewhat controlled through private security and limits on hours during which access is permitted.

Most Nobleseon residents complain about crime and illegal firearms possession (e.g., target practice) in the Neon Point area or illegal marijuana growing in the area. In both cases, the increased police presence caused by the project may be expected ultimately to reduce these illegal activities, but there is a potential for unpleasant or even violent incidents to occur in the process. Mitigation would include strong project security in the Neon areas and cooperation with police in searching for illegal marijuana patches before the area is opened to the public. For the Neon Point area, strong warnings to Nobleseon residents of the area's presence and police should discourage most people from exploring the region and thus protect them from harassment.

4.8 Social Mitigation

4.8.1 Mitigation of Community Concerns

A preliminary community dialogue program initiated by the developer has resulted in the initial identification of various community concerns. Many of which (e.g., traffic) are outside the scope of the present "social" analysis. Many community concerns in the "social" areas are clearly subject to mitigation, although only very broad statements can be made at this point in the planning process. These would include:

- Negotiated resolution of questions about the future of public activities, e.g., Makaha, and hiking/camping access to the area properties. These negotiations are in progress.
Landscaping is believed to have any sense of intimidation by project structures or population on the nature of recreational or residential experiences at beachfront locations adjacent to the project's walkway. Initial efforts along these lines have been made at Camp Noyellow, and the major remaining need would probably involve Makaha Beach Park.

Control of any problems caused by increased public access increased access will likely constitute a major good and City and County park expansion (land, however, concerns about overfishing, public safety in rough waters, litter, and protection of vegetation Sans to be addressed. The issue of lifeguards and warning signs; waste receptacles, vegetation, overfishing, however, is an insalubrious problem which may require insalubrious solutions.

Disorganization of Makaha visitor exploration of the Kaena Point road, due to fear of (1) generating demand for goods will be confronted by persons engaging in illegal times exploring the area by activity and recreational use. It is hoped that some kind of advisory group, for such use, be confronted by persons engaging in illegal times exploring the area by activity and recreational use. It is hoped that some kind of advisory group, and special community-oriented reserve events and programs.

Standing citizens' advisory committee; special community-oriented reserve events and programs; record of agreements — either formal (through incorporation into zoning conditions) or informal.

4.6.3 Job Training and Related Efforts to Maximize Resident Employment Benefits

Jobs training for already-housed current residents could possibly mitigate both potential labor shortages discussed in Section 4.3, and also the increased pressure on North Shore housing at this time. The developer regards discussion any specific programs elements as highly premature at this time.

However, it may be recalled that Section 4.3.2 identified seven likely target groups for either increased overall size of the current dialogue process. Therefore, the developer regards discussion any specific programs elements as highly premature at this time.

The developer's plans for establishing and maintaining dialogue with interested community members. The developer presented the proposed plan.

One of the components of this program will involve forming a special community-oriented reserve events and programs.

The question of long-term communication mechanisms was well be addressed during the course of these initial discussions. At present, little can be said about this with any certainty. However, none of the potential elements may include:

- creation of a reserve operators' association (typically oriented to marketing, but also potentially a vehicle for interaction with the local community);
- special community-oriented reserve events and programs;
- record of agreements — either formal (through incorporation into zoning conditions) or informal.

The developer has stated that actual implementation of any such programs would depend on community priorities as they evolve during the current dialogue process. Therefore, the developer regards discussion any specific programs elements as highly premature at this time.

However, it may be recalled that Section 4.3.2 identified seven likely target groups for either increased overall size of the current dialogue process. Therefore, the developer regards discussion any specific programs elements as highly premature at this time.
Appendix A:
Detailed Assumptions Regarding Labor Demand

This appendix provides a more detailed explanation of the assumptions about Study Area labor demand listed in summar in Section 4.3.2 of the text.

1. Project Demand

Assumption #1: Focus on Operational Employment. It is assumed that the major public policy issue for both demand and supply consideration concerns operational rather than construction employment. While there will be community interest in construction work and any job training effort might well involve efforts to increase study area residents' participation in construction work opportunities, construction jobs are unlikely to generate much new population or housing pressure in the study area. While the project will provide numerous construction jobs, each individual structure and infrastructure effort will last a few years at longest, and many workers will be small-time only for a portion of this time. Thus, construction workers temporarily commuting from other parts of the United States are unlikely to make permanent residence on the North Shore because of this project.

Assumption #2: Demand for Direct-Employment Workers Will Be Equal to the Numbers Provided in Table 4.3. As previously noted, the actual operational employment situation could be more complicated, due in part-time jobs, multiple job holding, and seasonal factors. Simplifying assumptions are necessary - e.g., it seems particularly appropriate in the absence of data to assume that employment figures for each sector presented in Table 4.3) rather than attempting to guess the extent of seasonal variations in current employment 20 years in the future.

Implicit in Assumption #2 is the further assumption that the effects of multiple job holding essentially cancel out the effects of splitting full-time equivalent jobs into part-time jobs. Some justification for this implicit assumption is provided in the occupancy component of the State Tourism Study (Hawaii State Department of Planning and Economic Development, 1981). This study indicated 78% of visitor industry employees are full-time and 22% part-time (p. 102), and it also found that 14% of total industry employees have a second job, of which 55% (or 7.2% of the total) had a second job less than 20 hours per week (p. 205). This leads to the following equation:

\[ W1F1 = W1P1 + W1F0P1 + W1P0F1 + W1P1F0 + W1F1P0 + W1F0P0 \]

where the variables are:

- **W1F1**: all visitor industry workers
- **W1P1**: workers with one full-time job
- **W1F0P1**: workers with one part-time job and one full-time job
- **W1P0F1**: workers with one part-time job
- **W1P1F0**: workers with one part-time job

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Assuming the 7.2% of workers with a second and part-time job also consist of 23% part-time workers (i.e., part-time for the first job as well), then the equations become:

\[ W_1 = W_1 + W_2 + \frac{0.67W_1}{2} + \frac{0.67W_2}{2} + \frac{0.67W_3}{2} + \frac{0.67W_4}{2} \]

\[ W_2 = 0.67W_1 + 0.23W_2 + 0.05W_3 + 0.02W_4 + 0.03W_2 \]

Assuming a value of 1.0 full-time equivalent positions to each full-time job and 0.5 to each part-time job, then a total of 1,900 workers (4,000 x 0.5) would generate the following number of full-time equivalent positions:

\[ W_1 = 1000 \times 1.0 = 1000 \text{ full-time equivalents} \]
\[ W_2 + W_3 + W_4 = 550 + 150 + 85 = 785 \text{ full-time equivalents} \]
\[ W_5 = 1000 + 500 = 1500 \text{ full-time equivalents} \]
\[ W_6 = 1975 \text{ full-time equivalents} \]

The inverse of 975,521,000 produces a ratio of 1.02 workers for each full-time equivalent position. This is as close to 1.00 that, given the age of the foregoing data and the general error which must be allowed in any such analysis, it would seem to justify the overall assumption that number of workers equals number of full-time equivalent positions.

Another aspect of the direct employment issue involves accepting the on-site employment as equivalent to total direct employment. Lodging expenses account for only 2% of Hawaii visitor expenditures, while other major expenditure categories such as food and beverages, 25%, or gifts and souvenirs, 15%, or transportation, 15% - Hawaii State Department of Planning and Economic Development, 1985, p. 209, could arguably generate direct jobs away from a resort destination complex and still within a regional study area.
Followed numbers for 1990 and 1995 were derived as
straight-line interpolations from the 1980 and 2000
figures. Numbers for the year 2005 were derived by
calculating the average annual percentage growth rate for
the 1980 figures and utilizing this percentage to project
to 2005.

Added to these figures would be 2,100 Study Area Jobs
from the Kealiihitaan expansion as of the year 2005. The
Kealiihitaan socio-economic study (Community Resources and A.
Loomis Associates, 1984, p. 141) projects a total additional
3,565 jobs in the North Shore/Kailua area from future
Kealiihitaan development. However, the study assumes that
1.4% of these jobs would come from previous land use
approvals which would arguably have been included in the
Oahu total.

Of the 2,100 new jobs, 83% would be off-site. Since
Kailua's location is close to the North Shore/Kailua
boundaries, it will be assumed that half of these off-
site jobs will be in Kailua and the other half in the
North Shore area.

Based on Kailua's plans to develop a new 350-room hotel
by 1990, it is assumed that 47% of the new jobs will be in
existence as of 1990 (350 on-site, plus off-site jobs
assumed to be on appropriate multiplier factors, with 1990 and
2000 job figures calculated as straight-line interpolations.

Also to be added to the Oahu job figures would be the
11,280 jobs projected for the 1987 Kilohana High-Tech
Park as of the year 2005 (Sachi International, 1983). Of
these, 85% are estimated to be direct and 15% off-site but
indirect/included (e.g., warehousing, retailing, etc.).

The official in charge of developing the park (James
Calhoun, senior vice president, Oceanic Properties,
personal communication, June 21, 1986) indicates that
2,000 direct jobs (implying an additional 353 indirect/
induced jobs) will be on-line by 1990, with the remainder
in place by 2005. Figures for 1995 and 2000 were inter-
polated from the 1990 and 2005 totals.

Assumption B: Because of the uncertainty of high-techology
park employment prospects, it is appropriate to consider varying
scenarios for job development there. High-techology activities have
an extremely limited track record in Hawaii. Therefore, one
scenario will assume development to the full employment levels
stated previously (2,353 in 1990; 11,280 in 2005), but a second
scenario will assume development to only 50% of these totals.

Assumption C: For tentative analysis separating labor
needed by educational level, it will be assumed that
50% of all additional employment desired will be for persons with
less than a four-year college degree. An exception will be the
high-techology park, for which the assumed figure is 65%. The
65% figure is an estimate of the probable assumptions for Kealiihitaan
work (many of which would be agricultural or retail), and the
indirect high-tech jobs. The 65% figure for direct high-tech jobs is based on the following assumptions about educational
requirements for the assumed breakdown of direct high-tech jobs
(From Environment Capital Resources, 1983):

<table>
<thead>
<tr>
<th>Employee Category</th>
<th>% of Total</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial</td>
<td>6.2%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Technical</td>
<td>20.8%</td>
<td>20.8%</td>
</tr>
<tr>
<td>Clerical</td>
<td>18.4%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Additionally, it may be noted that the official in charge of
developing the park (James Calhoun, senior vice president,
OCEANIC Properties, personal communication, June 21, 1986)
believes few residents from the North Shore would be employed
there because of lack of skills. The park is currently
evaluated as a research center rather than a manufacturing/
processing center. Mr. Calhoun said a higher majority of
employees are expected to come from the lower central valley
and the suburban Triangle (Ewa, Salt Lake, Makaha) because many of these
residents now work in skilled jobs for the military at Pearl
Harbor or at Waimanalo. These skills are expected to be transfer-
able to the future high-tech Park, whereas the skills of North
Shore plantation workers would not be applicable.

Assumption D: Current Waimanalo plantation job levels are
held constant. This is a conservative measure from the
perspective of this analysis, since it assumes continuation of
many activities. However, the impact of this assumption
(involving only about 500 jobs) is negligible in contrast with
assumptions about the high-tech park.
APPENDIX B:
MOBILE/JA FUTURE LABOR SUPPLY ANALYSIS

This appendix provides the detailed basis for the figures and assumptions summarized in Section 1.3.3 of this report.

1. General Discussion

The future population and potential labor supply were calculated for the North Shore, Baldwin, Malibu, and Malibu/Oxenhead areas with the use of the Cohort-Survival Model technique. This model is a projection technique which assumes that an existing population increases through the natural process of births and deaths. The model further assumes (linearly adjusted) that the net migration of the given population is equal to zero. It begins by breaking the total population into age groups, called cohorts. Each cohort is further subdivided into a male cohort and a female cohort.

Cohort-survival analysis takes each of these cohorts and projects them separately. Survival rates for each cohort are determined from historical records and multiplied by the number of persons within a cohort. Since the survival rates will always be less than 100%, each individual will always die, given a smaller and smaller. Births are generated for the lowest age groups applied to the cohort of women of childbearing age, generally 15 to 44 years.

Following the completion of the cohort-survival analysis, which provided estimated populations for the four portions of the Study Area for years 1985, 1990, 2000, and 2005, the potential labor force for each area by year was determined. This was accomplished by subtracting all persons 15 years or younger from the estimated populations and multiplying the resulting figures by area-specific labor force participation rates. The final step of the analysis estimated future educational levels within each portion of the Study Area. This achieved projected population levels of labor force participants that are expected to have less than four years of college.

2. 1980 Population

The 1980 population was calculated with the use of data from the U.S. Census Bureau on file at the State Department of Planning and Economic Development (1980 Summary Tape File 3-A).

Table B-1 presents the results of these calculations by age-sex cohorts for the four portions of the Study Area.

This population was further segmented into military personnel, military dependents, and civilians. The total number of military personnel within a given area can also be found in the census data 3-A file. The corresponding dependent
<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>100,000</td>
</tr>
<tr>
<td>1995</td>
<td>110,000</td>
</tr>
<tr>
<td>2000</td>
<td>120,000</td>
</tr>
<tr>
<td>2005</td>
<td>130,000</td>
</tr>
</tbody>
</table>

The population has been increasing steadily over the years.
The military and dependent populations for each of the four areas in 1980 are shown below:

<table>
<thead>
<tr>
<th>Area</th>
<th>Military</th>
<th>Dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honolulu</td>
<td>105</td>
<td>285</td>
</tr>
<tr>
<td>Kohala</td>
<td>138</td>
<td>212</td>
</tr>
<tr>
<td>Kauai</td>
<td>12,031</td>
<td>11,933</td>
</tr>
<tr>
<td>Molokai</td>
<td>4,110</td>
<td>4,026</td>
</tr>
</tbody>
</table>

The army male/female and dependent populations within each area were distributed into age cohorts from 15 to 64 years old based on state-wide military personnel characteristics. State-wide characteristics were utilized due to a lack of detailed data on military personnel and dependents by specific area. See reference previously noted for state-wide military data. Male and female military personnel were distributed by age as follows:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 21</td>
<td>0.51005</td>
<td>0.352305</td>
</tr>
<tr>
<td>22 to 31</td>
<td>0.520225</td>
<td>0.381772</td>
</tr>
<tr>
<td>32 to 41</td>
<td>0.532294</td>
<td>0.344754</td>
</tr>
<tr>
<td>42 to 51</td>
<td>0.546151</td>
<td>0.331683</td>
</tr>
<tr>
<td>52 to 64</td>
<td>0.559708</td>
<td>0.320801</td>
</tr>
<tr>
<td>65 plus</td>
<td>1.000000</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

The 1980 civilian population in each area was multiplied by the above rates to obtain the number of individuals expected to survive to 1990. These individuals were then moved up one age cohort.

The number of births during the 1990-1989 period were calculated using the 1980 state-wide fertility rate of 57.74 births per 1000 women (area-specific rates were unavailable). For each area, the number of women aged 15 to 49 was multiplied by the fertility rate to obtain the number of total births. Half of the total expected births were placed in the 0 to 4 year-old age cohort. They were distributed by sex using the observed 1980 sex ratio. The remaining half of total births was similarly distributed by sex, then multiplied by the survival rate of the 0 to 4 year-old age cohort. These individuals were then moved to the 5 to 11 year-old age cohort. This resulted in a final estimated population by area for the year 1990.

The cohort analysis for years 1995, 2000, and 2005 followed the same procedure as described above except for one aspect.
### Table 8-2
1980 Study Area Resident Military Population by Age Cohort

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 to 9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10 to 14</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 to 19</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20 to 24</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25 to 29</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30 to 34</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35 to 39</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40 to 44</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45 to 49</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50 to 54</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>55 to 59</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60 to 64</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65+</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Totals: 1,280 1,280 2,560

**Note:** Totals may not add due to rounding.

### Table 8-2
1980 Study Area Military Dependent Population by Age Cohort

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 to 9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10 to 14</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 to 19</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20 to 24</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25 to 29</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30 to 34</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35 to 39</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40 to 44</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45 to 49</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50 to 54</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>55 to 59</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60 to 64</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65+</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Totals: 1,280 1,280 2,560

**Note:** Totals may not add due to rounding.
population and the number of labor force participants in 1980 to derive an adjusted rate.

Labor force participation rates were assumed to change in ways proportionate to the projected changes in statewide rates incorporated in the State's economic/population model (Hawaii State Department of Planning and Economic Development, 1981). Using data from this model, total projected age-specific participation rates were calculated for the state as a whole for future years 1990, 1995, 2000, and 2005. (Variations by age group were omitted because the area-specific 1980 rates for the Study Area could not be disaggregated by age group.) These were then expressed as ratios to the statewide 1980 age-specific rates, and the ratios were applied to the 1980 Study Area rates to provide future average rates.

For example, assume that females had a statewide participation rate of 50.0% in 1980 and were projected to have a rate of 55.5% in 2005. The ratio of the 2005 rate to the 1980 rate would then be 1.11 to one. However, within a certain portion of the Study Area, the 1980 female participation rate may have been only 20.0% for military dependents and 40.0% for other civilians. The assumed 2005 female participation rates in this location would then be 22.2% for dependents and 44.4% for other civilians.

The results of the steps described above are shown in Table B-5.

By multiplying the potential labor force in the various areas (those persons aged 18 or more) by the rates shown in Table B-5, an estimated number of labor force participants was provided. Table B-6 gives the results of this step.

5. Future Educational Patterns

The final calculated step of the potential labor supply analysis was to calculate the estimated number of persons within each area expected to have less than a four-year college degree. This step was conducted since it is intuitively assumed that such individuals constitute the segment of the labor market most interested in the majority of Mulelua (sic) resort jobs.

In order to make assumptions about future educational levels, educational characteristics for the island of Oahu and the Waikiki Census Division (the North Shore Primary Study Area) were established for 1950, 1960, 1970, and 1980. This analysis showed that for each ten-year interval, the percentage of persons aged 25 or more with a minimum of four years of college rose at an increasing rate, most significantly during the 1970-1980 period. A higher than average increase was observed in Hilo during the 1970-1980 period, and a lower than average increase was observed for Waikiki during the same time frame. Since 1970 data for the Mulelua/Waikiki area were unavailable, the increase in education of persons living in this area could not be calculated for other than 1980.

Table B-5

<table>
<thead>
<tr>
<th>Labor Force Participation Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Dependents Total Study Area</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>Other Civilians</td>
</tr>
<tr>
<td>North Shore</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>Kawainui</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>Waikiki</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>Mulelua/ Waikiki</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
</tbody>
</table>

Source: Community Resources, Inc.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>North Shore</td>
<td>7,000</td>
<td>1,775</td>
<td>8,775</td>
<td>6,000</td>
</tr>
<tr>
<td>Homestead</td>
<td>4,204</td>
<td>2,725</td>
<td>6,929</td>
<td>3,474</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>18,496</td>
<td>10,240</td>
<td>28,736</td>
<td>20,078</td>
</tr>
<tr>
<td>Totals</td>
<td>20,000</td>
<td>21,755</td>
<td>41,755</td>
<td>24,071</td>
</tr>
</tbody>
</table>

*Note: Totals may not add due to rounding.*

---

In Table 8-6, the estimated number of civilian labor force participants in the potential study area was calculated. The methodology involved the following steps:

1. Estimation of the total labor force participants in 1990.
2. Adjustment for expected growth and changes in labor force participation rates.
3. Calculation of the labor force participants by gender and age groups.
4. Application of the expected changes in employment status (full-time, part-time, unemployed).

The table presents the estimated labor force participants by gender and age groups for 1990, 1995, 2000, and 2005. The data was derived from a combination of official labor force surveys and demographic projections. The methodology used to estimate the labor force participants is based on historical trends and demographic forecasts. The estimates were adjusted for expected changes in labor market conditions, including potential impacts from economic growth, demographic shifts, and policy changes.
Figure B-1
Projected Educational Levels For Study Area Population

<table>
<thead>
<tr>
<th>Year</th>
<th>North Shore</th>
<th>Honolulu</th>
<th>Waiʻanae/Halawa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>2.479</td>
<td>3.516</td>
<td>2.473</td>
</tr>
<tr>
<td>1960</td>
<td>3.445</td>
<td>5.227</td>
<td>3.476</td>
</tr>
<tr>
<td>1990</td>
<td>42.076</td>
<td>46.489</td>
<td>48.344</td>
</tr>
<tr>
<td>2000</td>
<td>46.473</td>
<td>45.031</td>
<td>44.041</td>
</tr>
</tbody>
</table>

Table B-7
Potential Study Area Civilian Labor Force Participants—Persons With Less Than 1 Year of College
Years 1990 through 2005

* Out-migration at ages 1990 and 2000.*


APPENDIX D

Development Plan
Public Facilities Amendment

Prepared by
Engineers, Surveyors Hawaii, Inc.

June 1986
**TERMOLEIA**
**PUBLIC FACILITIES AMENDMENT**

**ADDITIONS:**

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Interceptor Sewer Lines</td>
<td>Construct new 12&quot; to 15&quot; sewer lines in Farrington Highway and new privately constructed roadways.</td>
</tr>
<tr>
<td>Sewage Lift Stations</td>
<td>Construct sewage lift stations to move the wastewater towards the treatment plant.</td>
</tr>
<tr>
<td>New Wastewater Treatment Plant and Apparatuses</td>
<td>Construction new wastewater treatment plant, injection wells, and appurtenances to treat and dispose of the wastewater.</td>
</tr>
<tr>
<td>New Water Wells</td>
<td>Complete the installation of pumps and appurtenances on three (3) new wells that have been drilled but not yet completed and drill one new well and install the required pumps and appurtenances.</td>
</tr>
<tr>
<td>New Water Reservoir and Lift Stations</td>
<td>Construct two (2) reservoirs, one at the low service limit, the other at the higher service limit, together with the required water lift stations and appurtenances.</td>
</tr>
<tr>
<td>New Water Transmission Lines</td>
<td>Construction of water transmission mains of various sizes to be built in the private and public roadways.</td>
</tr>
<tr>
<td>Farrington Highway Improvements</td>
<td>Miscellaneous pavement widening and shoulder improvements and left turn lane. Reconstruction and lengthening of one bridge, raising the roadway grade to provide adequate flood elevation and miscellaneous highway lighting.</td>
</tr>
<tr>
<td>Primary Access Roadway</td>
<td>Construct primary access roadway from Farrington Highway through the development to service the adjacent sections of land within the project, that will be developed.</td>
</tr>
</tbody>
</table>

Exhibit 1
I. APPLICANT INFORMATION

A. Name: Mokuleia Development Corporation

B. Address: Pacific Tower, 1001 Bishop Street Suite 279

C. Contact Person: William Hsu or Robert Itagaki

Phone: 511 3116 Date Submitted: June 1986

II. PROJECT INFORMATION

A. Project Title: NEW INTERCEPTOR SEWER LINES

B. Project Description: CONSTRUCT NEW SEWER LINES VARYING IN SIZE FROM 3 IN TO 12" WITHIN NEW PRIVATELY CONSTRUCTED ROADWAYS AND WITHIN THE EXISTING FARRINGTON HIGHWAY RIGHT-OF-WAY.

C. Project Location: Land situated off Farrington Highway at Mokuleia, Waianae, Oahu, Hawaii. Being portion of land Court App. #15-1987, 1110, and being portion of Grant 131 to Hanaa and Hanaa, and portion of Grant 131 to Hampel and Hamel.

Tax Map Key: 1st Div 6-8-02 and 0

Neighborhood Board Area
- Name: North Shore
- Number: 27
- Census Tract(s): 95.01
- DP Area(s): North Shore

D. Type of Amendment Request (mark "x")
- ADD
- DELETE
- CHANGE
E. Map for Amendment
To serve the projected development by Muehler Developers
Corporation

F. DP Public Facilities Reference No.
(Assigned by DCP)

G. Maps Attached (mark "x")
  Location Map x
  Site Plan x
  Service Area Map

H. Start of Land Acquisition (year)
   Start of Construction (year)

I. Estimated Project Costs (in thousands of dollars)

<table>
<thead>
<tr>
<th></th>
<th>Within 4 Years</th>
<th>Beyond 4 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land Acquisition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Planning &amp;</td>
<td>161,000</td>
<td></td>
</tr>
<tr>
<td>Engineering (P&amp;E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Construction</td>
<td>1,710,000</td>
<td></td>
</tr>
<tr>
<td>4. Beautification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Inspection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Furniture,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixtures, Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Relocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Other</td>
<td>1,811,000</td>
<td></td>
</tr>
<tr>
<td>9. Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. DP MAP STATUS
A. Current Public Facilities Map Status
1. Is project on the current PP Map?
   Yes x No
   (If no, skip to #5.)

3. Current Project Description

4. Site Location on PP Map
   a. Site Location Determined (Tax Map Key)
   b. Location Undetermined

4. Timing (mark "x")
   "Within 4 years"
   "Beyond 4 years"
   Programmed by increments? Yes No

5. Current DP Land Use Map Designation(s) Underlying the
   Project Site (mark "x")
   Preservation
   Residential
   Commercial
   Industrial
   Park

B. Proposed Public Facilities Map Status (Skip if request
   is to "delete" a project.)
1. Proposed Site Location
   Proposed Site Location Determined (Tax Map Key)
   Location Undetermined

2. Timing (mark "x")
   "Within 4 years" XX
   "Beyond 4 years"
3. Has project or any portion of this project been previously considered for inclusion on the PF Map?
   No [X]  Yes ______
   If yes, what were previous DGP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being processed to which this project relates?
   No ______  Yes [X]
   If yes, what is concurrent DGP Land Use Application No.? ______

IV. IMPACT ON PUBLIC FACILITY SYSTEMS

A. Additional Load or Demand
   1. Sewage
      a. 1.5 mgd, average flow to nearest 0.1 mgd
      b. 0.6 mgd, peak flow to nearest 0.1 mgd
   2. Water
      a. ______ mgd, average flow to nearest 0.1 mgd
      b. ______ mgd, peak flow to nearest 0.1 mgd
   3. Traffic
      a. Average Daily Traffic (ADT)
      b. Peak Hour Volume
   4. Other

B. Explain the basis for demand or load figures used above. Use the City's Section Criteria to determine the quantity of flow.

C. How will this project interface with the public system? Describe and include map. There is no public system currently available in the area. The City is requiring a sewage disposal system for the project area. Portions of the system may be owned with the City's right in a participating basis.

D. Are public facilities adequate to handle additional load? Yes ______  No ______
   Explain and attach letters from impacted agencies indicating their commitment to handle the additional loads. MILLIONDollar TO PARTICIPATE IN THE DEVELOPMENT OF THE SERVICE FACILITY WAS MADE AT A JUDICIAL MEETING WITH THE DEPT OF PUBLIC WORKS, WITH DETAILS TO BE RESOLVED LATER.

E. Will this facility be dedicated to the City? Yes ______  No ______
   When is this dedication anticipated?

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.)
   Resort, Commercial, Industrial

B. Indicate the size of the development this project supports.
   Land Area 1,081 acres
   Population (residential or resort) 3,300 (Resort) 6,000 (Residential)
   Floor Area (commercial or industrial) 100,000 sq ft

C. Is this project oversized to accommodate future development? Yes ______  No ______
   Explain.

D. Will future development require DP land use amendment? (attach location map.) Yes ______  No ______

E. Indicate the ultimate size of the development.
   Land Area
   Population (residential or resort)
   Floor Area (commercial or industrial)
Developed Facilities Map Amendment

Public Facilities Map Amendment

DGP Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

NOTE: Only "major" projects need to be shown on the Development Plan Public Facilities Map. See
Appendix A of the Instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION
A. Name: Nautella Development Corporation
B. Address: Pacific Tower, 1001 Bishop Street Suite 600
C. Contact Person: William Dee or Robert Itasaki
   Phone: (511) 3114 Date Submitted: June 1985

II. PROJECT INFORMATION
A. Project Title: CONSTRUCT SEWAGE LIFT STATIONS (2)
B. Project Description: CONSTRUCT NEW SEWAGE LIFT STATIONS TO
   PREVENT WASTE WATER TO THE TREATMENT PLANT
C. Project Location: Land situated off Farrington Highway at
   Nautella Way, Makaha, Wahiawa, Ewa, portions of Land Court Apts
   "E", "F", and "G") and being portion of County 111 in Wai`anae and Keaau,
   Makaha
Tax Map Key: 1st Div 6-9-01
Neighborhood Board Area: North Shore
Number: 27
Census Tract(s): 93.01
DP Area(s): North Shore
D. Type of Amendment Request (mark "x")
   Add ___    Delete ___    Change ___

E. Basis for Amendment: To serve the proposed development by Nautella Development
   Corporation

F. DP Public Facilities Reference No.: (Assigned by DGP)

G. Maps Attached (mark "x")
   Location Map ___
   Site Plan ___
   Service Area Map ___

H. Start of Land Acquisition (Year) ___
   Start of Construction (Year) ___

I. Estimated Project Costs (in thousands of dollars)

   Within 6 Years        Beyond 6 Years

   1. Land Acquisition:
   2. Planning & Engineering (P&E):
      50,000
   3. Construction:
      800,000
   4. Beautification:
   5. Inspection:
   6. Furniture, Fixtures, Equipment:
   7. Relocation:
   8. Other:
      9. Total:

III. DP MAP STATUS
A. Current Public Facilities Map Status
1. Is project on the current PP Map? Yes ___ No ___ (If no, skip to #5.)
2. Current Project Description
________________________________________________________________________
________________________________________________________________________

3. Site Location on PF Map
   a. Site Location Determined (Use Map Key) ..............................................
   b. Location Undetermined (THK to smallest detail possible) ......................

4. Timing (mark "X")
   "Within 4 years" ________
   "Beyond 4 years" ________
   Programmed by increments? Yes ________ No ________

5. Current DP Land Use Map Designation(s) Underlying the Project Site (mark "X")
   Preservation ________ Agriculture ________ XX
   Residential ________ Apartment ________
   Commercial ________ Resort ________
   Industrial ________ Military ________
   Park ________ Public Facility ________
   Quasi Public ________

B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
1. Proposed Site Location
   a. F-P-02: 10
   b. F-P-01: 11
   Site Location Determined (Use Map Key)
   Location Undetermined (THK to smallest detail possible)

2. Timing (mark "X")
   "Within 6 years" ________
   "Beyond 6 years" ________

3. Has project or any portion of this project been previously considered for inclusion on the PF Map?
   No ________ Yes ________
   If yes, what was previous DP Public Facility Application No(s)? ________

4. Is there a concurrent land use amendment being processed to which this project relates?
   No ________ Yes ________
   If yes, what is concurrent DP Land Use Application No.? ________

IV. IMPACT ON PUBLIC FACILITY SYSTEMS
   A. Additional Load or Demand
      1. Sewage
         a. 1.5 mgd, average flow to nearest 0.1 mgd
         b. 3.6 mgd, peak flow to nearest 0.1 mgd
      2. Water
         a. ________ mgd, average flow to nearest 0.1 mgd
         b. ________ mgd, peak flow to nearest 0.1 mgd
      3. Traffic
         Average Daily Traffic (ADT)
         Peak Hour Volume

B. Explain the basis for demand or load figures used above. Use the City's design criteria to determine the quantity of flow.

C. How will this project interface with the public system? Describe and include map. There is no public system currently available in the area. The City is planning a Septic Disposal System for the Malibu area. Portions of the system might be combined with the City's work on a participating basis.
D. Are public facilities adequate to handle additional loads? Yes ☐ No ☐

Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.

E. Will this facility be dedicated to the City? Yes ☐ No ☐

When is this dedication anticipated?

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.). Residential, Commercial, Residential.

B. Indicate the size of the development this project supports.

- Land Area 1,019 acres
- 700 Single Family units
- Population (residential or resort) 3,100 Hotel & Condominium units
- Floor Area (commercial or Industrial) 150,000 sq ft.

C. Is this project associated to accommodate future development? Yes ☐ No ☐

Explain.

D. Will future development require DP land use amendment? (Attach location map.) Yes ☐ No ☐

E. Indicate the ultimate size of the development.

- Land Area
- Population (residential or resort)
- Floor Area (commercial or Industrial)

Mohueloa
Public Facilities Map Amendment

DOF Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

NORTH: Only "major" projects need to be shown on the Development Plan Public Facilities Map. See attachment A of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION

A. Name

B. Address

C. Contact Person

Phone ☑ Date Submitted June 1986

II. PROJECT INFORMATION

A. Project Title

NEW WASTEWATER TREATMENT PLANT AND APPURTENANCES

B. Project Description

CONSTRUCT NEW WASTE WATER TREATMENT PLANT INFECTION WELLS. AND APPURTENANCES TO TREAT WASTEWATER FROM THE MOHUEL OA DEVELOPMENT AND PROPOSE FROM MAHALIA IWAH.

C. Project Location

Land situated off Farrington Highway at

Mohueloa, Wahiawa, Oahu, Hawaii. Being portions of Land Court Appx 8754, 1105, 1115, and being portion of Grant 313 to Wahiawa and Hena, and portion of Grant 115 to Hana and Hualalai.

Tax Map Key 1st Div 6-6-02 and 83

Neighborhood Board Area

Name North Shore

Number 27

Census Tract(s) 99.01

DP Area(s) North Shore

D. Type of Amendment Request (mark "x")

Add ☐ Delete ☐ Change ☒
E. Basis for Amendment
To serve the proposed development by Melville Development Corporation.

F. DP Public Facilities Reference No. (assigned by DGP)

G. Maps Attached (mark "x")
Location Map  
Site Plan  
Service Area Map  

H. Start of Land Acquisition (year)  
Start of Construction (year)  

I. Estimated Project Costs (in thousands of dollars)

<table>
<thead>
<tr>
<th></th>
<th>Within 6 Years</th>
<th>Beyond 6 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land Acquisition</td>
<td>1,020,000.00</td>
<td></td>
</tr>
<tr>
<td>2. Planning &amp; Engineering (PLIE)</td>
<td>5,500,000.00</td>
<td></td>
</tr>
<tr>
<td>3. Construction</td>
<td>9,570,090.00</td>
<td></td>
</tr>
<tr>
<td>4. Beautification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Inspection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Furniture, Fixtures, Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Relocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Total</td>
<td>9,570,090.00</td>
<td></td>
</tr>
</tbody>
</table>

III. DP Map Status
A. Current Public Facilities Map Status
1. Is project on the current DP Map?
   Yes ___  No ___  (If no, skip to #4.)

B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
1. Proposed Site Location  
   Site Location Determined  
   Location Undetermined  

2. Timing (mark "x")
   "Within 6 years"  
   "Beyond 6 years"  
   Programmed by increments? Yes ___  No ___
3. Has project or any portion of this project been previously considered for inclusion on the PF Map?  
   No \ Yes \  
   If yes, what were previous DGP Public Facility Application No(s)?  

4. Is there a concurrent land use amendment being processed to which this project relates?  
   No \ Yes \  
   If yes, what is concurrent DGP Land Use Application No(s)?  

IV. IMPACT ON PUBLIC FACILITY SYSTEMS  

A. Additional Load or Demand  
1. Sewage  
   a. 1.5 gpd, average flow to nearest 0.1 gpd  
   b. 0.0 gpd, peak flow to nearest 0.1 gpd  
2. Water  
   a. mgd, average flow to nearest 0.1 mgd  
   b. mgd, peak flow to nearest 0.1 mgd  
3. Traffic  
   Average Daily Traffic (ADT)  
   Peak Hour Volume  

B. Explain the basis for demand or load figures above, using the City's design criteria to determine the quantity of flow.  

C. How will this project interface with the public system?  
   Describe and include map. There is no public system currently available in the area. The city is planning a sewage disposal system for the adjacent area. Portions of this sewage system will be combined with the city's works on a participating basis.  

D. Are public facilities adequate to handle additional load? Yes \ No \  
   Explain and attach letters from impacted agencies indicating commitment to handle the additional load.  

E. Will this facility be dedicated to the City? Yes \ No \  
   When is this dedication anticipated?  

V. GROWTH IMPACTS  

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.). Retail, Commercial, Residential  

B. Indicate the size of the development this project supports.  
   Land Area 1,018 acres  
   Population (residential or resort) 3,300 Hotel & Condominium units  
   Floor Area (commercial or industrial) 100,000 sq ft.  

C. Is this project over-sized to accommodate future development? Yes \ No \  
   Explain.  

D. Will future development require DP land use amendment? (Attach location map.) Yes \ No \  

E. Indicate the ultimate size of the development.  
   Land Area  
   Population (residential or resort)  
   Floor Area (commercial or industrial)  

-5-
Makawila
Public Facilities Map Amendment

DCP Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

NOT. Only "major" projects need to be shown on the Development Plan Public Facilities Map. See Attachment 1 of these instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION
A. Name: Makawila Development Corporation
B. Address: Pacific Tower, 1001 Bishop Street Suite 919
C. Contact Person: William Lee or Robert Iseki
   Phone: 531-3116     Date Submitted: June 1986

II. PROJECT INFORMATION
A. Project Title: New Water Wells
B. Project Description: Complete the installation of pumps and appurtenances on new wells and the development and installation of pumps and appurtenances on new well.
C. Project Location: Land situated off Farrington Highway at Makawila, Wailua, Kauai. Being portions of land covered by Title 476-2, 210, and being portions of Grant 311 in Wailua and Kauai, and Portion of Grant 311 to Hanalei and Hanalei.
   Tax Map Key: 1st Div 6-3-01 and 62
   Neighborhood Board Area: North Shore
   Number: 37
   Census Tract(s): 95-01
   DP Area(s): North Shore
D. Type of Amendment Request (mark "x")
   Add        Delete    Change

E. Basis for Amendment
   To serve the proposed development by Makawila Development Corporation

F. DP Public Facilities Reference No. (Assigned by DCP)

G. Maps Attached (mark "x")
   Location Map: x
   Site Plan: x
   Service Area Map: 

H. Start of Land Acquisition (year)

I. Start of Construction (year)

J. Estimated Project Costs (in thousands of dollars)

   1. Land Acquisition                      Within 6 Years     Beyond 6 Years
   2. Planning & Engineering (P&E)          25,000.00          
   3. Construction                          240,000.00         
   4. Beautification                        
   5. Inspection                            
   6. Furniture, Fixtures, Equipment       
   7. Relocation                            
   8. Other                                 
   9. Total                                 275,000.00

III. DP MAP STATUS
A. Current Public Facilities Map Status
   1. Is project on the current PF Map?
      Yes ______ No ______ (If no, skip to 5.)
2. Current Project Description

3. Site Location on PF Map
   a. Site Location Determined  
      
      (Tax Map Key) 
   b. Location Undetermined  
      
      (PM in smallest detail possible) 

4. Timing (mark "x")  
   "Within 6 years"  
   "Beyond 6 years"  
      
      Programmed by increments? Yes No 

5. Current DP Land Use Map Designation(s) Underlying the Project Site (mark "x")  
   Preservation Agriculture  
   Residential Apartment  
   Commercial Resort  
   Industrial Military  
   Park Public Facility  
   Quasi Public  

   B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)  
   1. Proposed Site Location  
      Site Location Determined  
      
      (Tax Map Key) 
   2. Timing (mark "x")  
      "Within 6 years"  
      "Beyond 6 years"  

3. Has project or any portion of this project been previously considered for inclusion on the PF Map?  
   No Yes  
   If yes, what were previous DP Public Facility Application No(s)?  

4. Is there a concurrent land use amendment being processed to which this project relates?  
   No Yes  
   If yes, what is concurrent DP Land Use Application No.?  

IV. IMPACT ON PUBLIC FACILITY SYSTEMS  
   A. Additional Load or Demand  
      1. Sewage  
         a. ___ mgd, average flow to nearest 0.1 mgd  
         b. ___ mgd, peak flow to nearest 0.1 mgd  
      2. Water  
         a. ___ mgd, average flow to nearest 0.1 mgd  
         b. ___ mgd, peak flow to nearest 0.1 mgd  
      3. Traffic  
         Average Daily Traffic (ADT)  
         Peak Hour Volume  

4. Other  
   B. Explain the basis for demand or load figures under A, above. 
      THE SEWERAGE OF THE BOARD OF WATER SUPPLY, CITY AND COUNTY OF HAWAII, WAS USED. 
      C. How will this project interface with the public system? 
         Describe and include map. 
         THERE IS CURRENTLY NO PUBLIC SYSTEM IN THE VICINITY. THIS 
         PROJECT WILL STAND ALONE. THE NEAREST PUBLIC WATER MAIN IS 
         AROUND 1/2 MILE PAST. THERE ARE NO CURRENT PLANS TO INTER-
         CONNECT THE SYSTEMS.
D. Are public facilities adequate to handle additional load? Yes No

Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.

E. Will this facility be dedicated to the City? Yes No

When is this dedication anticipated?

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.). Resort; Commercial, Residential

B. Indicate the size of the development this project supports.

<table>
<thead>
<tr>
<th>Land Area</th>
<th>1.019 acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (residential or resort)</td>
<td>3,200 Hotel &amp; Condom. units</td>
</tr>
<tr>
<td>Floor Area (commercial or industrial)</td>
<td>100,000 sq ft.</td>
</tr>
</tbody>
</table>

C. Is this project oversized to accommodate future development? Yes No

Explain.

D. Will future development require DP land use amendment? (Attach location map.) Yes No

E. Indicate the ultimate size of the development.

<table>
<thead>
<tr>
<th>Land Area</th>
<th>1.019 acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (residential or resort)</td>
<td>3,200 Hotel &amp; Condom. units</td>
</tr>
<tr>
<td>Floor Area (commercial or industrial)</td>
<td>100,000 sq ft.</td>
</tr>
</tbody>
</table>

DCP Form 101
(For Privately Funded Projects)
(Revised December 17, 1984)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP MAJOR AMENDMENT APPLICATION

NOTE: Only "major" projects need to be shown on the Development Plan Public Facilities Map. See page 9 of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION

A. Name Mahi Residences Development Corporation

B. Address Pacific Tower, 1001 Bishop Street, Suite 919

C. Contact Person William H. or Robert Storey

Phone 511 3116 Date Submitted June 1986

II. PROJECT INFORMATION

A. Project Title NEW WATER RESERVOIRS AND LIFT STATION

B. Project Description CONSTRUCT TWO RESERVOIRS, ONE AT THE LOW SERVICE LIMITS THE OTHER AT THE MIDDLE SERVICE (900) TOGETHER WITH THE REQUISITE WATER LIFT STATION AND APPURTENANCES.

C. Project Location Land situated off Farrington Highway at Mahi Residences, Kahului, Maui, falling portion of land Court Applic 410, 1101, 1810; and being portion of Grant 31 to Hulana and Kam, Plantation of Maui 331 to Panama and Mula

Tax Map Key 1st Div 6-8-01 and 01

Neighborhood Board Area

<table>
<thead>
<tr>
<th>Name</th>
<th>North Shore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>27</td>
</tr>
</tbody>
</table>

Census Tract(s) 331.01

DP Area(s) North Shore

D. Type of Amendment Request (mark "x")

Add Delete Change
2. Current Project Description

3. Site Location on PF Map
   a. Site Location Determined ___ (Tax Map Key)
   b. Location Undetermined ___ (TMI to nearest detail possible)

4. Timing (mark "x")
   "Within 6 years" ___
   "Beyond 6 years" ___
   Programmed by increments? Yes ___ No ___

5. Current DP Land Use Map Designation(s) Underlying the Project Site (mark "x")
   Preservation ___ Agriculture ___
   Residential ___ Apartment ___
   Commercial ___ Resort ___
   Industrial ___ Military ___
   Park ___ Public Facility ___
   Quasi Public ___

B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
   1. Proposed Site Location 6-8-03:5,6
      Site Location Determined ___ (Tax Map Key)
      Location Undetermined ___ (TMI to nearest detail possible)

2. Timing (mark "x")
   "Within 6 years" ___
   "Beyond 6 years" ___
3. Has project or any portion of this project been previously considered for inclusion on the PF Map?
   No XX Yes

   If yes, what were previous DGP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being processed to which this project relates?
   No XX Yes

   If yes, what is concurrent DGP Land Use Application No.?

IV. IMPACT ON PUBLIC FACILITY SYSTEMS
A. Additional Load or Demand
   1. Sewage
      a. ______ mgd, average flow to nearest 0.1 mgd
      b. ______ mgd, peak flow to nearest 0.1 mgd
   2. Water
      a. ______ mgd, average flow to nearest 0.1 mgd
      b. ______ mgd, peak flow to nearest 0.1 mgd
   3. Traffic
      a. Average Daily Traffic (ADT) ______
         b. Peak Hour Volume ______
   4. Other

B. Explain the basis for demand or load figures under A. above. (Ref: Standards of the United Water District, CDPH, and City of El Cerrito Water Dept.) ______

C. How will this project interface with the public system? Describe and include map. ______

D. Are public facilities adequate to handle additional load? Yes XX No

   Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.

   ______

E. Will this facility be dedicated to the City?
   Yes XX No

   When is this dedication anticipated?

V. GROWTH IMPACTS
A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.): Resort, Commercial, Residential ______

B. Indicate the size of the development this project supports:
   Land Area ______ acres
   Population (residential or resort) ______
   Floor Area (commercial or industrial) ______

C. Is this project overbuilt to accommodate future development? Yes XX No

   Explain. ______

D. Will future development require DP land use amendment? (Attach location map.) Yes XX No ______

E. Indicate the ultimate size of the development:
   Land Area ______
   Population (residential or resort) ______
   Floor Area (commercial or industrial) ______
Makaha
Public Facilities Map Amendment

DGP Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

Note: Only "major" projects need to be shown on the Development Plan Public Facilities map. See
Appendix A of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION
A. Name                      Makaha Development Corporation
B. Address                   Pacific Tower, 1001 Bishop Street Suite 979
C. Contact Person            William Hae or Robert Itayaki
   Phone 631-1116             Date Submitted June 1986

II. PROJECT INFORMATION
A. Project Title             WATER TRANSMISSION MAIN
B. Project Description       CONSTRUCTION OF WATER TRANSMISSION MAINS AT
   OF VARIOUS SIZES TO BE BUILT IN PRIVATE AND PUBLIC ROADWAYS.
C. Project Location          Land situated off Farrington Highway at
   Makaha, Wahiawa, Oahu, Hawaii. Being portions of land court Applic
   674-119/120, 121, and being portion of acres 118 to William and Reas,
   and Portion of Grant 331 to Hanska and Hula.
   Tax Map Key 1st Div 6-9-02 and 02
   Neighborhood Board Area    North Shore
   Name 27
   Census Tract(s)            99.01
   DP Acre(s)                 North Shore

D. Type of Amendment Request (mark "x")
   Add              Delete       Change  
   2

E. Basis for Amendment
   ___ to serve the proposed development by Makaha Development
   Corporation

F. DP Public Facilities Reference No. (Assigned by DGP)
   ________________

G. Maps Attached (mark "x")
   Location Map   ________________
   Site Plan      ________________
   Service Area Map ________________

H. Start of Land Acquisition (year) ________________
   Start of Construction (year) ________________

I. Estimated Project Costs (in thousands of dollars)

<table>
<thead>
<tr>
<th></th>
<th>Within 5 Years</th>
<th>Beyond 5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land Acquisition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Planning &amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering (PAE)</td>
<td>90,000</td>
<td></td>
</tr>
<tr>
<td>3. Construction</td>
<td>1,010,000</td>
<td></td>
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<tr>
<td>4. Beautification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Inspection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Furniture,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixtures, Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Relocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Other</td>
<td>1,040,000</td>
<td></td>
</tr>
<tr>
<td>9. Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. DP MAP STATUS
A. Current Public Facilities Map Status
   1. Is project on the current PF Map?
      Yes    No    (If no, skip to 5.)
2. Current Project Description

3. Site Location on FF Map
   a. Site Location Determined (Use Map Key)
   b. Location Undetermined (Mark to smallest detail possible)

4. Timing (mark "x")
   "Within 6 years" ______
   "Beyond 6 years" ______
   Programmed by Increments? Yes _____ No _____

5. Current FF Land Use Map Designation(s) Underlying the Project Site (mark "x")
   Preservation ______ Agriculture ______
   Residential ______ Apartment ______
   Commercial ______ Resort ______
   Industrial ______ Military ______
   Park ______ Public Facility ______
   Quasi Public ______

B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
   1. Proposed Site Location 6-8-03: 5, 6, 11, 19, 31, 33, 18, 19, 56
      Site Location Determined (Use Map Key)
      Location Undetermined (Mark to smallest detail possible)
   2. Timing (mark "x")
      "Within 6 years" ______
      "Beyond 6 years" ______

3. Has project or any portion of this project been previously considered for inclusion on the FF Map?
   No ______  Yes ______
   If yes, what were previous DGP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being considered to which this project relates?
   No ______  Yes ______
   If yes, what is concurrent DGP Land Use Application No.? ______

IV. IMPACT ON PUBLIC FACILITY SYSTEMS

A. Additional Load or Demand
   1. Sewage
      a. ______ mgd, average flow to nearest 0.1 mgd
      b. ______ mgd, peak flow to nearest 0.1 mgd
   2. Water
      a. ______ mgd, average flow to nearest 0.1 mgd
      b. ______ mgd, peak flow to nearest 0.1 mgd
   3. Traffic
      Average Daily Traffic (ADT) ______
      Peak Hour Volume ______

B. Explain the basis for demand or load figures under A. above.
   THE STANDARDS OF THE BOARD OF WATER SUPPLY, CITY AND COUNTY OF HONOLULU, ARE USED.

C. How will this project interface with the public system?
   Describe and include map. THERE IS CURRENTLY NO PUBLIC SYSTEM IN THE VICINITY. THIS PROJECT WILL SIMPLE AFFECT THE NEAREST PUBLIC WATER MAIN. IS ABOUT ______ FEET AWAY. THERE ARE NO CURRENT PLANS TO INTERCONNECT THE SYSTEMS.
D. Are public facilities adequate to handle additional load? Yes ___ No ___

Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.

E. Will this facility be dedicated to the City? Yes ___ No ___

When is this dedication anticipated? ____________

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.).

B. Indicate the size of the development this project supports.

   Land Area 1,000 acres
   Population (residential or resort) 5,000
   Floor Area (commercial or industrial) 100,000 sq ft

C. Is this project oversized to accommodate future development? Yes ___ No ___

Explain. _______________________________________________________________________

D. Will future development require DP land use amendment? (Attach location map.) Yes ___ No ___

E. Indicate the ultimate size of the development.

   Land Area ____________________________
   Population (residential or resort) __________
   Floor Area (commercial or industrial) __________

Mukilteo
Public Facilities Map Amendment

DOP Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

NOTE: Only "major" projects need to be shown on the Development Plan Public Facilities Map. See
Attachment A of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION

A. Name Mukilteo Development Corporation

B. Address Pacific Tower, 1001 Bishop Street Suite 979

C. Contact Person William He or Robert Isgaard

Phone 395-3115 Date Submitted June 1986

II. PROJECT INFORMATION

A. Project Title FARRINGTON HIGHWAY IMPROVEMENTS

B. Project Description MISCELLANEOUS PAVEMENT WIDENING AND
   SIGNS, IMPROVEMENTS AND LANE SHIFT CAP, INTERSECTION AND
   LENGTHENING OF ONE BRIDGE, WIDENING THE ROADWAY TO PROVIDE
   APPROPRIATE ROOM CLEARANCE UNDER THE BRIDGE, HISTOGRAM LIGHTING

C. Project Location Land situated off Farrington Highway at
   Mukilteo, Walper Way, Seattle, being portion of Land Court Applic
   874, 110, 1810, and being portion of Grant 180, in Tulalip and King,
   portion of Grant 181 in Puyallup and Tulalip.

   Tax Map Key 1st Div 6-8-02 and 03
   Neighborhood Beach Area
   Name North Shore
   Number __________
   Census Tract(s) 99.01
   DP Area(s) North Shore

D. Type of Amendment Request (mark "x")

Add ___ Delete ___ Change ___
### E. Basis for Amendment

In serve the projected development by Morten Development Corporation.

### F. DP Public Facilities Reference No.

(Allocated by DDP)

### G. Maps Attached (mark "x")

- Location Map   
- Site Plan     
- Service Area Map

### H. Start of Land Acquisition (year) ________

Start of Construction (year) ________

### I. Estimated Project Costs (in thousands of dollars)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Within 6 Years</th>
<th>Beyond 6 Years</th>
</tr>
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<tbody>
<tr>
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<td>2. Planning &amp; Engineering (P&amp;E)</td>
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<td>6. Furniture, Fixtures, Equipment</td>
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<td>7. Relocation</td>
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<td>8. Other</td>
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<td>9. Total</td>
<td>2,250,000.</td>
<td></td>
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</table>

### II. DP Map Status

### A. Current Public Facilities Map Status

1. Is project on the current PF Map?
   - Yes ___
   - No ___  (If no, skip to 8.)

### B. Proposed DP Facilities Map Status (Skip if request is to "delete" a project.)

1. Proposed Site Location
   - 0 5006: 70

   Location: Undetermined

   (Tax Map Key)

2. Timing (mark "x")
   - "Within 6 years"
   - "Beyond 6 years"

### III. DP Map Status

### A. Current Public Facilities Map Status

1. Is project on the current PF Map?
   - Yes ___
   - No ___  (If no, skip to 8.)

### B. Proposed DP Facilities Map Status (Skip if request is to "delete" a project.)

1. Proposed Site Location
   - 0 5006: 70

   Location: Undetermined

   (Tax Map Key)

2. Timing (mark "x")
   - "Within 6 years"
   - "Beyond 6 years"
3. Has project or any portion of this project been previously considered for inclusion on the PP Map?
   No [XX] Yes [XX]
   If yes, what were previous DGP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being processed to which this project relates?
   No [XX] Yes [XX]
   If yes, what is concurrent DGP Land Use Application No.?

IV. IMPACT ON PUBLIC FACILITY SYSTEMS
A. Additional Load or Demand
   1. Sewage
      a. _ mgd. average flow to nearest 0.1 mgd
      b. _ mgd. peak flow to nearest 0.1 mgd
   2. Water
      a. _ mgd. average flow to nearest 0.1 mgd
      b. _ mgd. peak flow to nearest 0.1 mgd
   3. Traffic
      Average Daily Traffic (ADT) Year 2000 on
      700 Peak Hour Volume

4. Other

B. Explain the basis for demand or load figures under A. above. EXTRACTED FROM A PRELIMINARY TRAFFIC ASSUMPTIONS USING 1990 CENSUS DATA. THIS TAKING TRAFFIC VOLUMES FROM HORNBY FIELD STUDIES AND ESTIMATING THE VOLUMES EXPECTED FROM THIS PROJECT.

C. How will this project interface with the public system?
   Describe and include map. FARRINGTON HIGHWAY HAS A 36 FT. WIDE PAVEMENT, THE PROJECT WILL WIDEN THE PAVEMENT BY 6 FEET, PROVIDE FOR SOME LIGHTING, PROVIDE A LEFT TURN LANE AND IMPROVE THE STORM DRAINAGE SYSTEM ALONG THE HIGHWAY. GENERALILY, THE PROJECT WILL IMPROVE THE EXISTING HIGHWAY CONDITIOUS TO ITS PRESENCE.

D. Are public facilities adequate to handle additional load? Yes [XX] No [XX]
   Explain and attach letters from impacted agencies indicating commitment to handle the additional loads. THE MUNICIPAL RIGHT OF WAY IS SUFFICIENT TO ACCOMMODATE THE IMPROVEMENTS. IMPROVEMENT COSTS IN CL BY PRIVATE FUNDING.

E. Will this facility be dedicated to the City?
   Yes [XX] No [XX]
   When is this dedication anticipated? INDETERMINATE

V. GROWTH IMPACTS
A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.)
   RESORT COMMERCIAL RESIDENTIAL

B. Indicate the size of the development this project supports.
   Land Area 1,615 acres
   700 Single Family Units
   Population (residential or resort) 1,500 Hotel & Condominium Units
   Floor Area (commercial or industrial) 100,000 sq ft.

C. Is this project oversized to accommodate future development? Yes [XX] No [XX]
   Explain.

D. Will future development require DP land use amendment? (Attach location map.) Yes [XX] No [XX]

E. Indicate the ultimate size of the development.
   Land Area
   Population (residential or resort)
   Floor Area (commercial or industrial)
Makuaia
Public Facilities Map Amendment

DGF Form 101
(For Privately Funded Projects)
(Revised December 17, 1984)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

Note: Only "major" projects need to be shown on the Development Plan Public Facilities Map. SeeAttachment B of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION
A. Name Makuaia Development Corporation
B. Address Pacific Tower, 1001 Bishop Street Suite 929
C. Contact Person William Nei or Robert Iseakai
Phone 531-1116  Date Submitted June 1984

II. PROJECT INFORMATION
A. Project Title PRIMARY ACCESS ROADWAY 76 TO 78 FEET WIDE
B. Project Description THERE WILL BE A PRIMARY ACCESS ROADWAY FROM FARRINGTON HIGHWAY THROUGH THE PROJECT TO SERVICE THE ADJACENT VILLAGES OF LAND THAT WILL BE DEVELOPED.
C. Project Location Land situated off Farrington Highway at Makuaia, Waialua, Oahu, Hawaii, being portions of Land Court Aplc 671, 1107, 1810, and being portion of Grant 118 in William and Rana, a portion of Grant 110 to Arman and Rana.
Tax Map Key 1st Div 6-8-02 and 03
Neighborhood Board Area Name North Shore
Number 32
Census Tract(s) 93.01
DP Area(s) North Shore
D. Type of Amendment Request (mark "x")
  Add  x  Delete  Change

E. Basis for Amendment
To serve the proposed development by Makuaia Development Corporation

F. DP Public Facilities Reference No.
(Assigned by DGF)

G. Maps Attached (mark "x")
  Location Map  x
  Site Plan
  Service Area Map

H. Start of Land Acquisition (year) ______
Start of Construction (year) ______

I. Estimated Project Costs (in thousands of dollars)

<table>
<thead>
<tr>
<th></th>
<th>Within 6 Years</th>
<th>Beyond 6 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land Acquisition</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>2. Planning &amp; Engineering (P&amp;E)</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>3. Construction</td>
<td>6,500.000.</td>
<td>______</td>
</tr>
<tr>
<td>4. Beautification</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>5. Inspection</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>6. Furnishings, Fixtures, Equipment</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>7. Relocation</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>8. Other</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>9. Total</td>
<td>7,020.000.</td>
<td>______</td>
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</tbody>
</table>

III. DP MAP STATUS
A. Current Public Facilities Map Status
1. Is project on the current PF Map?
   Yes ______ No ______
   (If no, skip to 5.)
2. Current Project Description

3. Site Location on FF Map
   a. Site Location Determined ___________________________ (Fax Map Key)
   b. Location Undetermined ___________________________ (Sketch to smallest detail possible)

4. Timing (mark "x")
   "Within 4 years" ______
   "Beyond 4 years" ______
   Programmed by Incurrence? Yes ____  No ______

5. Current DP Land Use Map Designation(s) Underlying the Project Site (mark "x")
   Preservation ______  Agriculture ______  Residential ______  Apartment ______
   Commercial ______  Resort ______  Industrial ______  Military ______
   Park ______  Public Facility ______  Quasi Public ______

   B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
   1. Proposed Site Location
      Location Determined ___________________________ (Fax Map Key)
      Location Undetermined ___________________________ (Sketch to smallest detail possible)

   2. Timing (mark "x")
      "Within 4 years" ______
      "Beyond 4 years" ______

   C. Have project or any portion of this project been previously considered for inclusion on the FF Map?
      No ______  Yes ______
      If yes, what were previous DP Public Facility Application No(s)? ___________________________

   D. Is there a concurrent land use amendment being processed to which this project relates?
      No ______  Yes ______
      If yes, what is concurrent DP Land Use Application No? ______

IV. IMPACT ON PUBLIC FACILITY SYSTEMS
   A. Additional Load or Demand
      1. Sewage
         a. _______ mgd, average flow to nearest 0.1 mgd
         b. _______ mgd, peak flow to nearest 0.1 mgd
      2. Water
         a. _______ mgd, average flow to nearest 0.1 mgd
         b. _______ mgd, peak flow to nearest 0.1 mgd
      3. Traffic
         "N, N-1, N-2, N-3, N-4" Average Daily Traffic (ADT) YEAR 2000 ON THE WEEK DAY
         TID Average Hour Volume

   B. Other

   C. Explain the basic for demand or load figures under A. above. A PRELIMINARY TRAFFIC ASSESSMENT WAS MADE FOR THIS PROPOSED PROJECT BY PARSONS BRINCKERHOFF QUINN AND WILKINSON, 1990. USING TRAFFIC VOLUMES FROM MANUAL FIELD COUNTS AND PROJECTING THE VOLUMES EXPECTED FROM THE DEVELOPMENT.

   D. How will this project interface with the public system? Describe and include map. THE PROJECT WILL INTERSECT FARRINGTON HIGHWAY AT THE PROJECT AREA WITH DONALD HUES INTERSECTION.
D. Are public facilities adequate to handle additional load? Yes __ No ___

Explain and attach letters from impacted agencies indicating commitment to handle the additional load.

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.), Yes ___ No ___

B. Indicate the size of the development this project supports.

Land Area 1,019 acres

Population (residential or resort) 3,100 Hotel & Condominium units

Floor Area (commercial or industrial) 100,000 sq ft.

C. Is this project oversized to accommodate future development? Yes ___ No ___

Explain.

D. Will future development require DP land use amendment? (Attach location map.) Yes ___ No ___

E. Indicate the ultimate size of the development.

Land Area ________

Population (residential or resort) ________

Floor Area (commercial or industrial) ________

DEVELOPMENT PLAN PUBLIC FACILITIES MAP MAJOR AMENDMENT APPLICATION

NOTE: Only "major" projects need to be shown on the Development Plan Public Facilities Maps. See attachment A of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION

A. Name Makalea Development Corporation

B. Address Pacific Tower, 1001 Bishop Street, Suite 310

C. Contact Person William Hee or Robert Igebali

Phone 511 1116 Date Submitted June 1986

II. PROJECT INFORMATION

A. Project Title DELETE PARISITE, DETERMINED

B. Project Description DELETE A DETERMINED PARISITE WHICH IS SKIM ON THE PROPERTY OWNED BY THE APPLICANT

C. Project Location Land situated off Farrington Highway at Makalea, Wai`ula, Maui. Being portions of Land Court Abstract 314, 1140, 11110 and being portion of Grant 314 to Dilion and Kane, and Portion of Grant 111 to Hanada and Hale

Tax Map Key 1st Div 6-8-02 and 03

Neighborhood Board Area

Name North Shore

Number 27

Census Tract(s) 99.01

DP Area(s) North Shore

D. Type of Amendment Request (mark "x")

Add ___ Delete ___ Change ___
E. Basis for Amendment
To serve the proposed development by Maxis, Inc. Corporation

F. DP Public Facilities Reference No. __________
   Assigned by DP

G. Maps Attached (mark "x")
   Location Map X
   Site Plan X
   Service Area Map

H. Start of Land Acquisition (year) __________
   Start of Construction (year) __________

I. Estimated Project Costs (in thousands of dollars)

   1. Land Acquisition
      Within 4 Years __________
      Beyond 4 Years __________
   2. Planning & Engineering (PAE)
      Within 4 Years __________
      Beyond 4 Years __________
   3. Construction
      Within 4 Years __________
      Beyond 4 Years __________
   4. Beautification
      Within 4 Years __________
      Beyond 4 Years __________
   5. Inspection
      Within 4 Years __________
      Beyond 4 Years __________
   6. Furniture, Fixtures, Equipment
      Within 4 Years __________
      Beyond 4 Years __________
   7. Relocation
      Within 4 Years __________
      Beyond 4 Years __________
   8. Other
      Within 4 Years __________
      Beyond 4 Years __________
   9. Total
      Within 4 Years __________
      Beyond 4 Years __________

III. DP MAP STATUS
A. Current Public Facilities Map Status
   1. Is project on the current PF Map?
      Yes X No __________ (If no, skip to #15.)

2. Current Project Description
   PARKSITE, LOCATION

3. Site Location on PF Map
   a. Site Location Determined 6-8-92
      (Tax Map Key)
   b. Location Undetermined (TAX to smallest detail possible)

4. Timing (mark "x")
   "Within 4 years" X
   "Beyond 4 years"
   Programmed by increments? Yes No

5. Current DP Land Use Map Designation(s) Underlying the
   Project Site (mark "x")
   Preservation X Agriculture __________
   Residential __________ Apartment __________
   Commercial __________ Resort __________
   Industrial __________ Military __________
   Park __________ Public Facility __________
   Quasi Public __________

B. Proposed Public Facilities Map Status (Skip if request
   is to "delete" a project.)
   1. Proposed Site Location
      Site Location Determined (Tax Map Key)
      Location Undetermined (TAX to smallest detail possible)

   2. Timing (mark "x")
      "Within 4 years" __________
      "Beyond 4 years" __________
3. Has project or any portion of this project been previously considered for inclusion on the PT Map?
   No _____ Yes _____
   If yes, what was previous DGP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being processed to which this project relates?
   No _____ Yes _____
   If yes, what is concurrent DGP Land Use Application No.? ____________________________

IV. IMPACT ON PUBLIC FACILITY SYSTEMS

A. Additional Load or Demand

1. Sewage
   a. _____ mdp, average flow to nearest 0.1 mdp
   b. _____ mdp, peak flow to nearest 0.1 mdp

2. Water
   a. _____ mdp, average flow to nearest 0.1 mdp
   b. _____ mdp, peak flow to nearest 0.1 mdp

3. Traffic
   Average Daily Traffic (ADT)
   Peak Hour Volume

4. Other

B. Explain the basis for demand or load figures under A. above.

C. How will this project interface with the public system? Describe and include map. THE PROJECT WILL BE DEVELOPED AROUND A RECREATION Theme. PARKLIKE FACILITIES ARE PLANNED. LOCATE THEM IN A COMPREHENSIVE PROJECT SCHEME FOR BETTER UTILIZATION OF THE LAND AND FACILITIES.

D. Are public facilities adequate to handle additional load? Yes _____ No _____
   Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.
   ____________________________
   ____________________________
   ____________________________

E. Will this facility be dedicated to the City? Yes _____ No _____
   When is this dedication anticipated?

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.):
   ____________________________
   ____________________________

B. Indicate the size of the development this project supports.
   Land Area ______ acres
   Population (residential or resort) ______ hotel & condominium units
   Floor Area (commercial or industrial) ______ sq. ft.

C. Is this project oversized to accommodate future development? Yes _____ No _____
   Explain.
   ____________________________
   ____________________________
   ____________________________

D. Will future development require DP land use amendment? (Attach location map) Yes _____ No _____

E. Indicate the ultimate size of the development.
   Land Area ______
   Population (residential or resort) ______
   Floor Area (commercial or industrial) ______
DOF Form 101
(For Privately Funded Projects)
(Revised December 17, 1985)

DEVELOPMENT PLAN PUBLIC FACILITIES MAP
MAJOR AMENDMENT APPLICATION

Note: Only "major" projects need to be shown on the Development Plan Public Facilities Map. See
Appendix A of the instructions for the distinction between "major" and "minor" projects.

I. APPLICANT INFORMATION
A. Name Makai Development Corporation
B. Address Pacific Tower, 1001 Bishop Street Suite 979
C. Contact Person William Hsu or Robert Iwagaki
   Phone 531-3116 Date Submitted June 1986

II. PROJECT INFORMATION
A. Project Title [DELETE PARESIT, UNDETERMINED]
B. Project Description [DELETE AN UNDETERMINED PARESIT]
   WHICH IS DESIGNATED UPON THE PROPERTY OWNED BY THE
   APPLICANT.
C. Project Location Land situated off Farrington Highway at
   Makai, Waipahu, Oahu, Hawaii. Being portion of land court
   App. 815, 1010, 1015, and being portion of Grant 138 in Millau and Kana,
   and portion of Grant 139 to Waianae and Nual.
   Tax Map Key 1st Div. 6-8-02 and 03
   Neighborhood Board Area Name North Shore
   Number 27
   Census Tract(s) 99.01
   DP Area(s) North Shore
D. Type of Amendment Request (Mark "x")
   Add [ ] Delete [ ] Change [X]

E. Basis for Amendment
   To serve the proposed development by Makai Development
   Corporation

F. DP Public Facilities Reference No.
   (Assigned by DOF)

G. Maps Attached (mark "x")
   X Location Map
   X Site Plan
   X Service Area Map

H. Start of Land Acquisition (year)
   Start of Construction (year)

I. Estimated Project Costs (in thousands of dollars)

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<thead>
<tr>
<th>Within 4 Years</th>
<th>Beyond 4 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land Acquisition</td>
<td></td>
</tr>
<tr>
<td>2. Planning &amp; Engineering (P&amp;E)</td>
<td></td>
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<td>3. Construction</td>
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<td>4. Beautification</td>
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<td>5. Inspection</td>
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<tr>
<td>6. Furniture, Fixtures, Equipment</td>
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<td>7. Relocation</td>
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<td>8. Other</td>
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<tr>
<td>9. Total</td>
<td></td>
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</tbody>
</table>

III. DP MAP STATUS
A. Current Public Facilities Map Status
1. Is project on the current PF Map?
   Yes [X] No [ ] (If no, skip to #5.)
2. Current Project Description

PARKSITE, LOCATION

________________________________________________________

3. Site Location on PF Map
   a. Site Location Determined
      (See Map Key)
   b. Location Undetermined
      6-8-01-30
      (See Map Key)

4. Timing (mark "x")
   "Within 6 years"   __
   "Beyond 6 years"  XX
   Programmed by increments? Yes ___  No ___

5. Current DP Land Use Map Designations(s) Underlying the Project Site (mark "x")
   Preservation ___  Agriculture  XX
   Residential ___  Apartment ___
   Commercial ___  Resort ___
   Industrial ___  Military ___
   Park ___  Public Facility ___
   Quasi Public ___

B. Proposed Public Facilities Map Status (Skip if request is to "delete" a project.)
   1. Proposed Site Location
      Site Location Determined
      (See Map Key)
      Location Undetermined
      (See Map Key)

   2. Timing (mark "x")
      "Within 6 years"   __
      "Beyond 6 years"  ___

3. Has project or any portion of this project been previously considered for inclusion on the PF Map?
   No ___  Yes ___
   If yes, what were previous DP Public Facility Application No(s)?

4. Is there a concurrent land use amendment being processed to which this project relates?
   No ___  Yes ___
   If yes, what is concurrent DP Land Use Application No.? ___

IV. IMPACT ON PUBLIC FACILITY SYSTEMS

A. Additional Load or Demand
   1. Sewage
      a. ___  MGD, average flow to nearest 0.1 MGD
      b. ___  MGD, peak flow to nearest 0.1 MGD
   2. Water
      a. ___  MGD, average flow to nearest 0.1 MGD
      b. ___  MGD, peak flow to nearest 0.1 MGD
   3. Traffic
      Average Daily Traffic (ADT)
      Peak Hour Volume

4. Other ___

B. Explain the basis for demand or load figures under A, above.
   __________________________________________________________
   __________________________________________________________

C. How will this project interface with the public system described and include map. THE PROJECT WILL BE DEVELOPED AROUND A RECREATION SITE - PUBLIC FACILITIES ARE PLANNED LOCATING THEM IN A COMPREHENSIVE PROJECT SCENARIO FOR MAXIMUM UTILIZATION OF THE LAND AND FACILITIES.
D. Are public facilities adequate to handle additional load? Yes _______ No _______

Explain and attach letters from impacted agencies indicating commitment to handle the additional loads.

E. Will this facility be dedicated to the City?
   Yes _______ No _______

When is this dedication anticipated?

V. GROWTH IMPACTS

A. Indicate the basic type(s) of development this project supports (residential, resort, commercial, industrial, etc.).
   Resort, Commercial, Residential

B. Indicate the size of the development this project supports.
   Land Area _______ 1,019 acres
   Population (residential or resort) _______ 700 Single Family units
   1,300 Hotel & Condominium units
   Floor Area (commercial or industrial) _______ 109,000 sq ft.

C. Is this project oversized to accommodate future development? Yes _______ No _______

Explain.

D. Will future development require DP land use amendment? (Attach location map.)
   Yes _______ No _______

E. Indicate the ultimate size of the development.
   Land Area _______
   Population (residential or resort) _______
   Floor Area (commercial or industrial) _______
APPENDIX E

Proposed Tsunami Potential and Hurricane Potential Studies for Mokuleia Development Area, Oahu

Prepared for Mokuleia Development Corp.

Prepared by Charles L. Bretschneider & Associates, Ltd.

July 1986
PROPOSED TSUNAMI POTENTIAL AND HURRICANE POTENTIAL STUDIES FOR MOKULEIA DEVELOPMENT AREA, OAHU

To:
Mr. Tim Yee, Chairman
Mokuleia Development Corporation
1591 Bishop Street
Pacific Tower, Suite 978
Honolulu, Hawaii 96813

Report No. 86-1

July 1986

TSUNAMI POTENTIAL AND HURRICANE POTENTIAL STUDIES

SUMMARY AND CONCLUSIONS

This report represents a limited study of tsunami and hurricane flooding for the Mokuleia development area. The study at the present time has to be limited because the final grade elevations and roughness conditions are unknown.

However, this study should be very useful for planning or preliminary design for the Mokuleia development area. The latest scientific and ocean engineering principles (listed in the references at the end of this report) have been used in this report.

In summary, the findings for the tsunami elevation 200 feet inland from the coastline are given in Table II, and the worst case hurricane in Table III. The maximum tsunami elevation for 156 years recurrence interval, corresponding to the highest on record at Mokuleia, is 15.1 feet MSL (16 MLLW) and the maximum hurricane wave run-up is less than 8 feet MSL. Therefore, the tsunami is the governing factor in design. The tsunami elevation above ground elevation will flow inland over the terrain to a distance where the water surface elevation, energy grade elevation and the ground elevation intersect. A typical example of these three elevations is shown in Figure 1. An obstruction to the flow will change the water surface profile. If, for example, a vertical wall is placed in the path of the tsunami, the water elevation will rise to the energy grade line.

In view of the above it is recommended that a recurrence interval of no less than 156 years be used for the design tsunami. The design tsunami elevation study should be made after the proposed design elevation and roughness parameter have been established for the Mokuleia development area. The present study gives an indication of the tsunami elevation 200 feet inland from the coastline which may be altered depending on what changes are made in the topographic elevation and roughness parameter.
A. TSUNAMI POTENTIAL STUDY

1. Introduction.

A review of the subject area was made of the following:
(a) preliminary plans and copies of the flood insurance maps furnished me by Mr. Barry Okuda, (b) recent topographical survey map loaned to me by Mr. William Lee, (c) on-site visit by myself on the morning of May 16, 1966 at low tide, during which a number of color photographs were taken, (d) gathered pertinent historical data for the 1946, 1957, 1958 and 1960 tsunamis at Makahala, which are considered to be 200 feet inland from the coastline for the corresponding then existing topographic and roughness conditions.

In addition, frequency and recurrence intervals have been determined for the 1946, 1957, 1958 and 1960 tsunamis, and also for the 50-year, 100-year and 150-year recurrence intervals, corresponding to the chance of 95, 10 and 0.6778 that the tsunami with the given elevation (MSL) 200 feet inland will occur during any particular year.

Finally, it is proposed that the selected tsunami elevations as determined from the results (or other recurrence intervals) be used to determine the tsunami wave elevations and energy grade lines first from 200 feet inland from the coastline to the coastline and then inland over traverses spaced 200 feet apart inland over the beach over the dunes and inland to a distance where the intersection of the ground elevation, tsunami elevation and energy grade line elevation all coincide. This should be done after the proposed grading topographical features and roughness parameters have been established. An increase in topographical elevations and roughness factors will reduce the flooding consequences and a decrease in topographical and roughness parameters will increase the flooding consequences. A combination of the above two factors can have compensating results, depending on the corresponding changes in topographic and roughness parameters. The roughness parameters to be used in the calculations will be made by use of the extensive data by Bretschneider et al. (1948). Color photographs with corresponding friction factors are given by 35 typical Hawaiian terrain, as well as a summary of a literature search friction factors for a very wide range of friction factors.

2. Prediction equations for frequency of occurrence and recurrence intervals.

Calculated or predicted tsunami elevations have been determined by Houston et al. (1970), U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi and used in a manual for Determining Tsunami RUN-UP Profiles on Coastal Areas of Hawaii by U.S. Army Engineer Pacific Ocean Division (1974).

The prediction equation is as follows:

1) \[ H = - B - A \log F \]

where \( H \) = elevation of maximum tsunami wave crest above Mean Sea Level (MSL) 200 feet inland from the coastline, based upon the then existing topographical and roughness parameters, neither of which were actually known or determined and were not required in the development of Equation 1.

\( F \) = frequency per year of occurrence (F equal to or less than 0.05 or for less than a 5% chance in any one year).

A and B are coefficients determined for locations along the shoreline.

An alternate form of Equation 1 can be given as

2) \[ H = - B + A \log_{10} R \]
where \( R = \frac{1}{F} \) and is the recurrence interval in years.

\( F = .95 \) corresponds to \( R = 20 \) years, which means that it has on the average a recurrence interval of once in 20 years.

\( F = .91 \) corresponds to \( R = 100 \) years.

3. Historical Tsunami Data.

The 1946, 1952, 1957 and 1960 tsunamis were the four major tsunamis that occurred at Mokulele. Frequency of occurrence and recurrence intervals can be determined from the inverse of Equation 1 and 2 respectively as follows:

\[
\log_{10} F = -\frac{H + B}{A}
\]

and

\[
\log_{10} R = \frac{H + B}{A}
\]

The \( A \) and \( B \) coefficients for Mokulele are obtained from Station 6 of the Corps of Engineers report and are \( A = 8.3 \) and \( B = 2.3 \). Thus for Mokulele, Equation 3 and 4 become

\[
\log_{10} F = -\frac{H + 2.3}{8.3}
\]

\[
\log_{10} R = \frac{H + 2.3}{8.3}
\]

The historical tsunami elevations for 1946, 1952, 1957 and 1960 can be found in the detailed report by Bretschneider and Wybro (1973) based in part on the report by Adams (1967), and respectively are as follows: 16, 9, 12, and 11 feet (MLLW), 100 feet inland.

The following Table 1 summarizes the results of calculations.

### Table 1

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MLLW</th>
<th>F</th>
<th>%</th>
<th>R (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>16</td>
<td>.0064</td>
<td>0.64</td>
<td>156</td>
</tr>
<tr>
<td>1952</td>
<td>9</td>
<td>.0147</td>
<td>4.5</td>
<td>17</td>
</tr>
<tr>
<td>1957</td>
<td>12</td>
<td>.0195</td>
<td>2.0</td>
<td>51</td>
</tr>
<tr>
<td>1960</td>
<td>11</td>
<td>.0157</td>
<td>2.6</td>
<td>39</td>
</tr>
</tbody>
</table>

4. Prediction tsunamis for Mokulele development area.

The subject development area extends from Mokulele westward toward Kawalihapai. From the Army Engineers manual, Mokulele is Station No. 6 and Kawalihapai is Station No. 9. The report by Bretschneider and Wybro (1973) does not give historical tsunami data for Kawalihapai. The \( A \) and \( B \) coefficients for Station 5 are \( A = 5.9 \) and \( B = 1.0 \).

Interpolation stations can be made between Station 6 and 5 using the Army Engineers manual. Tsunami elevation predictions for Station 6, 5.5 and 5 are given in Table II.
TABLE II:
PREDICTED TSUNAMI ELEVATIONS
200 FEET INLAND FROM THE COAST FOR SUBJECT DEVELOPMENT AREA

<table>
<thead>
<tr>
<th>STATION</th>
<th>MOKULEIA</th>
<th>HALFWAY</th>
<th>KAWAIAHAII</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>3.5</td>
<td>5.0</td>
</tr>
<tr>
<td>A COEFFICIENT</td>
<td>2.3</td>
<td>1.6</td>
<td>1.0</td>
</tr>
<tr>
<td>D COEFFICIENT</td>
<td>2.2</td>
<td>2.6</td>
<td>5.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R (YEARS)</th>
<th>H(ft)</th>
<th>H(ft)</th>
<th>H(ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>11.0</td>
<td>10.2</td>
<td>9.8</td>
</tr>
<tr>
<td>100</td>
<td>14.6</td>
<td>16.6</td>
<td>10.0</td>
</tr>
<tr>
<td>150</td>
<td>15.9</td>
<td>11.0</td>
<td></td>
</tr>
</tbody>
</table>

| 155 (1946) | 14.0  | 13.0  | 11.0  |

In the above table for R = 155 years corresponds to the 1946 tsunami observed at 16 ft (MLLW) for Mokuleia and calculated for predicted 16 feet at Halfway and 12 feet at Kawaiahaii to the closest foot.

B. HURRICANE POTENTIAL STUDY

1. Introduction.

Since the occurrence of Hurricane Iwa (Nov. 22-25, 1982) the State of Hawaii became fully aware of the potential hurricane damage caused by wind, waves, wave run-up, flooding and inundation. Subsequently the U.S. Army Engineers, Federal Emergency Management Agency in cooperation with Civil Defense and other agencies awarded a contract to Charles W. Bretschneider, with sub-contract to Edward R. Noda and Assoc. The contract included the development of a suitable hurricane model for the verification of Hurricane Iwa data, above existed, and to develop suitable scenario hurricane models for four hurricanes, which were used to determine over water wind and pressure fields, deep water wave height and period fields. A report was prepared and approved, the title of which was: "Hurricane Vulnerability Study; Limits for Southern Oahu, from Barbers Point to Koko Head."

The four scenario hurricanes, except for the radius of maximum wind, were developed by Pacific Weather, Inc. (1984) for the entire State of Hawaii, including the Island of Oahu. The radius of maximum wind for each scenario hurricane was determined from an empirical equation developed from published data from U.S. East and Gulf Coast and Western Pacific Typhoons. The radius of maximum wind depends on the latitude £, the central pressure reduction from normal $AP_c$, the forward speed $V_A$ and a constant. Thus all pertinent information is available to develop the appropriate scenario hurricane models for the Mokuleia development area. Of the four scenario hurricanes, only two will have direct application to the study area, both of which originate from the east to southeast and follow a path north of the Island chain. The project site will not be affected by the worst condition or the right rear section of the hurricane, where the waves are directed away from the islands. However, the wind and waves from the left rear section of the hurricane will travel in opposite direction to the forward motion of the hurricane and will for a short period of time be directed perpendicular toward the project site.

Based on a preliminary investigation using the data in the above-mentioned report, it is estimated that the maximum winds and offshore deep-water waves directed toward the project site will be as given in Table III below.

<table>
<thead>
<tr>
<th>SCENARIO HURRICANE</th>
<th>$V_A$ (KT)</th>
<th>$H_{1/3}$ (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>55</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
<td>25</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>9-10</td>
<td>9-10</td>
<td>11-12</td>
</tr>
</tbody>
</table>

The above conditions will also increase the tide plus storm surge, wave run-up flooding and inundation limits.

-5-
Preliminary estimates for storm surge and wave run-up due to the scenario hurricanes can be made by maximizing the conditions and making calculations by use of simple equations. First, it will be assumed that the maximum waves for the worst case hurricane (see Table III) will approach perpendicular to the coastline, minimizing refraction. Thus wave refraction will be neglected. Second, the maximum conditions will occur during higher, high tide, which will be taken approximately as 1.9 feet above MLLW for 1.0 foot above MSL.

The equation for storm surge elevation is given by

\[ \Delta \eta = \Delta h + \Delta h_0 + \Delta Y + \Delta P = \Delta \eta + \Delta h_0 + \Delta Y + \Delta P \]

where
- \( \Delta \eta \) = 1.0 feet tide elevation above MSL
- \( \Delta h \) = storm tide due to direct wind stress over the shall water and assuming the wind stress is perpendicular to the coastline.
- \( \Delta Y \) = storm tide due to wind stress parallel to the coast, and in this case \( \Delta Y \) will be zero.

\[ \Delta P = \frac{0.0218 \cdot V_{w}^2 \cdot \Delta X}{D + 0.5 \cdot \Delta P} \]

where
- \( V_{w} \) = wind speed in knots
- \( \Delta X \) = distance over shallow water in nautical miles
- \( D \) = average depth over shallow reach (mostly reef).

1.14 \( \Delta P \) = The inverted barometer storm tide component and is given by the following equation:

\[ \Delta P = \Delta P_0 \cdot \frac{SR}{R} \]

where
- \( \Delta P_0 \) = \( P_0 - P_0 \)
- \( P_0 \) = 29.92 inches of mercury
- \( P_0 \) = Central pressure at hurricane in inches of mercury

1.14 \( \Delta P \) = feet of water, and is known as the inverted barometer effect (or pressure tide).

\\
8) \( S_w = \frac{137}{9 \cdot \frac{H_b}{T_b}} \)

where
- \( S_w \) = wave set-up due to breaking waves
- \( H_b \) = breaking wave height in feet
- \( T_b \) = wave period in seconds.

\( S_w \) has a variation of \( \pm 2.75 \) feet every couple of minutes and should be added to the wave run-up accordingly.

The assumption are as follows:

From Tables III for worst conditions \( V_{w} \) = 65 knots, \( H_{1/3} \) = 30 feet \( T_b \) = 12 seconds, it will be assumed that refraction and shoaling will be negligible, hence \( H_b = H_{1/3} \) = 30 feet. The depth of breaking will be given by:

\[ \Delta h = 1.28 \cdot H_b = 38.4 \text{ feet} \]

It will be assumed that \( \Delta = 2 \) feet above the average reef elevation during MLLW tide.

From the above conditions for equation 4, it is found that

- \( \Delta h = 1 \) foot
- \( \Delta h = 0.67 \) feet
- \( \Delta Y = 0 \)
- 1.14 \( \Delta P_0 = 0.74 \) feet
- \( S_w = 2.75 \) feet

The simple wave, run-up formula is given by:

\[ \Delta \eta = \frac{\sqrt{1.5 \cdot H_b}}{5} \]

where
- \( \Delta \eta \) = wave run-up above
- \( H_b \) = 1.0 + 1.14 = 1.8 + 0.67 + 0.74 = 2.21 feet
\[ \theta = 5.12 \times 2^3 = 5.12 \times 8 = 40.96 \text{ ft} \]

Thus run-up \( R_u \) is obtained as follows:

\[ R_u = \frac{1}{2} \times 737.8 \times \theta = 2.31 \text{ feet above MSL} \]

\[ \text{whence } \quad R_u = 2.31 + 2.31 = 4.62 \]

Thus:

\[ \text{Max } R_u = 7.5 \text{ feet above MSL} \]

\[ \text{Min } R_u = 1.8 \text{ feet above MSL} \]

Therefore, the run-up will be variable from 1.8 to 7.3 feet every few minutes.

**CONCLUSION**

1. The hurricane maximum wave run-up calculations done herein are crude and only approximate. More accurate hurricane storm surge and wave run-up calculations cannot be made using more sophisticated methods without also having more accurate offshore bottom topography surveys.

2. However, it can be concluded fairly accurately, that the design tsunami wave run-up elevations will exceed the worst case hurricane wave run-up elevation.

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**CITED REFERENCES ON TSUNAMIS AND HURRICANES**


APPENDIX F

A Nearshore Marine Environmental Survey of Mokuleia, Oahu, Hawaii

Prepared for Mokuleia Development Corporation

Prepared by Oceanit Laboratories, Inc.

June 1986
EXECUTIVE SUMMARY

The proposed Mokuleia development is located in the Wai'anae District on the North Shore of Oahu and includes approximately 1.5 miles of coastline.

Water quality conditions along the coastline indicate compliance with the Department of Health marine water quality standards, with the exception of turbidity. However, there is not enough statistical evidence to be concerned with this finding. The high turbidity values are attributed to rough sea and high wind conditions that existed during our sampling. Additional data, taken over time and space, should statistically balance turbidity results so that ambient coastline conditions comply with accepted water quality standards.

The marine life habitats found along the adjacent coastline indicated greater diversity and density in areas that were protected from high wave conditions and had good circulation.

Although current measurements were very peripheral, our survey indicates that the nearshore marine environment is well flushed with wind and wave generated currents. Based on data collected...
at six water quality stations along the coastline and general observations, there are various locations along the coastline where fresh water discharges. If we exclude Kal'ahulu Bay, a special case discussed below, the proposed development is not expected to change the discharge of fresh water at the coastline. Therefore, it is not expected to significantly impact the nearshore marine water quality.

Kal'ahulu Bay has accommodated major stream discharge for the Hokuulea coastline for many years. This is apparent from the deep channel that runs through the middle of the bay, directly in front of the Makalena Stream discharge outlet. In addition, the benthic habitat characteristics of the submarine channel indicate that it is subject to periodic stream discharge and high current conditions.

Makalena and Kapala'a Stream have discharge outlets that empty into Kal'ahulu Bay. However, under the current drainage configuration, only Kapala'a is able to discharge the runoff from the adjacent watershed area. An improvement in the Makalena Stream discharge outlet is planned as part of the proposed development.

Currently, Kapala'a Stream is discharging all of the runoff from its adjacent 4000 acre watershed. Although measurements of current were sparse, the channel in front of Makalena Stream is believed to be the major canal to the open ocean for all waters within Kal'ahulu Bay. Therefore, moving the discharge outlet approximately 330 meters east from Kapala'a to Makalena Stream is expected to have no significant impact on the nearshore marine water quality or environment. In fact it is believed that moving the discharge outlet to the Makalena Stream location will improve the water quality and benthic habitat directly in front of Kapala'a Stream outlet. This is because there is no channel that directly connects Kapala'a Stream discharge to the open ocean.

Based on our measurements and observations, the proposed Hokuulea Resort development is not expected to significantly impact the nearshore marine environment. Conditions along the coastline and within Kal'ahulu Bay are not expected to significantly change.
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1. INTRODUCTION

A. BACKGROUND

The Wokuleia development, proposed by the Wokuleia Development Corporation, is located in the Wai'alea District on the North Shore of Oahu and includes approximately 1.5 miles of coastline, as indicated in Figure 1-1. The Wokuleia coastline faces north with its outer reef exposed to large waves in the winter. Various streams, including the Wailua, Kapaa'au, and Polipoli Streams empty into the coastline.

In May of 1986, Oceansit Laboratories, Inc. (hereinafter "OLI") was contacted by the Wokuleia Development Corporation, a division of Northwestern Mutual Insurance Company, to investigate the nearshore marine environment along the coastline and to determine the impact from rerouting the discharge of Kapaa'au Stream to the Makaleha Stream discharge outlet. An area of special consideration during the study was Kali'ahulu Bay (approximately 0.10 km²), located near to the polo field at Wokuleia where the stream rerouting is to be considered.

The specific objectives of the study include the following:

1) Assess nearshore marine environmental conditions along the coast, adjacent to the development.

2) Assess the potential nearshore marine environmental impact from the development and from rerouting the discharge of Kapaa'au Stream to the Makaleha Stream outlet inside Kali'ahulu Bay.

OLI performed field work at the Wokuleia site over approximately two weeks. During this time the coastline was exposed to calm wind and sea conditions as well as moderate wave and high wind conditions. Data was collected to characterize the coastline with respect to physical conditions and marine habitat types.

B. ACKNOWLEDGEMENTS

Oceansit Laboratories, Inc. would like to acknowledge the contributions made to the study from the following: Dr. Patrick A. Sullivan, Dr. Hans-Jürgen Krook, Mr. Dayanaa Vithany, Mr. Manfred Zahle, Mr. David Takeyama, Mr. Greg Lelouch, Mr. Randy Campbell and Ms. Judy Miyashiro.
II. METHODOLOGY

Various data were collected from May 28 to June 10, 1985 to characterize the coastline along the proposed Makaha Development. Physical measurements were performed in the field; chemical analysis of the samples was performed at a local, State of Hawaii certified, water quality laboratory using standard methods [1]. Water quality data were statistically analyzed using methods adopted by the State of Hawaii, Department of Health, as described in "An Ecosystem Approach to Water Quality Standards" and "Public Health Regulations, Chapter 54 of Title II, Water Quality Standards" [2,3].

A. WATER QUALITY

Water quality measurements were performed at various locations along the coastline, as indicated in figure II-1. Six stations were used for physical and chemical sampling on May 29, 1986. These measurements included: temperature, salinity, conductivity, turbidity, nutrients, non-filtrable residues, fecal coliforms, dissolved oxygen, pH, and redox potential. A listing of water quality data is provided in appendix A.

II-1
Salinity, temperature and conductivity

Salinity, temperature and conductivity measurements were made using a Beckman S33-5 portable salinometer. Conductivity was calibrated using a standardized circuit of known resistance. Calibration was checked after every other sample.

Dissolved oxygen, pH and Redox potential

Dissolved oxygen was measured in-situ on May 20, 1985 on samples obtained from stations 3 and 4. Due to rough sea conditions, measurements from stations 1, 2, 5 and 6 were made from water samples that were carefully removed from the ocean in a large bucket and brought to shore to be immediately measured. Measurements were performed with a YSI dissolved oxygen meter, model 57. Calibration was frequently checked using fresh water. Several measurements were performed and averaged to get the final dissolved oxygen values.

Measurements of pH were performed on May 20, 1985 using an Orion Model 401 pH meter. Calibration was performed using a buffer solution of pH equal to 8.2. The pH electrode used for measurements was an Orion 01-06 pH electrode.

Redox potential measurements were performed on May 20, 1985, using a high impedance digital voltmeter and an Orion Redox Model electrode.

Turbidity

Turbidity measurements were performed on May 20 with a Turner Model 40 nephelometer. Calibration was performed using a Turner standard calibration cell of 6 nephelometric turbidity units (NTU). Calibration was checked after every two samples.

Nutrients

Nutrient measurements included total nitrogen, nitrite plus nitrate, total phosphorus, and orthophosphate. These measurements were performed using a Technicon Autoanalyzer II. Samples collected from the five water quality stations were immediately placed in a dark cooler in the field for a few hours before being brought in for analysis.

Chlorophyll a and Fecal Coliforms

Chlorophyll a was measured from samples collected May 20, 1985 at the six water quality stations. Measurements were made using a spectrophotometer following methods outlined by Strickland and Parsons [1].
Fecal coliforms were determined from samples collected on May 29, 1986 from the six water quality stations. The method of measurement followed standard methods for waste water analysis [5]. Two separate testings were made per 100 ml sample. Results were then averaged to determine the number of coliforms per 100 ml.

**Non-filtrable residue**

Non-filtrable residue measurements were performed on samples collected from the six stations on May 29, 1986. The measurements followed procedures by Strickland and Parsons [4] using a 0.4 um filter.

**B. Currents**

Water current measurements were performed on May 29 and June 10, 1986 using current drogues. A stopwatch was used to time the movements of drogues, as followed from the shore and a small boat.
C. MARINE HABITAT IDENTIFICATION AND SURVEY

A description of the marine life habitats along the Molokai coastline was obtained by taking three transects in Kal'ahului Bay and various 100 meter observational swims along the coastline of the proposed development, as identified in Figure 11-1. Identification of the habitat zones in Kal'ahului Bay was obtained from a bathing overview that also resulted in the selection of transects sites.

Divers equipped with snorkel and scuba gear worked in teams of three. A modification of the visual census method was employed [6]. Together, divers unraveled the transect line while following a north heading. After the line was set, the divers waited approximately ten minutes for frightened fish to return to the area. While swimming down the line, divers noted species, estimated the number of individuals, and classified them as large, medium, or small. The reference frame was an area two meters wide adjacent to the transect line.

It must be noted that information collected by the visual census method yields only rough estimates. Discrepancies between actual and recorded length of individual fish, total biomass, and population sizes can be attributed to (1) several families of nocturnal fishes which retreat into the cracks during the day; (2) the behavior and relative abundance of certain cryptic species that appear primarily during dawn and dusk periods could be overlooked by a visual census at other times; (3) observers "snooping" fishes out of the area under study; and (4) observers over or underestimating the size of individual fish.

The substrate and algal surveys were done in conjunction with the fish survey at each transect site to allow for the correlation of the three. These surveys were conducted immediately following the fish transect along the same transect line.

The grid method of survey [7] was conducted using scuba on all transects. At ten meter intervals a 0.25 square meter quadrat was positioned on the left hand side of the transect line. For the 75 meter transects, a random number between 1 and 10 was generated for each 10 meters. For the 25 meter transect, data collection was taken every 5 meters from a random number between 1 and 5.

The dominant algae and corals occupying each of the 16 squares of the quadrat were identified and the percentage of cover was estimated and recorded on data sheets.

Depth measurements and dominant substrate surveys were taken at each meter mark. Substrate types were divided into four major groups: sand, limestone, basalt rock and coral rubble. Coral rubble was further divided into the type of coral rubble (i.e., 11-7.
Porites compressa rubble) or coraline algae rubble (i.e., Porolithon gardineri) [7].

Site one, at the mouth of Nahalea Stream, was chosen because of its proximity to the stream discharge outlet and began approximately 30 meters from shore and ran in a northerly direction for 75 meters along the edge of the sand channel.

Site two, at the mouth of the Kapa'a Stream, was chosen for its proximity to the stream discharge outlet and began approximately 30 meters from shore and ran in a northeasterly direction for 75 meters. Site 2-a is representative of the mixing zone of the two streams and is located approximately 205 meters from shore running north for 25 meters.

Swimming observations were performed at stations 1 and 2 (Kai'alului Bay), station 3 at Polipoli Stream, station 4 at Camp Mokule'ia, station 5 at Pu'u O Hekili and station 6 at Mokule'ia Army Beach, as indicated in figure 11-1. A 100 meter observational snorkel was performed at stations 3-6. Notes were taken on substrate, corals, fish, algae and substrate characteristics that differed from station to station.

III. RESULTS

A. WATER QUALITY

Marine water quality at the proposed Mokuleia Development is class "A", identified as "seasonally wet" coastal waters by the State of Hawaii, Department of Health [2]. Water samples were collected to determine various physical and chemical characteristics of the nearshore marine environment. Tables III-1 to III-3 provide a view of how the Mokuleia nearshore waters compare to the State of Hawaii water quality standards [3]. Water quality data are tabulated in appendix A.

The State of Hawaii water quality standards were designed so that passing or failing water quality tests does not depend on a single number determined from a single day of sampling. Moreover, it was designed so that the natural variations in water quality could be statistically balanced to indicate the water quality condition based on several samples collected during a variety of environmental conditions [5,6].
Temperature, salinity and conductivity data indicate that fresh water is discharged into the coastline from the adjacent streams. This effect is primarily noticed in front of station 1, directly in front of the Nakalena Stream discharge outlet. Although the mouth of the outlet is covered with sand, underground water apparently intrudes. Data from the other stations also indicates the presence of fresh water. This is to be expected because measurements were taken during an intermittent rain, one of the streams along the coastline was discharging.

Dissolved oxygen data ranged from 6.7 to 9.3 parts per million (ppm), indicating saturated to supersaturated conditions. The highest value measured, in front of station 5, was very high, probably because of the wave action in the area -- forcing more oxygen into the water. In addition, a high dissolved oxygen level is expected when large amounts of fresh water, identified from the salinity measurements, are present. Redox and pH measurements indicate values that are expected for seawater.

All fecal coliform measurements were found to average less than one colony per 100 ml except for station 2, in front of Kapa'a Stream discharge outlet. Here we measured three coliforms. The stream was not discharging; therefore, the coliforms probably came from nearby human recreational activity.

Turbidity measurements ranged from 0.65 to 1.49 nephelometric turbidity units (NTU). The relatively high values were probably a result of rough seas and high wind conditions. Stations 1 and 2, located in Kai'ahulu Bay had the largest turbidities. This probably resulted from the nitty material that was previously discharged into the bay by Nakalena and Kapa'a Streams -- it became resuspended during the rough weather conditions. In addition, currents converge at the center of the bay and bring in fine particulate material. Moreover, the overall water clarity exceeds the geometric mean for a seasonally wet coastline, but does not exceed the 80 percentile criteria. It is anticipated that if additional data were taken under different environmental conditions, i.e., over time and space, the statistics would show lower values of turbidity.

Non-filterable residue (NFR) measurements indicate that there are particulate materials in the water column at Kai'ahulu Bay. Data from station 2, in front of Kapa'a Stream, are nearly two times those measured at the other stations. However, all of the values are low with respect to the geometric mean value for a wet or dry coastline.
Total Kjeldahl nitrogen and total nitrogen were measured and found to be within values expected. The values measured at station 5 were slightly higher than the other stations. This is probably because of the fresh water, also identified from the salinity measurements.

Total phosphorus and orthophosphate were measured and found to be within expected values. However, total phosphorus values appear to be low for a seashore coastal area. This could be explained in a variety of ways (e.g., the formation of phosphate compounds); however, without additional data an explanation would be too speculative.

### TABLE III-1

<table>
<thead>
<tr>
<th></th>
<th>Temp. deg-C</th>
<th>Diss O² ppm</th>
<th>Turb. NTU</th>
<th>Non-f-res. Sal mg/l</th>
<th>Sel n/cm</th>
<th>Cond n/cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside Lab. Inc</td>
<td>24.2</td>
<td>1.7</td>
<td>1.00</td>
<td>2.83</td>
<td>33.9</td>
<td>50.8</td>
</tr>
<tr>
<td>S* wet</td>
<td>---</td>
<td>---</td>
<td>0.50</td>
<td>20.00</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>S* dry</td>
<td>---</td>
<td>---</td>
<td>0.20</td>
<td>10.00</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

* State of Hawaii Water Quality Standards [3]

### TABLE III-2

<table>
<thead>
<tr>
<th></th>
<th>Chlor. µg/L</th>
<th>Fec. Col. No./100ml</th>
<th>pH</th>
<th>Redox mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside Lab. Inc</td>
<td>0.41</td>
<td>0.6</td>
<td>8.4</td>
<td>187.8</td>
</tr>
<tr>
<td>S* wet</td>
<td>0.30</td>
<td>---</td>
<td>7.6-8.6</td>
<td>---</td>
</tr>
<tr>
<td>S* dry</td>
<td>0.15</td>
<td>---</td>
<td>7.6-8.6</td>
<td>---</td>
</tr>
</tbody>
</table>

* State of Hawaii Water Quality Standards [3]

### TABLE III-3

<table>
<thead>
<tr>
<th></th>
<th>TEN µg/L</th>
<th>NO₃/NO₂ µg/l</th>
<th>MED/L</th>
<th>TN µg/L</th>
<th>ORP µg/l</th>
<th>TP µg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside Lab. Inc</td>
<td>136</td>
<td>1.3</td>
<td>2.3</td>
<td>141</td>
<td>6.8</td>
<td>7.1</td>
</tr>
<tr>
<td>S* wet</td>
<td>150</td>
<td>3.5</td>
<td>5.0</td>
<td>---</td>
<td>7.0</td>
<td>20.0</td>
</tr>
<tr>
<td>S* dry</td>
<td>110</td>
<td>2.0</td>
<td>3.5</td>
<td>---</td>
<td>5.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>

* State of Hawaii Water Quality Standards [3]
D. CURRENTS

Current patterns along the Hokuilo coastline are a result of tide, wind and wave influences. Drogue data, taken in the nearshore areas, indicated a significant influence from wind driven currents. Offshore currents are mainly tidal driven and are predominantly in the westerly direction most of the year.

The waves coming from offshore are refracted and broken at the outer reef flat. When convergence occurs rip currents are formed that run perpendicular to the shoreline, usually extending beyond the breaker zone.

Local currents are dependent on the nearshore bathymetry which is dominated by pockets of sand, coral and sandstone reefs. Beaches run in a west-east direction and feature small undulations, depending on the adjacent depth contours. Beach areas closest to deep nearshore waters show signs of erosion, indicated by concave beach shapes. Beach areas adjacent to protected shallow reefs show signs of accretion, indicated by their convex shapes. The east part of the beach is sandy and has medium grain size sand. The western beaches are fringed on the sea side with partly exposed reef and sand.

The main features in the nearshore area are two deep trenches. The first one is located at the Manuolu Stream outlet and runs at a northwesterly direction reaching depths of 15 meters. The other trench is located west of the Aukulea Beach Park and runs almost perpendicular to the coastline. The area between the two trenches is a shallow reef flat with a maximum depth of 3.6 meters. The flat is about 360 meters wide in widest area and narrows down to about 243 meters at the central part.

In the area between the beach and the breakers, local currents are modified due to the mass transport of breaking waves, the longshore component of the momentum from the waves and the variation of the longshore bathymetry.

Data from current measurements are illustrated in figure III-1. Wave induced currents of approximately 52 centimeters per second towards the east at the east end were measured during the field survey on May 30, 1986. Currents were measured to be approximately thirty centimeters per second offshore near the trench at the east end.
Currents measured in the trench on June 10 varied from 3.6 centimeters per second to 1.5 centimeters per second. Longshore currents were measured in Kal'ahulu Bay and were found to vary from 0.6 to 15 centimeters per second.

The flat reef area dissipates wave energy and acts as the main mixing zone for run off from the stream. The diluted runoff is carried by the dominant currents at the time.

Available data indicates that circulation in Kal'ahulu Bay can be divided into two cells: (1) water entering the littoral area due to waves breaking over the reef flat; and, (2) the longshore flow. Although current data is scarce, it is believed that in both cases water returns offshore through the trench. However, the erratic flow caused by scattered patches of coral is superimposed on the average circulation. Therefore, runoff entering the coastal area is mixed in the breaker zone as well as on the reef flat before it is transported to the circulation currents and discharged to offshore waters with the return current.

Mokulea beaches are exposed to waves arriving from the east through the north to northeast. Under ordinary conditions waves coming from the northeast dominate; however, large swells reach this area from north and northeast approximately 2.0% of the time (based on data from Haleiwa) [10]. These 10 to 25 foot height waves have periods of up to 18 seconds. Waves come from the northeast approximately 25% of the time and are generally less than 2.1 meters high with periods of about 12 seconds. The wave climate is usually mild from April through August, and harsh during the winter season due to northern swells (based on data from Haleiwa) [10].
C. MARINE HABITAT IDENTIFICATION AND SURVEY

Water quality stations 1 and 2 were located in Ka'ahulu Bay in front of Makalena and Kapalau Streams, respectively. In order to give special attention to environmental concerns that result from the rerouting of discharge from Kapalau to Makalena Streams, special consideration was given to Ka'ahulu Bay. Here we identified three habitat types, as illustrated in figure 11-2. Survey findings are included in appendix B. Stations 3 to 6, identified in figure 11-1, were then surveyed separately. The three habitat types identified in Ka'ahulu Bay, located around stations 1 and 2, are described below.

HABITAT 1 - Silt-sand bottom (channel)

Substrate in this habitat consisted of a large sand bottom (95%), approximately 150 m wide, that divided Habitat 2. The area was found to be generally flat through the mid-sections with slight rolling valleys next to the adjoining limestone of Habitat 2. Depth gradually increased from the shoreline to 12-14 meters at about 200 meters offshore in a northwest direction. Except for sand ripples caused from high energy waves, the bottom of the channel (12-14 meters) was found to be flat.
Only one species of fish (a single Purpuragor spilosoma) was sighted in this area, indicated in Appendix B. At 75 meters to about 45 meters shoreward, small sporadic clumps of encrusting coral (i.e., P. lobata), approximately 2.5-7.6 centimeters, were found. Along the perimeter of Habitats 1 and 2 and within 15 meters of the shore, T. ornata was found to be sparsely scattered.

HABITAT 2 - Limestone reef flats

Survey results indicated that Habitat 2 is covered with approximately 51% sand and 31% limestone. Porites compressa rubble and lesser amounts of coralline algae were found. The depth in this area ranged from 1.5 to 7.6 meters.

Our visual census indicated twelve species of fish. The most numerous were T. duperrey and Stegastes fasciatus. Most of the fish observed were juveniles. Hard corals were found to cover about 4.0 percent of quadrat transect lines 1 and 2. The most abundant corals were P. lobata, Pavona varians and P. compressa, respectively. Montipora flabellata and Leptastrea buttis were also present in smaller amounts. (Scattered heads of P. meandrina were found in the area, but were not represented on the transect line.) The majority of the corals observed (including the P. lobata) were encrusting; this may be an adaptation to the heavy wave action during the winter. Algae cover was 7.6 percent, as determined by grid transects of Habitats 1 and 2. A total of 13 algal species were seen. An abundance of Pedia sp. and T. ornata was observed from the shore to 10 meters offshore but neither species were observed in the grid transect that started 30 meters offshore. Very little green algae was found (only Dictyosphaeria versicolor). Of the large invertebrates, only one Echinoidea mactae, 2 mollusks (Drupa sp.) and 2 brittle stars Ophiocoma sp. were found. Holothurias atra and Actinopyga mauritiana were also found in this area.

HABITAT 3 - Wave Surge Habitat (Transact 2A)

Limestone substrate covered approximately 88 percent of the transect in Habitat 3. Basalt type stone covered approximately 8 percent and was found in deep crevasses/potholes in the limestone. A small percentage of sand was found in groove/trough indentations in the substrate. Depths ranged from 1 to 1.5 meters. This habitat is exposed to strong surge and wave energy that creates a poor environment for delicate corals, fleshy algae, or permanent residence fish.

The only fish sighted was a T. balteatus. Therefore no assertion of dominant species can be made. Only 6.8 percent of the total transect was live coral. The predominant species of corals were
P. lobata (5.8%), P. compressa (0.8%), and P. evermanni (0.2%).
P. lobata and P. evermanni were present in small patches of
encrusting coral approximately 5-10 centimeters. P. compressa
were present in compact two-finger 5 centimeter tall tufts. The
dominant algae were T. ornatiss (6.2%) and Dictyopteris sp. (1%).
Zoanthidae sp. (1.6%) was found on a dead head of P. meandrina.
The Zoanthidae sp. appeared in several 5-8 centimeter radial
tufts.

Outside of the surge zone in Kailahulu Bay (about 450 meters
offshore, due north of the Hualalai Stream outlet), visibility
was better. Small arches of limestone 1.2-3.0 meters high were
observed along the sides of the channel.

Station 3 was located in front of the Pali-Pali Stream area which
is protected from wave action by the limestone flats found
approximately 20 meters directly offshore. Inshore visibility
was poor, i.e., 1.5-3.5 meters. Silt and corruer materials
covered the substrate. Round basalt (river rock) was found
directly in front of the mouth of the stream. Further out we
found sand and limestone. Overcast, rainy and windy conditions
contributed to poor visibility. Consequently, fish observability
was impeded; few species of fish were sighted. Additional
information on corals, algae, fish and invertebrates can be found
in Appendix B.

Station 4 was located in front of Camp Mokuleia. Again, due to
overcast and rainy conditions visibility was poor. Our sampling
site was located approximately 30 meters west from the stream
mouth. We found a greater abundance of fish and algae and less
sedimentation with respect to station 3. Generally, the
shoreline was found to be unprotected from wave action. A large
population of P. meandrina was observed within 3 meters from the
shore. Additional information can be found in Appendix B.

Station 5 was located in front of Pu‘u O Hekili Park. Here we
found a large diversity of habitat types; however, limestone was
dominant. Visibility was poor (2 to 3 meters) and became clearer
(3 to 8 meters) about 100 meters offshore. On shore we found
beach rock and sand, and an abundance of P. meandrina sp. growing
in the nearshore grooves. Additional information can be found in
Appendix B.

Station 6 was located in front of the Mokuleia Army Beach. This
area was found to dominantly consist of limestone flats covered
with sand. The shoreline was not protected from wave action. In
depths of 0.5 to 1 meter, coraline algae and coral rubble were
found. The surf break was observed to be approximately 100
meters offshore. Additional information can be found in Appendix
B.
IV. DRAINAGE MODIFICATIONS AT KAI'AHULU BAY

A. EXISTING DRAINAGE SYSTEM

Currently, the drainage system at the proposed Mokuleia resort development serves to discharge the runoff from five basins, indicated in figure IV-1. Drainage basin areas are tabulated in table IV-1.

<table>
<thead>
<tr>
<th>Basin</th>
<th>Area (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3770</td>
</tr>
<tr>
<td>2</td>
<td>250</td>
</tr>
<tr>
<td>3</td>
<td>1600</td>
</tr>
<tr>
<td>4</td>
<td>750</td>
</tr>
<tr>
<td>5</td>
<td>370</td>
</tr>
</tbody>
</table>

During our field studies, a local resident who lives close to Kai'ahulu Bay reported that in the mid 1970's Dillingham Ranch made changes in the drainage to Makalea Stream. Under existing conditions, runoff from basins 1 and 2 discharge via Kapaa'a Stream. The peak discharge is approximately 9000 cfs from basin 1 and about 500 for basin 2 during high intensity storms [11]. Areas for basins 1 and 2 are 3770 and 220 acres, respectively. Kapaa'a Stream, the present point of discharge, is approximately 330 meters west of Makalea Stream, the original
discharge outlet. Currently, all of the storm water from drainage basins 1 and 2 is discharged at the Kapalama Stream.

B. PROPOSED DRAINAGE MODIFICATIONS

The modification to Wakea Stream at the proposed Mokuleia development will move the discharge location from Kapalama Stream east 330 meters to its original discharge location at Wakea Stream. The runoff from basin 2 will be diverted to a retention basin that will be constructed to receive runoff from both drainage basins 1 and 2. The retention basin will retain the lower intensity storm runoff and will function as a settling area for trapping debris and silt from higher intensity storm runoff. The retention basin will be connected to the sea by a major drainage channel that is an improvement of the Wakea Stream discharge outlet.

TABLE IV-2
STORM DISCHARGE FOR BASINS 1 AND 2

<table>
<thead>
<tr>
<th>Recurrence Interval</th>
<th>Runoff Quality (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1500</td>
</tr>
<tr>
<td>2</td>
<td>2500</td>
</tr>
<tr>
<td>5</td>
<td>3170</td>
</tr>
<tr>
<td>10</td>
<td>3770</td>
</tr>
<tr>
<td>25</td>
<td>4070</td>
</tr>
<tr>
<td>50</td>
<td>4520</td>
</tr>
<tr>
<td>peak discharge</td>
<td>8500</td>
</tr>
</tbody>
</table>

**Fig. IV-1. Drainage map for study site.**

iv-2
C. DISCHARGE LOADING IN KAI'AHULU BAY

Nutrients and suspended solids currently discharged at Kapala'au Stream outlet will be moved to the previous location, 330 meters east, at the Makalea Stream discharge outlet. This will also transfer the nutrients, suspended solids, fresh water and temperature shock that accompanies a major discharge. However, the new location will still mix and disperse the discharged effluent in Kai'ahulu Bay.

Nutrient and suspended solid loading in the bay is not expected to change as a result of stream rerouting. However, for completeness we will calculate loading under the 10, 50 and peak storm discharge flow rates.

Nutrient loading is dependent on the characteristics of the adjacent watershed areas. For example, range land is expected to have different characteristics than rural areas [17]. In addition, stream flow concentrations of nutrients and suspended solids change during discharge. It is reported that total phosphorus changes from 0.2 - 0.4 mg/l during low flows but increases to a maximum of 2.4 - 4.0 mg/l during high storm runoff. Concentrations of nitrogen, measured as nitrate, are reported to range from 0.2 - 4.2 mg/l at low flow levels and increase to maximums of 40 mg/l - 45 mg/l during high storm runoff conditions [17].

The characteristics of runoff are site specific and depend on environmental and agricultural conditions. In seawater, the dominant form of nitrogen is found as Kjeldahl nitrogen; however, in general the following trends are reported for terrestrial runoff [12]:

1) Areas undisturbed by civilization have a lower concentration than highly utilized areas, e.g., farmed areas.
2) Fertile cropland areas can contribute greater amounts of nitrogen than other areas.
3) Concentrations of total phosphorus are generally at least an order of magnitude lower than concentrations of nitrogen.
4) Nitrogen in the form of nitrate is the major contributor in rural runoff, except under runoff when sediment is lost.

If we had specific hydrographic and nutrient/suspended solid data, we could use pertinent unit hydrographs and nutrient/suspended solid concentration flow rate curves to calculate loading that occurs in Kai'ahulu Bay during storm conditions. However, since we do not have the detailed data required for these calculations, we will use data from Bugan [13] for average storm runoff for the West Beach Project on Keawaula, Oahu. Bugan's calculations were made for 640 acres of land. Average values for nitrogen, phosphorus and suspended solids are given in Table IV-3. Furthermore, since we do not have information regarding storm duration, total volume of discharge and the effective time of loading of the discharge stream, we
will use factors from the Kailua resort development on the North Shore, Oahu [14]. Discharge loading must follow equation IV-1.

TABLE IV-3

<table>
<thead>
<tr>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mg/l)</td>
<td>(mg/l)</td>
<td>(kg/event)</td>
</tr>
<tr>
<td>Underdeveloped Land</td>
<td>1.10</td>
<td>0.11</td>
</tr>
<tr>
<td>Developed Land</td>
<td>0.60</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Qm * f1 * D * L * E = Total load (g/event)

Eqn IV-1

Qm = discharge during the particular storm (cfs)

f1 = discharge coefficient

D = duration of storm (seconds)

L = loading (mg/l), given in table IV-3

E = 28 liters per cubic foot

If we follow the assumptions made for the Kailua resort development [14], we find that f1*f2*D = 10.89. We can then use equation IV-1 to calculate the loading for 10, 50 and peak discharge storms in Kailua Bay. This is presented in table IV-6.

IV-4. These numbers were used for approximate calculations only — actual values are site specific.

TABLE IV-4

<table>
<thead>
<tr>
<th>Storm</th>
<th>Qm (cfs)</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(kg/event)</td>
<td>(kg/event)</td>
<td>(kg/event)</td>
</tr>
<tr>
<td>10 yr</td>
<td>3770</td>
<td>1.26</td>
<td>126</td>
<td>1709</td>
</tr>
<tr>
<td>50 yr</td>
<td>4520</td>
<td>1.52</td>
<td>151</td>
<td>2067</td>
</tr>
<tr>
<td>peak</td>
<td>0000</td>
<td>3.02</td>
<td>301</td>
<td>4117</td>
</tr>
</tbody>
</table>

If basins 1 and 2 become developed, we would expect runoff characteristics to change, indicated in table IV-5.

TABLE IV-5

<table>
<thead>
<tr>
<th>Storm</th>
<th>Qm (cfs)</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg/event)</td>
<td>(kg/event)</td>
<td>(kg/event)</td>
<td>(kg/event)</td>
</tr>
<tr>
<td>10 yr</td>
<td>3770</td>
<td>0.62</td>
<td>565</td>
<td>256</td>
</tr>
<tr>
<td>50 yr</td>
<td>4520</td>
<td>0.87</td>
<td>745</td>
<td>344</td>
</tr>
<tr>
<td>Peak</td>
<td>0000</td>
<td>1.65</td>
<td>1564</td>
<td>686</td>
</tr>
</tbody>
</table>

IV-7
These numbers are estimates based on several assumptions. However, they give a general indication of loading in Kai'ahulu Bay. If more accurate calculations are required, further studies that are site specific will be needed.

V. DISCUSSION AND RECOMMENDATIONS

Conditions in the nearshore marine environment adjacent to the proposed Hokuleia development are typical of a class "A" nearshore coastal body of water. Several streams periodically discharge into the coastline during rainfall. The water clarity at the time of observation was slightly more turbid than generally expected. However, this is believed to be due to the rough sea and high wind conditions at the time of sampling.

Although measurements were sparse, currents along the coastline are principally wave and wind driven and can become very strong depending on the weather conditions. As a result, the nearshore marine environment is well mixed.

Various general observations of the Hokuleia coastline were made during our survey. In areas where wave action was less intense, i.e., station 3 (protected by reef), the coral was less restricted in its growth and formed large heads of P. lobata, P. compressa, and Pseudolithon gardineri. There was greater diversity in coral and algal species at stations 3-6 than at stations 1 and 2, within Kai'ahulu Bay. This is attributed to greater circulation that results from microcurrents formed on the reef by the breaking waves and the periodic stream discharge into Kai'ahulu Bay.

IV-R

V-1
A. KAL'AHULU HAY

The water found in Kal'ahulu Bay during our study was acceptable for recreational purposes and environmental considerations; however, it was more turbid, showed greater amounts of fresh water, showed higher non-filterable residues and had more coliform colonies than the rest of the stations visited. This is most likely due to the fact that it is a major site for stream discharge with respect to the rest of the coastline. The coliform colonies found are attributed to nearby human activity because neither of the stream outlets in Kal'ahulu Bay were open or discharging at the time of our study.

Although current measurements were sparse, it is believed that circulation within the bay forces discharged stream effluent to seek the open ocean via the channel located in the bay, in front of the Makalena Stream outlet. This is believed true for both streams; however, the path is much more direct in front of Makalena Stream. As waves increase in height, the rip current moving through the channel should become stronger -- increasing with the square of the wave heights.

The deep sand channel leading from the mouth of Makalena Stream out beyond the wave/surge zone, clearly illustrates the effect that fresh water has had on the reef over a long period of time.

Sediments suspended and/or settled on the coral decrease the amount of light reaching the photosynthetic zooxanthellae within the coral heads. Such a limitation on the photosynthetic activity of zooxanthellae inhibits growth. Algae, also photosynthetic, is adversely affected by water turbidity. Occasional heavy sedimentation can seriously affect the reef. This is why there was very little live coral or algae leading from the stream mouths into the bay.

Outside the wave/surge areas of the coast there was a greater diversity of habitats (limestone arches and sand trenches) that were available to flora and fauna. In the areas outside the wave/surge zone, we saw a greater diversity and density of fish and coral with respect to that found inshore. The decrease in turbidity corresponded with an increase in complexity of habitats.

Most of the corals found within the bay were encrusting (even much of the P. lobata). In addition, most of the live substrate were comprised of species of coral and coralline algae that could withstand heavy wave action. This is probably because the bay is exposed to heavy wave action during winter, resulting in the
proliferation of more hardy species. The same conditions seem to exist in the wave/surge zone and immediately beyond since there is a high proportion of encrusting coral and encrusting algae (as opposed to more delicate types of coralline algae such as P. gardinieri). Furthermore, there was little P. compressus in the outer bay; the zone normally occupied by compressus seemed to be "replaced" by sturdier corals such as P. divaricata and M. verrucosa.

It is evident from our survey that the condition of the reef flats in Kail"abula Bay is a result of stream discharge over a long period of time. The incursion of fresh water and sediments has impeded reef growth and development. This has resulted in a channel that extends from directly in front of Nākalele Stream to the open ocean. It is believed that rerouting discharge from Kapaia'a Stream to the Nākalele Stream will not have a significant impact on the environment in its present condition.

Rerouting the discharge to the Nākalele Stream site is believed to be an improvement over the present system which discharges (note: the word "discharges" is repeated) onto the reef before longshore currents take it into the bay's channel. While discharged material accelerates the reef, damage may result. If periodic discharging occurs over a long period of time, another channel could develop in the reef; thus, changing the natural circulation and littoral process along the nearby coastline.

B. DRAINAGE MODIFICATIONS

In general, storm effluent discharging into a nearshore marine environment can affect the local water quality and the benthic communities. Currently, the water quality conditions within Kail"abula Bay and along the Kukuiʻula coastline are typical of a nearshore "coastal water" environment. However, Nākalele and Kapaia'a Streams have been discharging into Kail"abula Bay for many years; therefore, water quality within Kail"abula Bay and nearby areas is not expected to change as a result of the proposed rerouting. Concentrations of nutrients are expected to depend on the degree of development of the drainage tributaries. However, these changes are not expected to significantly impact the water quality of the bay because it is a well flushed. In addition, during high surf conditions, strong currents pump through the channel.

Generally, the impacts from runoff on nearshore marine benthic communities result from low salinity levels, high levels of suspended solids, and changes in the algal populations due to...
increased nutrients. However, because of the channel found in Kailua Bay in a habitat that is suited for the disposal of storm effluent, no obvious adverse impact to the nearshore marine benthic communities is anticipated.

Furthermore, based on our water quality measurements, general observations and peripheral current measurements, it appears that Mokulea Stream is a superior discharge outlet compared to Kapa'a Stream. This is because the deep channel that runs directly to the open ocean is found in front of the Mokulea outlet. In addition, water that is currently discharged at Kapa'a is probably impeding reef growth directly in front of the stream outlet.

REFERENCES

1. AECOS, Kailua, Hawaii.


APPENDIX A

### TABLE A-1

<table>
<thead>
<tr>
<th>Sta</th>
<th>Cond.</th>
<th>Sal</th>
<th>Temp</th>
<th>pH</th>
<th>Nutrients</th>
<th>NTU</th>
<th>TKN</th>
<th>NH4</th>
<th>NO3</th>
<th>NO2</th>
<th>TP</th>
<th>FC</th>
<th>Chl</th>
<th>UFP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>49.82</td>
<td>31.12</td>
<td>24.2</td>
<td>1.49</td>
<td>.001</td>
<td>0.02</td>
<td>1.23</td>
<td>0.129</td>
<td>0.005</td>
<td>0.007</td>
<td>1</td>
<td>0.05</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>50.47</td>
<td>31.68</td>
<td>23.9</td>
<td>1.42</td>
<td>.002</td>
<td>0.04</td>
<td>1.41</td>
<td>0.135</td>
<td>0.008</td>
<td>0.009</td>
<td>3</td>
<td>0.75</td>
<td>3.4</td>
<td></td>
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<tr>
<td>3</td>
<td>50.84</td>
<td>34.30</td>
<td>23.8</td>
<td>0.88</td>
<td>.002</td>
<td>0.02</td>
<td>0.98</td>
<td>0.144</td>
<td>0.007</td>
<td>0.007</td>
<td>4</td>
<td>0.49</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>51.28</td>
<td>33.80</td>
<td>24.8</td>
<td>0.81</td>
<td>.001</td>
<td>0.03</td>
<td>0.92</td>
<td>0.138</td>
<td>0.003</td>
<td>0.003</td>
<td>1</td>
<td>0.31</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>51.74</td>
<td>33.80</td>
<td>24.8</td>
<td>0.81</td>
<td>.001</td>
<td>0.03</td>
<td>0.92</td>
<td>0.138</td>
<td>0.003</td>
<td>0.003</td>
<td>1</td>
<td>0.27</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>51.74</td>
<td>34.10</td>
<td>24.5</td>
<td>1.05</td>
<td>.001</td>
<td>0.02</td>
<td>1.36</td>
<td>0.133</td>
<td>0.006</td>
<td>0.006</td>
<td>1</td>
<td>0.26</td>
<td>3.6</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Nitrate/Nitrite, TN=Total Nitrogen, TP=Total Phosphorus, FC=Total Coliforms, Chl=Chlorophyll a, UFP=Non-filtable Residue

* less than 1

### TABLE A-2

<table>
<thead>
<tr>
<th>Sta</th>
<th>DO</th>
<th>pH</th>
<th>Redox</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>7.1</td>
<td>8.4</td>
<td>182</td>
</tr>
<tr>
<td>2</td>
<td>7.3</td>
<td>8.4</td>
<td>184</td>
</tr>
<tr>
<td>3</td>
<td>6.7</td>
<td>8.4</td>
<td>102</td>
</tr>
<tr>
<td>4</td>
<td>7.5</td>
<td>8.5</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>9.3</td>
<td>8.5</td>
<td>167</td>
</tr>
<tr>
<td>6</td>
<td>8.4</td>
<td>8.5</td>
<td>189</td>
</tr>
</tbody>
</table>

**Note:** DO=Dissolved Oxygen, Turb=Turbidity

Redox=Reduction Potential

**A-1**
### APPENDIX B

**TABLE B-1**

**DETHIC SURVEY RESULTS OF TRANSECT 1 - QUADIRAT**

CENSUS RESULTS (AS PRESENT COVER) ARE LISTED IN SECTION A.

<table>
<thead>
<tr>
<th></th>
<th>Quadrat Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>SAND</td>
<td>32.0</td>
</tr>
<tr>
<td></td>
<td>58.7</td>
</tr>
<tr>
<td>LIMESTONE/RUBBLE</td>
<td></td>
</tr>
<tr>
<td>CORAL</td>
<td></td>
</tr>
<tr>
<td>Porites lobata</td>
<td>5.6</td>
</tr>
<tr>
<td>Porites compressa</td>
<td>3.8</td>
</tr>
<tr>
<td>Porolithon labyrinther</td>
<td>0.6</td>
</tr>
<tr>
<td>Acropora discoides</td>
<td>0.0</td>
</tr>
<tr>
<td>Oolithus spp.</td>
<td>1.2</td>
</tr>
<tr>
<td>Plerocladia spp.</td>
<td>3.8</td>
</tr>
<tr>
<td>Zoanthus alticus</td>
<td>20.3</td>
</tr>
<tr>
<td>Asurina algeriense</td>
<td>5.0</td>
</tr>
<tr>
<td>Warragalia sp.</td>
<td>5.0</td>
</tr>
<tr>
<td>Galaxea sp.</td>
<td>5.0</td>
</tr>
<tr>
<td>Dicrhumoperia versatilis</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**A. QUADRAT CENSUS**

**B. SUMMARY OF TRANSECT 1**

<table>
<thead>
<tr>
<th></th>
<th>Quadrat Number</th>
</tr>
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<tbody>
<tr>
<td>SAND</td>
<td>5</td>
</tr>
<tr>
<td>LIMESTONE/RUBBLE</td>
<td>61.0</td>
</tr>
<tr>
<td>CORAL</td>
<td>5.6</td>
</tr>
<tr>
<td>Porites compressa</td>
<td>3.8</td>
</tr>
<tr>
<td>Porolithon labyrinther</td>
<td>0.6</td>
</tr>
<tr>
<td>Acropora discoides</td>
<td>0.0</td>
</tr>
<tr>
<td>Oolithus spp.</td>
<td>1.2</td>
</tr>
<tr>
<td>Plerocladia spp.</td>
<td>3.8</td>
</tr>
<tr>
<td>Zoanthus alticus</td>
<td>20.3</td>
</tr>
<tr>
<td>Asurina algeriense</td>
<td>5.0</td>
</tr>
<tr>
<td>Warragalia sp.</td>
<td>5.0</td>
</tr>
<tr>
<td>Galaxea sp.</td>
<td>5.0</td>
</tr>
<tr>
<td>Dicrhumoperia versatilis</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**B-2**
TABLE B-2

BENTHIC SURVEY RESULTS OF TRANSECT 2. QUADRATE CENSUS (AS PERCENT COVER) ARE LISTED IN SECTION A. EACH QUADRATE REPRESENTS 0.25 m². POINT ANALYSIS RESULTS ARE PRESENTED IN SECTION B. OTHER INVERTEBRATES SEEN ARE LISTED IN SECTION C.

<table>
<thead>
<tr>
<th>A. QUADRAT CENSUS</th>
<th>Quadrat Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Limestone/Bubble</td>
<td>80.6 88.8 88.4 81.4</td>
</tr>
<tr>
<td>Coral</td>
<td></td>
</tr>
<tr>
<td>Purites lobata</td>
<td></td>
</tr>
<tr>
<td>Acropora variegata</td>
<td></td>
</tr>
<tr>
<td>Montipora tribulosa</td>
<td>1.3 4.0 8.8</td>
</tr>
<tr>
<td>Lepidodina botac</td>
<td>0.3</td>
</tr>
<tr>
<td>Algae</td>
<td></td>
</tr>
<tr>
<td>Porolithon asperata</td>
<td>0.6</td>
</tr>
<tr>
<td>Cystoseira nitida</td>
<td>8.1 6.6 6.3 7.5</td>
</tr>
<tr>
<td>Porolithon purpurea</td>
<td>5.6 5.3 1.3</td>
</tr>
<tr>
<td>Dicranothecia veralius</td>
<td>2.8 1.3</td>
</tr>
<tr>
<td>Jania spp.</td>
<td>0.6 1.9</td>
</tr>
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</table>

B. SUMMARY OF TRANSECT SITE 2A

<table>
<thead>
<tr>
<th></th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral</td>
<td>3</td>
</tr>
<tr>
<td>Algae</td>
<td>7</td>
</tr>
<tr>
<td>Sand</td>
<td>33</td>
</tr>
<tr>
<td>Rubble</td>
<td>57</td>
</tr>
</tbody>
</table>

C. INVERTEBRATE CENSUS

<table>
<thead>
<tr>
<th>Species</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ophiocoma spp.</td>
<td>2</td>
</tr>
<tr>
<td>Feather boa mott</td>
<td>1</td>
</tr>
<tr>
<td>Brachiolaria</td>
<td>1</td>
</tr>
</tbody>
</table>

TABLE B-3

BENTHIC SURVEY RESULTS FROM TRANSECT 2A. QUADRATE CENSUS RESULTS (AS PERCENT COVER) ARE LISTED IN SECTION A. EACH QUADRATE REPRESENTS 0.25 m². RESULTS OF THE POINT ANALYSIS ARE PRESENTED IN SECTION B.

<table>
<thead>
<tr>
<th>A. QUADRAT CENSUS</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone/Bubble</td>
<td>84 88 83 79 48</td>
</tr>
<tr>
<td>Dead P. meandrite</td>
<td>30</td>
</tr>
<tr>
<td>Coral</td>
<td>4 9 10 8 3</td>
</tr>
<tr>
<td>Purites lobata</td>
<td>1</td>
</tr>
<tr>
<td>Purites compressa</td>
<td>2</td>
</tr>
<tr>
<td>Purites evansani</td>
<td>1</td>
</tr>
<tr>
<td>Algae</td>
<td>2 1 2 1 5</td>
</tr>
<tr>
<td>Dictyopteris spp.</td>
<td>5 12 14</td>
</tr>
<tr>
<td>Zonotrichia allida</td>
<td></td>
</tr>
<tr>
<td>Turbinaria obtusa</td>
<td></td>
</tr>
</tbody>
</table>

B. SUMMARY OF TRANSECT SITE 2A

<table>
<thead>
<tr>
<th></th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral</td>
<td>7</td>
</tr>
<tr>
<td>Algae</td>
<td>9</td>
</tr>
<tr>
<td>Sand</td>
<td>0</td>
</tr>
<tr>
<td>Rubble</td>
<td>84</td>
</tr>
</tbody>
</table>
TABLE B-1
SNORKEL SURVEY OUTSIDE HABITATS 1, 2 AND 3

Coral: H. vermiculosa - plates
P. duerden - downward slope of substrate was replaced at about 20-25 ft depth
(by P. duerden)

Some Zanclus altidos seen in this area, but not as abundant as
inshore areas.

Fish: much diversity,
S. perCUSillus - large
M. Trilobatus - large
C. multilobatus - large
P. forsteri
P. multifasciatus
M.riger
P.icker
C. philippinensis
C. arenarius adult
c. venustus
C. varians
G. variegata
S. maridodes
A. olivaceous
C. atiligious

Invertebrates: Pemphirum penseillatus
H. stellata
A. mauritianus

<table>
<thead>
<tr>
<th>Species</th>
<th>Station/location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthurus nigrocinctus</td>
<td>5</td>
</tr>
<tr>
<td>Acanthurus maia</td>
<td>4</td>
</tr>
<tr>
<td>Acanthurus triostegus</td>
<td>1</td>
</tr>
<tr>
<td>Acanthurus chrysurus</td>
<td>1</td>
</tr>
<tr>
<td>Blenniodes rectangulus</td>
<td>1</td>
</tr>
<tr>
<td>Chaetodon auriga</td>
<td>1</td>
</tr>
<tr>
<td>C. quinni</td>
<td>1</td>
</tr>
<tr>
<td>C. milleri</td>
<td>1</td>
</tr>
<tr>
<td>C. multilobatus</td>
<td>1</td>
</tr>
<tr>
<td>Paracirrhites acutus</td>
<td>1</td>
</tr>
<tr>
<td>Anampser cuvieri</td>
<td>1</td>
</tr>
<tr>
<td>Gymnothorax varius</td>
<td>1</td>
</tr>
<tr>
<td>Triaenodon bairdii</td>
<td>1</td>
</tr>
<tr>
<td>T. capensis</td>
<td>1</td>
</tr>
<tr>
<td>Pargogobius skipperius</td>
<td>1</td>
</tr>
<tr>
<td>P. pugetensis</td>
<td>1</td>
</tr>
<tr>
<td>Ostracoides melicagris</td>
<td>1</td>
</tr>
<tr>
<td>P. impallidus</td>
<td>1</td>
</tr>
<tr>
<td>Stegastes fasciatus</td>
<td>1</td>
</tr>
<tr>
<td>Scarus sp.</td>
<td>3</td>
</tr>
<tr>
<td>C. potential</td>
<td>1</td>
</tr>
</tbody>
</table>
STATION 3

The Poi-Poi stream area is protected from wave action by limestone flats that are approximately 20 meters from shore. Inshore visibility was poor: 2-3 meters. There was heavy silt suspension and sediment covering substrate. Round basalt (river rock) was seen directly in front of the stream mouth.

<table>
<thead>
<tr>
<th>TABLE B-6</th>
<th>DESCRIPTION OF STATION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corals:</td>
<td>P. compressa - some large dead heads covered by sediment. P. lobata - 1 meter size head also dead. P. didemnoides</td>
</tr>
<tr>
<td>Algae:</td>
<td>P. gardneri - individual clumps Dicrora sp. - patches live at 2-3 meters Coraline algae - large clumps more abundant G. reticulata L. aurata sp. B. veretula P. microlepis - not as abundant as site #2</td>
</tr>
<tr>
<td>Fish:</td>
<td>Few species of fish sighted probably due to overcast and rain; visibility poor. C. freemby T. inornata Acanthurus nigricans L. celtica Longirostrum forsteri P. episomes Centrichus fuscus</td>
</tr>
<tr>
<td>Invertebrates:</td>
<td>Echinometra metha - large population</td>
</tr>
</tbody>
</table>

STATION 4

Due to overcast and rainy conditions at Camp Wokulea, visibility was poor. There was less sedimentation in this area and a relative abundance of fish and algae. The shorelines was unprotected from wave action. A large population of E. metha was observed one to ten meters from shore.

<table>
<thead>
<tr>
<th>TABLE B-7</th>
<th>DESCRIPTION OF STATION 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corals:</td>
<td>P. lobata P. okahuita N. flavoluta U. veracosa P. barabcincas</td>
</tr>
<tr>
<td>Fish:</td>
<td>A. trifasciatus A. nigricans - large A. nigrolineus P. episomes P. forsteri</td>
</tr>
<tr>
<td>Invertebrates:</td>
<td>Echinometra metha - large population C. okahuita D. parvirosas</td>
</tr>
</tbody>
</table>
At Pu‘u O Hōlei Park we found a large diversity in habitats with a predominant limestone substrate. Nearshore visibility was poor (2-3 meters). Visibility became clearer at about 100 meters from shore (3-6 meters). Beach rock on shore was interspersed with sand channels.

### TABLE 9-8

**DESCRIPTION OF STATION 5**

Coral: (Mostly encrusting species)
- *M. verrucosa*
- *L. digitae*
- *P. bokia*
- *P. compressa*
- *F. flaviloba*
- *P. microdisca - scattered heads*
- *P. varians*

Algae:
- *T. crocea*
- *P. tenuifolia*
- *G. gracillaria*
- *T. gigantea*
- *P. ochracea*
- *H. formosa*
- *H. paluxanita*
- *O. atrata sp.*

Fish: Abundant species
- *T. cornuta*
- *C. ulinula*
- *C. quadricincta*
- *C. gaimard (JF)*
- *G. variegata*
- *H. unicolor*
- *M. dupreii*
- *A. sandifrensis*
- *A. obtusitai*
- *P. splendidus*
- *G. marmoratus* (zebra monkey)

Invertebrates: Echinometra methel
- *Echinophoca* sp. - (3)
- *Actinopyga* sp.

---

**STATION 6**

Moanalua Army Beach is predominantly limestone flats covered with sand. The shoreline was not protected from wave action. At a depth of about 3 meters coral reef algae and coral rubble were present.

### TABLE 9-9

**DESCRIPTION OF STATION 6**

Coral:
- *P. compressa*
- *P. microdisca - encrusting*
- *P. verrucosa*

Fish:
- *P. gaimard (JF)*
- *M. dupreii*
- *P. obtusitai*
- *P. splendidus*
APPENDIX G

Proposed Mokuleia Development: Impact on Agriculture and Aquaculture

Prepared for Mokuleia Development Corp.

Prepared by Decision Analysts Hawaii, Inc.

May 1986
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      Feed Crops
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   Competitive Advantages of Hawaii
   Competitive Advantages of Mokuleia
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   Pineapple
   Papayas
   Guava Purée
   Other Fruits
   Macadamia Nuts
   Coffee
   Seed Corn and Other Seed Research
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AGRICULTURAL LAND SUPPLY

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<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Yields and Water Requirements of Produce Crops Feasible for Mokuleia</td>
<td>9</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

INTRODUCTION

The proposed Mokuleia development will require converting about 1,600 acres of land—now used primarily for grazing—in resort, housing, and recreation areas. About 440 acres of this are prime agricultural lands, and about 260 acres are other agricultural lands. The remaining lands have very severe limitations which make them unsuitable or generally unsuitable for agriculture. The impact of developing these lands on the growth of agriculture and aquaculture in Hawaii is addressed below.

LAND DEMAND

In order to accommodate all diversified agriculture and aquaculture activities that are agronomically suited for the Mokuleia area and to provide the hope that not the expectation) of profitable operations, the acreage required is surprisingly small. To increase Hawaii's self-sufficiency in produce crops to a realistic level, and to accommodate resident-plus-vacation population growth to the year 2000, less than 1,200 acres of additional land would be required.

A large market exists for feed crops, but most of these crops are not commercially feasible for Hawaii. A possible exception is corn silage to feed cattle in feedlots. However, less than 2,600 acres would be needed Statewide to feed all cattle in feedlots, even with an increase in cattle operations. Experiments with corn silage and other feed crops have been performed, but returns per acre have been low.

Regarding export crops, papaya is a possibility being explored for Oahu lands, although the average requirement for increased production in relatively small total Statewide plantings amount to a little over 2,600 acres, primarily on the Big Island, Macadamia nuts offer the potential of absorbing a significant amount of agricultural land, but increasing overseas competition indicates that this is a high-risk venture unable to compete in those areas where other economic activities offer higher land rents. Other existing export crops are not agronomically suited for the Mokuleia area and/or require very little land. Finally, efforts in Hawaii for over a century indicate that it is extremely difficult to identify new export crops and develop them into new and profitable industries.

Livestock operations are another possibility, but the returns are low from cattle grazing; the trends are not favorable for increased dairy, egg, and swine and pork operations; and little land is required for poultry operations.

Problems with freshwater prawn include low profitability, a saturated local market, and an export market of doubtful potential. Other potential freshwater aquaculture activities suffer from low prices, stiff competition from the mainland, a small local market, unsuitable climate, and/or other problems.

The potential for beakfish and saltwater aquaculture, particularly shrimp, is regarded as more promising. However, beakfish and saltwater aquaculture is still in a research-and-development stage, with profitability for large-scale operations yet to be proven. Also, various land-use policies and regulations make profitability difficult to achieve, and limit development. Finally, concerns over salt contamination of prime agricultural lands and the groundwater supply argue against beakfish and saltwater aquaculture for most Mokuleia lands.

Increasing demand for agricultural land in Hawaii as a result of land shortages on the mainland should not be anticipated, since such mainland land shortages are not expected. On the mainland, as in Hawaii, there is a large supply of fertile agricultural land. Furthermore, this supply is expected to increase given genetic engineering advances which promise higher yields for crops, increased resistance to diseases and pests, and increased tolerance to variations in climate.

LAND SUPPLY

An enormous and growing supply of Hawaii's prime agricultural land has been freed from sugar and pineapple production. Since 1970 over 44,000 acres of land have been taken out of production, over 20,000 acres in Oahu and 23,000 on the Neighbor islands, and over 39,000 acres freed from pineapple production (11,000 acres on Oahu and over 28,000 on the Neighbor Islands).

Some of the land freed from sugar and pineapple production has or will be converted to urban, diversified agriculture, and aquaculture uses. Also, some of the land freed from pineapple use on Oahu was converted to sugar production. Making allowances for the various conversions, 28,000 acres of Statewide abandoned land was available to diversified agriculture and aquaculture amounts to many tracts of thousands of acres, with a large share of this on Oahu. Even though considerable agricultural land is available, it should be noted that the supply of markets for small-scale farmers is
EXECUTIVE SUMMARY

Limited. This is partially because of County regulations which require structural
plans, paved rather than gravel roads, and limited rather than surface water lines.
These requirements are appropriate for rural estates, but are unnecessary for agri-
cultural use of the land. The added expense for these items makes it uneconomical
for large land owners to subdivide their land into small agricultural lots.

The supply of fallow prime agricultural land probably will increase given the
unfavorable outlook for sugar prices. In fact, some unprofitable mills remain in
operation temporarily only because of lease and/or energy agreements. Furthermore,
some plantations continue as land-holding operations with their lands available for
other uses when and if profitable activities arise.

Many of the lands freed or to be freed from sugar and pineapple production
have excellent agricultural qualities and climatic conditions, and are well-suited for
crop and aquaculture production. Also, water is available for most of these lands,
particularly lands freed from sugar production. Further, some additional land has
been made available to diversified agriculture in government-sponsored agricultural
parks throughout the State.

OUTLOOK FOR DIVERSIFIED AGRICULTURE AND AQUACULTURE

It is extremely doubtful that the Molokai development will affect adversely
the statewide growth of diversified agriculture or aquaculture, either immediately or
over the long term. This conclusion derives from the following: an enormous amount
of prime agricultural land and water has been freed from sugar and pineapple produc-
tion in recent years (including much land on Oahu); there is a very real possibility
that additional sugar acreage and water will be freed; given the outlook for low sugar
prices; and diversified agriculture and freshwater aquaculture will require a compa-
natively modest amount of additional land and water for expansion, particularly in the
Molokai area given its particular conditions.

PROPOSED MOLOKAIA DEVELOPMENT:
IMPACT ON AGRICULTURE AND AQUACULTURE

The proposed Molokai development will require converting about 1,000 acres
of land now used primarily for grazing to resort, housing, and recreation uses.
Addressed in this report is the impact of this action on the growth of agriculture and
aquaculture in Hawaii.

AGRICULTURAL CONDITIONS OF MOLOKAIA

Soil Quality

The lands for the Molokai development can be divided into three general
categories: beachfront, coastal-plain, and foothill lands. The beachfront lands
consist of about 100 acres of beach sand, which has very severe limitations for agri-
culture because the soil is loose and lacks stability for heavy equipment, and is

The coastal-plain lands of the Molokai development cover about 200 acres. Of
this, about 440 acres are prime agricultural lands having few limitations for agri-
culture, or only moderate limitations because of some stoniness or vulnerability to
erosion. These are level or gently sloping lands consisting of Paliu clay loam,
Kahalalei clay loam, and Molokai clay loam. About 360 acres are other agricultural
lands having severe limitations for agriculture. Problems include stoniness, vulner-
ability to erosion, and poor drainage. Slopes are as high as 12 percent, and the soils
include Kamea clay, Kamea stony clay, Ewa silty clay loam, and Ewa stony silty clay.
Finally, about 10 acres of the coastal-plain lands have poorly drained Pearl Harbor
clay that has very severe limitations for agriculture.

The foothill lands of the development cover about 100 acres of the lower slopes
and gulches of the Waihee Range. The soils include Kamea very stony clay, Halawa
silt loam, Kamea silty clay, Helemann silty clay, and rock land. These soils have very
severe limitations which make them unsuited or generally unsuited for agriculture.
Problems include stoniness, unacceptable texture (too sticky and plastic), very steep
slopes, and vulnerability to severe erosion.
PROPOSED MOKULEIA DEVELOPMENT: IMPACT ON AGRICULTURE AND AQUACULTURE

Vegetation of the coastal plains land is low, and secondary vegetation is composed of less than 5 percent, and, for prime lands, clay loam or clay loam soils (Hawaii Agriculture Planning Program).

Crops for the Hawaii Market

Competitive Advantage of Mokuleia

Prospective farmers who would locate in Mokuleia would have to compete with other farmers on Oahu and the Neighbor Islands in supplying the Hawaii market. As with many other areas, Mokuleia provides year-round subtropical climatic conditions optimal for growing a great many crops. On the other hand, the area is unsuitable climatically for crops which require cool and/or moist conditions commonly found at higher elevations or on the wet windward side of an island.

Farmers in Mokuleia would have a significant economic advantage over Neighbor Island farmers because of their location. The Mokuleia farmers could easily truck their produce to the large Honolulu market where about 30 percent of the State's population resides. In addition, most supplies and equipment are readily available from a large selection of suppliers, and at lower costs than on the Neighbor Islands. In contrast, growers located on the Neighbor Islands who wish to sell or buy goods in the Honolulu market must contend with inter-island transportation costs. Also, farmers in the Kauai area on Oahu encounter somewhat longer trucking distances and correspondingly higher trucking costs.

Disadvantages for all farmers in Hawaii are the small and easily fluctuated local market, and high costs for labor and imported supplies.

Fruits and vegetables which are judged to be agronomically and possibly commercially feasible for Mokuleia are listed in Table 1. The judgment is based largely...
upon those crops which are already grown commercially in Hawaii in areas having a climate similar to that of Madeira. The crops are categorized by those which have:

1. Significant import-substitution potential, and the production trends are increasing or decreasing (an indicator of marginal profitability), and
2. Little or no import-substitution potential.

Crops excluded from Table 1 and the reasons for the exclusion include:

- citrus other than lime, Chinese head cabbage, head lettuce, carrots, cauliflower, celery, head lettuce, roman lettuce: require cool temperatures or other climatic conditions not found in Madeira.
- long- and medium-day onions: require longer days for proper growth and curing, and prices are too low for profitability.
- mangoes: a subsistence crop priced too low to justify commercial farming.
- papayas: treated as an export crop in the following section.
- potatoes: Hawaii's major food import (38 million pounds in 1963), but repeatedly proven unprofitable in Hawaii; requires cool temperatures.
- summer squash other than zucchini, and melon other than watermelon: insect and disease infestation.

The first column of Table 1 shows the 1963 Hawaii wholesale supply for the crops listed, based on the amount sold in the wholesale market. These quantities provide a crude estimate of the current demand for these products. The estimates are crude because the data for Honolulu are for aggregate results from all stores. For example, all types of bulgur are listed as "dry cereals," and both oriental and American types of cucumbers are listed as "cucumbers." Also, in some instances, imports and produce grown locally may be imperfect substitutes. An example could be sweet potatoes; although similar in appearance, the flesh of the imported potatoes is thicker than on the locally grown potatoes. These quantities will therefore reflect an overestimate of the demand for local products, since local products are not all identical to imports.

The second column of Table 1 gives the amount of Honolulu consumption which is produced in Hawaii, including amounts from the islands of Hawaii, Kauai, Maui, Molokai, and Oahu. The percentage ratio between local production and Honolulu consumption gives the market share shown in Column 3.

The last column of Table 1 presents the estimated potential market share based on import substitution. Factors involved when developing the estimates were:

- The mix of products contained within each product group.
- As mentioned above, dry onions include all types of both onions, and cucumbers include both oriental and American types. Also, sweet peppers have thicker skin than mainland ones. For these cases, local varieties are imperfect substitutes for certain mainland varieties.
- The extent of overseas competition.
- For certain crops, Hawaii can supply all or nearly all of the demand because of weak or nonexistent mainland competition; for these crops, Hawaii's market share can approach or reach 100 percent. But for those crops which face competition from the mainland, the rule of thumb is that prices will start to be depressed when local production increases the market share beyond about 40 percent. With lower prices, growing of the particular crop becomes less profitable, and some farmers begin to switch to alternative crops.
- Seasonal variation of overseas competition, and local demand and production.

Summer crops from California and elsewhere supply the Honolulu market with many fruits and melons at very low prices—prices that are too low for profitable operations by Hawaii farmers. When this occurs, Hawaii's market share approaches or reaches zero percent. But even though prices are stronger in the winter, the quality and yield of Hawaii winter crops may be less than that of summer harvests (i.e., tomatoes).

The potential producer market for Madeira growers is derived from these sources: displacing production from other areas in the State, displacing imports, and resident-plus-visiting population growth. Estimates of the potential market size due to these three sources for those crops feasible for Madeira are shown in Table 2. Corresponding land and water requirements are shown in Tables 3 and 4. Based on the yield and water assumptions given in Table 5.

The most promising producer crops for Madeira would be those which have substantial import-substitution potential, and show trends of increasing production in the Islands. Potential market size is an indicator of profitability. These crops include Chinese broccoli, tomatoes, sweet corn, sweet peppers, Italian squash, and watermelons. Crops with no recent history of profitable production in Hawaii offer additional potential. However, the
### Table 1. Potential Hawaiian Production for the Honolulu Market of Produce Crops Feasible for Monukula: 1983 and 2000

<table>
<thead>
<tr>
<th>Crop</th>
<th>Potential Production Increase Due to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual Production, 1983</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Bananas, Plantain</td>
<td>1,458</td>
</tr>
<tr>
<td>Brown Rice</td>
<td>520</td>
</tr>
<tr>
<td>Corn, Sweet</td>
<td>139</td>
</tr>
<tr>
<td>Peppers, Sweet</td>
<td>650</td>
</tr>
<tr>
<td>Spinach, Italian</td>
<td>455</td>
</tr>
<tr>
<td>Watermelon</td>
<td>5,865</td>
</tr>
</tbody>
</table>

### Table 2. Potential Land Required to Supply the Honolulu Market with Produce Crops Feasible for Monukula: 1983 and 2000

<table>
<thead>
<tr>
<th>Crop</th>
<th>Land Required, 1983</th>
<th>Import Substitution</th>
<th>Population Growth</th>
<th>Total</th>
<th>Potential Land Required, 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bananas, Chinese</td>
<td>98</td>
<td>300</td>
<td>93</td>
<td>475</td>
<td>571</td>
</tr>
<tr>
<td>Broccoli</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Corn, Sweet</td>
<td>12</td>
<td>14</td>
<td>6</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>Peppers, Sweet</td>
<td>22</td>
<td>31</td>
<td>10</td>
<td>43</td>
<td>63</td>
</tr>
<tr>
<td>Spinach, Italian</td>
<td>14</td>
<td>12</td>
<td>5</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Watermelon</td>
<td>158</td>
<td>197</td>
<td>69</td>
<td>266</td>
<td>423</td>
</tr>
</tbody>
</table>

### Table 3. Unlikely Import Substitution

<table>
<thead>
<tr>
<th>Crop</th>
<th>Unlikely Import Substitution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avocados</td>
<td>851</td>
</tr>
<tr>
<td>Butter Melon</td>
<td>649</td>
</tr>
<tr>
<td>Carrots</td>
<td>638</td>
</tr>
<tr>
<td>Cabbage</td>
<td>575</td>
</tr>
<tr>
<td>Corn, Sweet</td>
<td>1,438</td>
</tr>
<tr>
<td>Eggplant, Long</td>
<td>292</td>
</tr>
<tr>
<td>Ginger Root</td>
<td>1,300</td>
</tr>
<tr>
<td>Lettuce, Semi-hard</td>
<td>1,291</td>
</tr>
<tr>
<td>Onion, Red</td>
<td>1,207</td>
</tr>
<tr>
<td>Onion, Green</td>
<td>1,107</td>
</tr>
<tr>
<td>Pumpkins</td>
<td>104</td>
</tr>
<tr>
<td>Radishes</td>
<td>191</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>3,224</td>
</tr>
</tbody>
</table>

**TOTAL**: 74,955

**NOTES:**
2. 10% of Actual 1983 Production - Potential Production Increase Due to Import Substitution.

**Source:** Derived from Tables 2 and 3.
### Table 4. Potential Water Required to Supply The Honolulu Market for Produce Crops Feasible for Mokuleia: 1983 and 2000 (million gallons per day)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Potential Water Increase Due to Import Substitution</th>
<th>Potential Water Required, 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Import Substitution Potential: Increasing Production Trend</td>
<td></td>
</tr>
<tr>
<td>Bananas, Chinese</td>
<td>0.44</td>
<td>1.70</td>
</tr>
<tr>
<td>Deciduous</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Carrots, Sweet</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Peppers, Sweet</td>
<td>0.10</td>
<td>0.14</td>
</tr>
<tr>
<td>Squash, Italian</td>
<td>0.06</td>
<td>0.05</td>
</tr>
<tr>
<td>Watermelons</td>
<td>0.35</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Import Substitution Potential: Flat or Decreasing Production Trend</td>
<td></td>
</tr>
<tr>
<td>Beans, Snap</td>
<td>0.13</td>
<td>0.01</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>0.27</td>
<td>0.11</td>
</tr>
<tr>
<td>Eggplants, Round</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Limes</td>
<td>0.02</td>
<td>0.09</td>
</tr>
<tr>
<td>Peas, Chinese</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Squash, Toggen</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>Tomatillos</td>
<td>0.32</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>Unlikely Import Substitution</td>
<td></td>
</tr>
<tr>
<td>Avocados</td>
<td>0.24</td>
<td>0.01</td>
</tr>
<tr>
<td>Bittermelons</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Cabbage, Kai Choy</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>Celosia</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Dahlens</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Eggplants, Long</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>Ginger Root</td>
<td>0.16</td>
<td>0.02</td>
</tr>
<tr>
<td>Lettuce, Semi-head</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Onion, Dry</td>
<td>0.16</td>
<td>0.21</td>
</tr>
<tr>
<td>Onions, Green</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Pumpkins</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Radishes</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>0.23</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3.81</strong></td>
<td><strong>3.24</strong></td>
</tr>
</tbody>
</table>

Sources: Derived from Tables 3 and 5, using 1 acre-foot per year × 0.0008927 MRD.

### Table 5. Yields and Water Requirements of Produce Crops Feasible for Mokuleia

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yield per Crisp (bun/crate)</th>
<th>Crisp per Year (bun/crate)</th>
<th>Water (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Import Substitution Potential: Increasing Production Trend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas, Chinese</td>
<td>20,000</td>
<td>29,000</td>
<td>5</td>
</tr>
<tr>
<td>Broccoli</td>
<td>10,000</td>
<td>29,000</td>
<td>5</td>
</tr>
<tr>
<td>Carrots, Sweet</td>
<td>4,000</td>
<td>12,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Peppers, Sweet</td>
<td>15,000</td>
<td>30,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Squash, Italian</td>
<td>11,000</td>
<td>33,000</td>
<td>1.5</td>
</tr>
<tr>
<td>Watermelons</td>
<td>15,000</td>
<td>15,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Import Substitution Potential: Flat or Decreasing Production Trend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans, Snap</td>
<td>9,000</td>
<td>7,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>12,000</td>
<td>27,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Eggplants, Round</td>
<td>27,000</td>
<td>54,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Limes</td>
<td>5,000</td>
<td>7,000</td>
<td>3</td>
</tr>
<tr>
<td>Peas, Chinese</td>
<td>5,000</td>
<td>15,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Squash, Toggen</td>
<td>15,000</td>
<td>30,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>9,000</td>
<td>14,000</td>
<td>11</td>
</tr>
<tr>
<td>Tomatillos</td>
<td>20,000</td>
<td>60,000</td>
<td>7.5</td>
</tr>
<tr>
<td>Unlikely Import Substitution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocados</td>
<td>1,000</td>
<td>7,000</td>
<td>5</td>
</tr>
<tr>
<td>Bittermelons</td>
<td>13,000</td>
<td>26,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Cabbage, Kai Choy</td>
<td>12,000</td>
<td>56,000</td>
<td>1.5</td>
</tr>
<tr>
<td>Dahlens</td>
<td>1,000</td>
<td>12,000</td>
<td>4.25</td>
</tr>
<tr>
<td>Eggplants, Long</td>
<td>28,000</td>
<td>40,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Ginger Root</td>
<td>34,000</td>
<td>60,000</td>
<td>5</td>
</tr>
<tr>
<td>Lettuce, Semi-head</td>
<td>15,000</td>
<td>30,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Onion, Green</td>
<td>18,000</td>
<td>30,000</td>
<td>1.47</td>
</tr>
<tr>
<td>Onion, Dry</td>
<td>15,000</td>
<td>15,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>13,000</td>
<td>27,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Radishes</td>
<td>11,000</td>
<td>15,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>12,000</td>
<td>28,000</td>
<td>2.5</td>
</tr>
</tbody>
</table>

1 Excludes production during the seasons when consumption is supplied primarily by cheaper mainland imports.
A potential exists for Hawaii production of feed crops by displacing the large volume of animal feed which is now imported. In 1963, imports totaled 162,916 tons, and included corn, barley, wheat, bran, oats, sorghum, alfalfa, cottonseed, cottonseed meal, beet pulp, soybeans, and a number of mixed feeds. The potential for displacing a major portion of grain and alfalfa imports is indicated by the year-round growing conditions which have resulted in yields of about 50 percent greater than those obtained on the mainland. Two crops which have recently been grown commercially in Hawaii are corn and alfalfa. In addition, corn can be substituted for barley. Assuming Hawaii can reach 100 percent self-sufficiency in these crops, then an estimated 12,300 acres could be placed in grain production (assuming zero yields of 6 tons per acre annually to replace the 12,376 tons of imported corn, sorghum, barley and mixed feeds), and 2,300 acres could be placed in alfalfa production (assuming a yield of 11 tons per acre annually to replace 30,556 tons of imports). The market would be even larger if local production of feed were to stimulate livestock production in Hawaii. In 1964, Hawaii was 10 percent self-sufficient in feed and 25 percent self-sufficient in pork and chickens, 76 percent self-sufficient in eggs, and nearly 100 percent self-sufficient in milk.

However, feed crops have yet to be grown as a commercial venture in Hawaii. Unsuccessful results with past commercial attempts to grow grass crops were encountered for a number of reasons:

- Various pests have presented a major problem—particularly birds which have eaten major portion of crops before harvesting.
- Most feed crops are hybrids which have been developed over many decades to adapt to mainland conditions and, although a number of tropical corn-grain hybrids are under development at the University of Hawaii's College of Tropical Agriculture and Human Resources, species suited to Hawaii's particular environmental conditions are yet to be perfected.
- Hawaiian year-round warm weather allows the build-up of pathogens in the soil for the mainland, pathogens are killed during cold winter periods.
- The length of Hawaii's summer day is too short for proper growth of none crops, in particular soybeans.
- The high cost of land, labor, and imported fertilizers and other supplies makes it difficult to compete with imported feeds.

The production of alfalfa, however, has shown some promise, with Hawaii's only alfalfa farm being a 150-acre operation on Molokai. But large-scale commercial success has yet to be proven.

Another alternative is for displacing feed imports to be grown corn silage to feed cattle in feedlots. Until recently, corn silage was grown on the North Shore of Oahu and fed to dairy cows, and there are some small-scale operations on the East plains of Oahu. In 1962, 5,000 cattle were slaughtered in feedlots, of which 2,400 (48 percent) were fattened in feedlots. Since cattle spend about 1.5 months in a feedlot, the average population within Hawaii's feedlots during 1962 was 11,000 cattle (52,400 x 1.5/12). Assuming that increased production of corn silage and its use in feedlots would result in 5,000 slaughtered cattle to be fattened in feedlots, then the average population in feedlots would increase to about 20,200 cattle (11,000 x 52,400/5,000). Fattening more cattle in feedlots would free pasture land for other cattle (a limiting factor to beef production), and would allow an increase in the herd size by about 12 percent. Thus, the feedlot population can increase to about 22,000 cattle (20,200 x 1.12). Since cattle require about 67 tons of dry silage plants per year and one ton of cattle, only 2,600 additional acres of corn silage would be needed to supply all of Hawaii's feedlots at the increased level of production plan the 3,500 dry acres on the North Shore of Oahu.
CROP EXPORTS

Competitive Advantages of Hawaii

Because of the large size of overseas markets compared to Hawaii's market, the financial rewards of successful export crops are far greater than those of crops grown for local consumption. The competitive advantages which Hawaii offers in developing export crops include a tropical climate which allows year-round growing conditions and very high yields for some crops. Also, Hawaii is politically stable and has duty-free access to the U.S. mainland market. Frequent and reliable air and shipping service is available to the U.S. mainland and elsewhere. The University of Hawaii College of Tropical Agriculture and Human Resources and the Hawaiian Sugar Planters' Association are recognized worldwide as leaders in tropical agriculture research. Finally, the State and County governments provide strong political support for agriculture.

Repeated attempts have been made for well over a century to develop export markets for a great many commodities. Some of the more notable attempts have included silk, cotton, white potatoes, wheat, rice, bananas, rubber, tea, tobacco, and most fertilizer. (Elvehjem, Hawaii Sugar Industry, p. 214.) In addition, numerous studies have been conducted over the past 100 years. The limited success with these many attempts illustrates that it is extremely difficult to identify an export crop which has a competitive advantage over other areas, and then to develop that crop into a successful industry.

Reasons for the difficulties in developing export crops are many, and include:

- Many of the tropical and subtropical crops which grow well in Hawaii also grow well in similar areas of the Caribbean, Central and South America, Africa, and Asia, and many of these areas have cheaper labor, land, and water costs.
- Overseas transportation costs for both exports and imports of equipment and supplies are often higher than the corresponding costs for other tropical and subtropical countries which may be closer to major markets, and are not restricted to using expensive American shipping lines.
- Hawaii has tropical fruit flies which cause certain fruits to be banned from the U.S. mainland and Japan, or require expensive treatment and inspection of the fruit.
- Many temperate-climate crops do not grow well in Hawaii.
- Cheaper labor costs in Hawaii are relatively high because Hawaii soils are deficient in nutrients, and there is no cold winter to kill pests as is the case on the U.S. mainland.

In the past, sugarcane was able to overcome the above and other problems, and compete in an established market partly because yields in Hawaii have been the highest in the world. However, most other crops follow the development strategy of pineapple where the market is developed virtually from scratch at considerable cost and risk of failure. After the technology has been perfected and the market developed, growers in countries having lower production and delivery costs typically enter the market to the detriment of Hawaii growers. The export crops which are currently following this strategy with success are papaya, macadamia nuts, and cut flowers (principal pineapple). For each of these crops, overseas competition is developing. The other diversified agricultural exports from Hawaii include coffee, rice, ginger root, green tea, and guava puree. Other crops may be possible for export, but they have yet to be identified and/or their overseas market developed.

Competitive Advantages of Molokai

Regarding exports, growers on Oahu, including those who may locate in the Molokai area, are at a disadvantage because of better transportation service than that available to Molokai Island farmers. Air service is cheaper and more frequent, with direct flights to major cities; maritime shipping service is more frequent. With frequent airline and shipping service, storage costs are lower, fruit deliveries to needed supplies and equipment are quicker, and overseas delivery dates are more reliable when volumes are low. Also, the major water-dwelling pets which live in and off of Honolulu International Airport allow a reduction in packing, handling and transport costs because of the LDI containers used in these aircraft. For Oahu
PROPOSED MOKULUA DEVELOPMENT: IMPACT ON AGRICULTURE AND AQUACULTURE

SUGAR

Cultivation of sugarcane is a possible use of the prime and secondary agricultural lands which would be suitable for the proposed Mokulua development. Until the early 1970s, these lands were in sugar, and lands on each side of the Mokulua development are still in sugar. However, the future of sugar cultivation in Hawaii is uncertain because of the pessimistic outlook for sugar prices. In the world market, the average price of sugar is expected to remain well below the production costs for all countries. This is because sugar produced in excess of various trade agreements is dumped on the world market, particularly by the European Economic Community (EEC) which, because of generous price supports to local sugar-beet growers and generous trade agreements with former colonies, is a major sugar producer, importer, and exporter—although the EEC is one of the highest-cost sugar producers in the world. It is insufficient in sugar and has no need to export it. It must sell its excess sugar on the world market at enormous losses. In the United States, the Federal legislation protects sugar from the low world prices by import quotas, tariffs, and import fees. However, U.S. sugar prices are managed by the Federal Government so that they are sufficiently low to prevent the growth of high-fructose corn syrup (HFCS), which costs less to produce than normal sugar. In addition, the new sugar quota system is capturing market share and putting additional downward pressure on U.S. sugar prices. [Source: Hawaii Sugar Industry]

Historically, Waiola Sugar Co. has been one of Hawaii's most efficient producers, with the exception of a period during the late 1970s and early 1980s. Nevertheless, low sugar prices prevent profitable operations when depreciation of equipment is accounted for. Also, it should be noted that ground rents provided for sugar are relatively low, about $110 per acre per year (based on 14.5 cents per pound, yield of 15 tons per acre, and cost of 4.5 per cent of gross revenue). Nevertheless, these rents are generally higher than those available from diversified agricultural operations that use large amounts of land.

PINEAPPLE

Although pineapple production has declined greatly over the past two decades, the remaining pineapple industry is regarded as economically healthy because of the new focus on the fresh market. However, expansion of the industry is not expected because new plantations are not developed in the U.S. Fresh pineapple market, especially the Rockies, are being developed in Florida, Costa Rica, and the Dominican Republic. Some of the acreage for pineapple were needed, ample fallow land is available elsewhere, particularly on Lanai and Molokai, while Molokai land would not be agriculturally suited for pineapple.

PAPAYA

Papaya exports have grown from 1.9 million pounds in 1965 to 4.5 million pounds in 1981, experiencing an average annual growth rate of about 15 percent. However, exports fell to 3.6 million pounds by 1983. In this year, 2,750 acres were harvested in the State. Production is concentrated on the big island (36 percent), with Honolulu being the largest exporter in the State. Papaya is not well-suited for Mokulua for a number of reasons. First, the preferred variety for exports can be grown only in Puna. Second, Oahu has problems with tephra. Third, low land rents generally favor neighbor Island areas for growing papaya for export. Nevertheless, Honolulu has experimented with plantings of papaya on Oahu land that have been withdrawn from sugar production.

GUAVA PINE

Guava pinne is a small end, not a large, marginally profitable industry with exports of less than $200,000 (Hawaii Pineapple Growers Association, Hawaiian Industry, 1981). Production is mostly in avoids operations of the Big Island, with processing performed only occasionally in expensive plants which mostly cover losses. Without sizable papaya operations, a guava pinne export industry is unlikely to develop on Mokulua area.

Of interest, however, is the recent marketing of cranberries/guava juice being performed by the Hawaii Sun. The guava pinne is supplied by 1, Kaua'i. (Source on Kaua'i.)
PROPOSED SUBKULIA DEVELOPMENT:
IMPACT ON AGRICULTURE AND AQUACULTURE

Other Fruits

The recent approval of irradiation of papayas and other fruits in order to kill fresh-fly eggs raises the promise of increased exports to the mainland. Even with substantially increased exports, however, comparatively little land would be required.

Assuming that transportation costs will not limit market development and that Hawaii can capture 5 percent of the U.S. market for fruits other than apples, oranges, and bananas—an extremely optimistic assumption—then less than 7,000 acres would be required. This average could be accommodated on less than half the land recently leased by the closing of Puu Sugar Co. However, instead of increasing Hawaii's market for tropical fruits, the approval of irradiation could very well work against Hawaii; Mexico and other tropical and subtropical countries which have cheaper land, labor and transportation costs, but which also have fruit-fly problems, will gain increased access to the U.S. market by building their own irradiation facilities.

Macadamia Nuts

Production of macadamia nuts has grown from 0.5 million pounds in 1965 to 6.1 million pounds in 1983. In terms of acreage, macadamia nuts are Hawaii's largest diversified agriculture industry (15,000 acres in 1983), with practically all production located on Hawaii Island. However, some new orchards have been planted by C. Brewer & Co., Ltd. on about 2,000 acres of former land of Malu Suga Co. on Kauai.

Macadamia nut farms provide a relatively high return once the orchards mature. However, the orchards require a very large financial investment, do not bear fruit for 7 years, and reach full productivity even later. As a result, the return is marginally attractive for an investor. Given growing competition from other areas in Hawaii, C. Brewer & Co., Ltd. is also planting 8,000 acres in macadamia nuts on the Big Island and from other countries (Brazil, Guiana, Malaysia, Australia, and possibly Egypt). Macadamia nut orchards represent a high-risk investment. This is particularly true for farms which are new to the industry and which may lack the proprietary information on optimal varieties for a given area (assuming they even have access to a supply of cuttings of the proper variety), and on optimum farming practices. If the wrong variety of tree is planted or uneven orchard practices followed, yields will be low and substantial losses will be suffered.

Coffee

Hawaii's coffee industry is, for most years, marginally profitable, and has experienced declines in production in the past, although the industry has been more profitable and relatively stable in recent years. For the 1983/84 season, production was 2.5 million pounds on 1,800 acres of land centered at high elevations in Kaau on the Big Island. Molokai has climatic conditions unsuited for coffee production.

Seed Corn and Other Seed Research

The seed corn industry is research oriented, and exports new and improved seeds by air to seed companies, universities, and private and government research organizations located in the United States, France, Canada, South Korea, Germany, Italy, Holland, Yugoslavia, Bulgaria, Japan, and other nations. The research and seeds are provided under proprietary contract arrangements.

The amount of land used for nursery, observation, and seed production has gradually increased since its introduction to Hawaii in the late 1960s, reaching 680 acres in 1983; these lands are distributed among Kaau, Central Maui, Molokai, and Oahu. However, over half of the State's seed corn industry is located on Molokai where seven companies carry out research or produce seed corn on a permanent basis.

During the winter other seed companies produce seed corn in Hawaii on an intermittent basis.

In addition to seed corn, considerable activity also focuses on the production of genetic material for sugarbeet, soybeans, and sunflowers; lesser activity focuses on millet, flax, faba beans, sesame, barley, wheat, cotton, barley beans, black edible beans, onions, turnips, and other vegetables. But the major focus is on seed corn, both grain and forage, for two reasons. First, it is the major crop of the United States, with far greater demand for it than exists for other seeds. Second, even as a horticultural for which new varieties are continually under development, the other annual seeds are for annual use, and therefore do not lend themselves to extensive development efforts.
Seed corn and other seed research is a unique industry which has a clear competitive advantage in its Hawaiian site, enabling it to produce during winter months, and to be inoculated from diseases that could affect the large production areas on the mainland. Nine to twelve generations of new hybrids can be produced in 3 to 4 years in Hawaii versus the 9 to 12 years required on the mainland. Areas in competition with Hawaii include Mexico (which presents language and political problems), Florida (which has occasional freeze), and Puerto Rico. Hawaii, however, dominates the industry: approximately 75 percent of all the corn produced in the United States can trace its development to Hawaii, and over two-thirds of this to Mokolii.

As increased effort is directed to the needs of tropical areas, gradual growth in the seed corn industry is anticipated. However, the growth potential amounts to only a few hundred acres, and most of the growth is expected to occur near Kauaikaua on Mokolii where climatic conditions are regarded as the best in the world for conducting seed corn research, and where agricultural land rents are generally much lower than elsewhere in Hawaii.

Ginger Root

Ginger root production for export is a new industry with a promising, but still uncertain, future. Although production is relatively small, it has grown rapidly from 1.9 million pounds in 1979 to 5.1 million pounds in 1983; this production was harvested from 100 acres. However, ginger root is not a major commodity, and so has a limited overseas market; in fact, the market was glutted in 1983, which led to a major price drop.

Ginger root farming is labor intensive, and generally suited for small-scale operations. Also, other areas are competing for the U.S. market, including California and Fiji. Mokolii offers no locational advantage for ginger root production compared to other areas in Hawaii.

Floral and Nursery Products

Hawaii’s floral and nursery industry has expanded rapidly in recent years, with most growth occurring in the sales of potted foliage plants. Because expensive heating is not required in Hawaii as it is on the mainland, it is possible for local producers of floral and nursery products to achieve the transportation costs and compete in the mainland markets. However, this is also true for the competing areas of Puerto Rico, the Caribbean, and Central America.

The outlook for continued growth exports of floral and nursery products is favorable. Expansion will be paced primarily by market development and management expertise. However, relatively little land will be required; the average size of floral and nursery operations in the State is under 3 acres. Also, since several of the agricultural parks under development in the State make specific provisions for nurseries, adequate land is available. One of the larger nurseries in the State was started by Anson on former sugarcane land at Waikiki.

Sweet Corn

New hybrids of sweet corn have been developed recently which are specially suited for Hawaii’s climate, and provide promise of exports to the mainland during the winter. Developed by the University of Hawaii College of Tropical Agriculture and Human Resources, Supersweet 16 is a year-round variety which grows rapidly, stores well, is resistant to mold and blight diseases, and is tightly husked to help reduce damage caused by earworms. The major question is whether a large number of mainland consumers will be willing to buy high-priced fresh Hawaiian corn during the winter versus low-priced frozen and canned mainland corn. Hawaiian corn will have to be priced high because of shipping costs. Anson has 50 acres in corn production at Kona, and is exploring the export potential.

LIVESTOCK OPERATIONS

Cattle and Grazing

Cattle ranching in Hawaii continues to be an important agricultural activity, with 1983 sales of $15.3 million. With the reduction in sugar and pineapple operations, some of the land freed has been converted to grazing which, however, provides a low return and low employment per acre. Nevertheless, this is regarded as the best use of this land until a more profitable use can be identified and developed.

The production of beef could be greatly expanded without flooding the market since about 75 percent of the beef consumed in Hawaii is imported. In order to increase beef production, cell grazing (e.g. the Savory system) has been recommended to ranchers by researchers and extension agents from the University of Hawaii, College of Tropical Agriculture and Human Resources. With this approach, which has been used successfully on the Big Island and elsewhere, the land is partitioned like a wagon wheel, with large groups of land separated by fences. Periodically, cattle are moved from one wedge to the next, thereby giving the land in the empty wedges
Freshwater Prawns

Following investigations in the late 1960s into techniques for farming freshwater prawns, the State’s Aquaculture Fisheries Research Center developed a successful “cooperative Agreement Program” in the early 1970s to encourage people to try prawn farming. This activity experienced steady growth until 1980, and became the dominate aquaculture activity in the State. Since 1980, however, setbacks have occurred.

In 1978, Kilena Agronomics, a subsidiary of C. Brewer and Company, planted 100 acres in freshwater prawns at Kilena, Kaanapali, and had plans to expand to 300 acres. However, yields were lower than expected because of low water temperatures caused by prolonged periods of cloud cover at its north shore location. The decision was made to close operations in 1980 (Governor’s Aquaculture Industry Development Committee).

In spite of the experience of Kilena Agronomics, Amaia Aquatex, a subsidiary of Amaia, Inc., planted 35 acres in freshwater prawns in 1980, with plans to expand to 310 acres. The operation also was located on Kauai, but at Kekaha on the south shore, which is considerably warmer and hotter than on the north shore. Although yields were above industry averages, operations were closed in 1982 because the U.S. mainland market was thought to be insufficient to justify major corporate investments, and product acceptance was questionable.

Additional closures were experienced by six small prawn farms in 1980 and 1981. Reasons given included a loss of interest, lack of post-larvae, poor site for the pond, and inability to negotiate a long-term lease. Some of these problems reflect the fact that freshwater prawns may be only marginally profitable in Hawaii.

Most of Hawaii’s prawn production is sold locally, but some is exported to the mainland. The local prawn market is currently saturated and any increase in production would result in declining prices and decreased returns. Currently the export potential of the prawn industry appears uncertain.

Given the history of prawn production and uncertain market conditions, prawn operations at Kukula are little more than a shadow of their former selves.

Other Freshwater Species

Research has been carried out on a number of other aquaculture species for commercial production, and some have progressed to commercial attempts. However, success for these other aquaculture species has been negative or limited by low prices, stiff competition from the mainland, the small Hawaii market, the unsuitable climate, and other reasons. Problems with these other species are:

- Callfish
  - Local production faces very stiff competition from low-cost imports from the mainland.

- Trout
  - Small Hawaii market. Also, trout grows better in cold water as found in some streams on Hawaii, Kauai and Maui.

- Tilapia
  - Small market and low price of about $1 per pound, wholesale. Some pond operators on Oahu have found it cheaper to treat tilapia as trash and bury it rather than try to sell it. However, red or golden hybrids command higher prices (about $2.50 per pound), but the market is small.

- Bullfrog
  - A favorable price of $4 to $5 per pound, but a small market.

- Ornamental koi and carp
  - Very limited market.

Breeding and Saltwater Aquaculture

The potential for breackish and saltwater aquaculture is regarded as more promising than it is for freshwater aquaculture. However, breackish and saltwater aquaculture is still in a research-and-development stage, with profitability for large-scale operations yet to be proven in Hawaii. Also, various land-use and other regulations make profitability difficult to achieve, and limit development.

Shrimp

The market for shrimp is very large, an estimated 3.4 million pounds for Hawaii in 1980, and 440 and 477 million pounds for the U.S. mainland and Japan, respectively. However, no processing facilities are available to local producers, so the potential market for shrimp is limited to the market for the higher priced fresh product. The current farm price for medium-size fresh shrimp on Oahu is $5 to $5.50 per pound (whole animal). However, the size of the market at these higher prices is uncertain; major expansion in sales may require lower prices.

A recent study found that pond production of shrimp in Hawaii is marginally profitable given the prevailing price, existing production technology, and regulatory constraints (Ishii, et. al). Consistent with these findings have been recent failures...
in shrimp operations. In 1975, ISKO Hawaiian Aquaculture Co., Ltd., developed 13 acres at Kaua'i, Oahu, for the production of Japanese tiger shrimp, with plans for expansion to 50 acres. However, operations closed in 1982 due to technical and regulatory problems.

Nevertheless, shrimp production, which has proven to be profitable in Asia, is believed by some to hold considerable promise for Hawaii. For example, Marine Culture Enterprises, a partnership of the F. H. Pierre and W. H. Sheen Companies, has established field research facilities in Kaua'i to develop a controlled environment method of producing marine shrimp. The research and development is being conducted by the University of Arizona's Environmental Research Laboratory (ERL) through grants from Marine Culture Enterprises. Originally the project was conducted jointly with the University of Sonora, Mexico, but ERL transferred its research facilities to Hawaii in 1981, after a difference of opinion arose over methods of production.

High stocking densities are made possible through the use of an airtight plastic-covered sprints, and production yields of about 85,000 pounds of shrimp tails per acre per year were obtained at the Mexico site. Substantial developmental work remains, nevertheless, major expansion by Marine Culture Enterprises is likely.

In addition, ORCA Sea Farms plans to produce marine shrimp on Molokai, and has already developed a number of ponds, with plans to expand to 100 ponds. Very high yields are projected (200,000 pounds of tails per acre per year) based on the favorable climate offered by Molokai, and continuous monitoring of conditions in the ponds using sensors tied into computers. However, the operation has yet to make the transition from research to commercial production.

Oysters

Major investments have been made in oysters in recent years. Taylor "Tap" Proctor's Towedline Oyster Operations on 165 acres in Kahului, Maui, represented an approximate $11-million-dollar investment in an intensive production system for oysters. Oysters were cultured in traps placed on concrete breakers, or raceways. Each oyster was expected to produce over 200 oysters per month once full commercial production was achieved, with total production anticipated to be one million oysters per month. Although about 100,000 oysters were produced and marketed per month during the first half of 1982, a number of technical and production-incident prevented the attainment of planned output. Financial problems resulted in staffing cutbacks, then damages caused by Hurricane Iwa in late 1982 forced the company into bankruptcy soon afterward.

Brine shrimp

Research has been carried out on brine shrimp for commercial production. However, brine shrimp has not yet shown to be viable economically; low prices for imports and the small local market forced one local producer to close operations.

Land Use Policies and Regulations

The location of breakwater and saltwater ponds is restricted to access to contaminate the underlying freshwater ground supply—a restriction which would restrict operations to the makani portion of the coastal plain at Molokai.

Also, breakwater and saltwater ponds are usually located on coastal plains which have limited agricultural potential—a policy which would argue against breakwater and freshwater aquaculture development at Molokai. The reasons for not locating these activities on quality agriculture land are that, in case of overfertilization, the accumulation of salt in the soil would decrease crop yields.

Breakwater and saltwater aquaculture activities that locate in or near the coastal zone also would be subject to a number of regulatory requirements which significantly increase the time, cost, and risks required to start coastal aquaculture operations, as well as increase operating costs. These requirements—many of which would apply to aquaculture development at Molokai—make profitability difficult to achieve, and will limit development. Such regulations include:

- National Pollutant Discharge Elimination System (NPDES) Permit for effluent discharges from aquaculture facilities that produce in excess of 100,000 pounds of aquatic animals per year or discharge 20 or more days per year;
- U.S. Army Corps of Engineers permit for stream diversions or impoundment, and for projects affecting streams, wetlands, and wetlands;
- Floodproofing of structures in defined flood and tsunami inundation areas, and Federal flood insurance;
- Federal Environmental Impact Statement (EIS) for projects which require a Federal permit, affect a registered historic site, or involve Federal funds;
- State review for "conformance" with Coastal Zone Management 0-2M goals and objectives for major Federal actions and permits in the 0-2M area;
- State Underwater Inspection Control Regulations which control the inspection or placement of underwater;
Some of the land freed from sugar and pineapple production has or will be converted to urban, diversified agriculture, and agriculture uses. Also, some of the land freed from pineapple use on Oahu was converted to sugar production. Making allowances for all these conversions, uncommitted acreage which remains available for diversified agriculture and aquaculture amounts to many tens of thousands of acres, with a large share of this on Oahu. Furthermore, the supply probably will increase given the unfavorable outlook for sugar prices. In fact, some unprofitable mills remain in operation temporarily only because of lease and/or energy agreements. Furthermore, some plantations continue to land-hold operations with their lands available for either uses when and if profitable activities arise.

Many of the lands freed or to be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well suited for crop and aquaculture production. Also, water is available for many of these lands, especially lands freed from sugar production. However, some of these lands are at high elevations where pumping costs are relatively high.

Further, some additional land has been or will be made available to diversified agriculture in government-sponsored agricultural parks throughout the State.

Even though considerable agricultural land is available, it should be noted that the supply of parcels for small-scale farmers is limited. This is partially because of County regulations which require electrical power, paved rather than gravel roads, and buried rather than surface water lines. These requirements are appropriate for rural estates, but are unnecessary for agricultural use of the lands. The added expense for these items makes it unattractive for large landowners to subdivide their land into small agricultural lots.

Of interest, there is also a large supply of fallow agricultural land on the mainland. This supply is expected to increase given genetic engineering advances which give promise of developing crops having higher yields, increased resistance to diseases and pests, and increased tolerance to climatic variations. Thus, increasing demand for agricultural land in Hawaii as a result of land shortages on the mainland should not be expected since such mainland land shortages are not expected.

CONCLUSION

It is extremely doubtful that the Molokai development will affect adversely the statewide growth of diversified agriculture or aquaculture, either immediately or in the long term. The conclusion derives from the following: in enormous amount of
prime agricultural land and water has been freed from sugar and pineapple production in recent years (including much land on Oahu); there is a very real possibility that additional sugar acreage and water will be freed given the outlook for low sugar prices; and diversified agriculture and freshwater aquaculture will require a comparatively modest amount of additional land and water for expansion, particularly in the Waikiki area given its particular conditions.

REFERENCES


Hawaii Department of Planning and Economic Development, Hawaii Sugar Industry.


University of Hawaii College of Tropical Agriculture and Human Resources, organic industry analysis, 1982.


APPENDIX H

ARCHAEOLOGICAL INVESTIGATIONS
AND
RECOMMENDATIONS
FOR
MOKULEIA, O'AHU

Prepared for
Mokuleia Development Corp.

Prepared by
Archaeological Consultants of Hawaii, Inc.
INTRODUCTION

At the request of Mr. K. Tim Yee, Archaeological Consultants of Hawaii, Inc. has conducted a preliminary archaeological investigation of approximately 7,300 acres of land at Mokuleia, Waialua District, O'ahu. This property includes the KAEWA and RANALO of KEELE, KAAOAULU and MOKULEIA. The tax map listed parcels include the 6-B-02: 1, 4,10,14; the 6-B-03: 5,6,11,15,16,17,18,19,20,31,33,34,35,38,39,40; the 6-B-08: 32.

The purpose of this report is to provide preliminary information regarding the existence of any archaeological resources within the project area, assess their significance, and, based on these data, to offer recommendations regarding their future treatment.

To this end, a brief field examination was conducted, archival sources reviewed and informant testimony collected. This last exercise was considered to be of particular importance to this report and especially so when one considers the size of the survey area, the limited scope of the present investigation, and the availability of individuals who have lived and worked on the property for more than thirty years.
PHYSICAL SETTING

The subject property, nearly 2,800 acres, spreads from sea level to about 1,500 ft. Within this area, a wide variety of soil types are in evidence along with a number of differing land forms ranging from ocean front sandy beach parcels, narrow alluvial plains and up to steep mountain slopes. Nourished streams occur and run according to rainfall.

Floral patternsing on the property is also varied and includes cultivated sugar cane (Saccharum officinarum), hala (Spartina cynosuroidis), kalo (Ipomoea batatas), chrisstberry (Rubus ursinus), and a number of grasses and other introductions.

Much of the property has been subjected to past contact alterations that include farming and ranching activities and there can be little doubt that these developments have had a substantial impact on any above-ground archaeological sites that may have existed here.

At this writing, grazing by cattle and horses is in evidence and linked to Honolulu and Crook Ranches. Modern dwellings associated with this ranching are scattered about the property and are serviced by roads, water tanks, the Kawihapal Keeaumoku Reservoir and a variety of other constructions.

PREVIOUS ARCHAEOLOGICAL WORK

The first archaeological examination of the Mokuleia area was conducted in the 1930's by Gilbert McAllister. He identified seven sites (190, 191, 192, 193, 194, 195 and 196) which are on or else very close to the subject property. Some of these sites have been destroyed.

190. Puu o Lehua. An ahupua'a fishing shrine. At this stage, it is indeterminate if this site was once within the limits of the subject property — although I think not. This site is not of particular concern as it's surface manifestation has long ago been destroyed and it's function suggests little opportunity for sub-surface data recovery. It is, however, important to list this site as it adds to the overall interpretation of the general area.

191. Koahana Nupea. Again, in the absence of a well-defined property boundary, it is difficult to determine if all, or a portion of this site rests within the limits of the property. Furthermore, it is still undetermined if surface remains of this religious structure, or any part of it, still exist. Nevertheless, sub-surface data recovery for this type has promise especially considering the report of associated Kalua Hale or private houses. McAllister reports that Kauia was an extensive two terraced structure paved with small stones.

192. Hidden Water. These consist of four springs which have important legendary associations with the Hawaiian deity Kila. This site is clearly within the subject parcel.

193. Kalua Fishing Shrine. Most likely contained on the property at one time. Nothing remains of it today and excavations at its former location would not be likely to yield anything of consequence.

194. Hau Hale. Well within the property limits, in a site of Kalua (Summers and Dietling 1978). It was reported that this site has been destroyed. I am not sure this is the case. Our partial field examination in the remnant area, upon which this possibility was based, will be discussed in a later section.

195. Kalua Fishing Shrine. Once contained within the property but now destroyed. Sub-surface excavation at former location is not recommended.

196. Village Site. This unowned village is most likely outside the limits of the property but it's close proximity, undetermined boundary, and research potential combine to make this an area of considerable interest.

In sum then, McAllister's 1933 report lists seven sites for the area. Three of these sites (190, 193, 195) have been destroyed and site function suggests that sub-surface excavation at their former location would be unnecessary. Three more sites (191, 194, 196) hold unusual promise and more work is necessary to determine existence, exact location and extent. The remaining site is connected to Hawaiian mythological beliefs and needs further study.
The next archaeological work in the area was conducted by Robert J. Romann in May of 1982. This reconnaissance covered five select areas some distance east of the subject property towards Waiholo. Romann lists nearly 30 sites of archaeological interest in the general area and added another as a result of his field investigations (site 50-00-04-3400).

It is worthwhile to quote directly from Romann's report as his observations concerning the archaeology of the Maluulu region are not without value to conclusions set forth later in this report.

The archaeological record including the in formation on destroyed sites indicates that in precontact times and during the 19th century the economic system in the project region included both wet and dry agriculture as well as aquaculture in at least two ponds. Little is known of the residential pattern... but the population was probably relatively dense, especially along the shore if we may judge from the number of religious sites (nine heiau and four known shrines and alters, now destroyed) that were recorded by McAllister.

(Romann 1982:7)

In January of this year, William Barrera Jr. conducted an archaeological reconnaissance survey of the subject property. Briefly, Barrera presented word-for-word copies of McAllister's site descriptions and handy's agricultural accounts; by admission made "no attempt to locate any of the sites discussed by McAllister." The probable significance or research potential of these sites, and the current state of archaeological research in the maluulu area, is what is known and what is needed, were not discussed.

Barrera listed only two sites for the entire area (one stone wall on the end of the ridge and south of the Dillingham Ranch and another which is probably part of a historic paddock, southeast of the Kauhikaua Reservoir). There is no site location map in the report and therefore it is difficult to be certain where these sites actually are. For instance, in his "stone wall" 100 meters SE of the reservoir, just west of it, or some further distance in the direction of the Kekauli`u Mountains. I believe the stone wall refers to in the same one that, if followed to term, leads to a set of two platforms that may well be the once-thought destroyed 194 heiau site recorded by McAllister.

In any case, these platforms were missed in his preliminary survey and, if we are talking about the same stone wall, accompanied the mislabeling of it as part of a historic paddock. It would be difficult to believe that above ground sites are not contained within the study area, although I do agree with Barrera that the number is likely to be low due to the operation of heavy equipment and other ranch/agricultural activity.

Barrera cannot be faulted for not locating every site on a 2,400 acre piece of property in a short two days; however, it is quite clear that a much more detailed survey must take place before one could even consider making the pronouncement that there are only two sites "...of possible archaeological or historical interest" (Barrera 1985:5) on the property.

This problem is compounded by Barrera's own conclusion section in which he demonstrates an awareness of "...the likelihood that sub-surface evidence of agricultural practices present on the property...that previous work ...strongly indicate that habitation sites were present in the vicinity."(Ibid). These sites, or the possibility of their existence need to be addressed.

Also, the possibility of mo`a burial caves (there are documented accounts of such sites in an almost identical environmental setting not more than one mile away), and burials in the maulo section and heiau-associated burials are additional archaeological areas requiring further research.
METHODOLOGY

Given the short duration of this preliminary study, (two field days), and the realization that full reconnaissance of the entire 7,800 acres would be impossible in that time, it was decided that the most practical approach toward a meaningful overview of the archaeological potentials on this property would involve a heavy reliance on information provided by individuals who have lived and worked on or near the property for the past 30 years.

Mr. Jame Dowsett and Mr. Tommy Ah Chu of Mokuleia Ranch were most helpful in terms of discussion and taking me directly to places of archaeological interest. With the help of these two individuals and in the company of one assistant, I visited a number of selected spots around the property and was able to familiarize myself with the variety of ecological settings.

No archaeological report can be complete without a complete review of like work on the property in question and in the immediate area. Accordingly, the archaeological library at the Department of Land and Natural Resources was consulted for archival information as was the State of Hawaii Survey Office, where, with the help of Mr. Charlie Okino, I was able to inspect the U.S. Emerson map of the area, drawn in 1887. At the archaeological library, with the help of Mr. Earl Haeli and Agnes Griffin, I was able to renew McAllister's 1932 survey report and in particular the section dealing with Mokuleia. In addition, I was able to review the work of Emerson (1882) and Barrera (1964). Other material consulted was Samuels and Sterling's Sites of Oahu (1978), and Foote et al. (1972). I was also able to locate a site map prepared by the State of Hawaii entitled Lands Print State Earth Conceptual Plan which gives approximate locations of archaeological sites on the subject property.

From the sources above in combination with the informal testimony and brief field inspection, I was able to arrive at what I believe to be a reasonable and documented conclusion concerning the archaeological potential on this particular piece of property and offer recommendations that will hopefully ensure the proper treatment of cultural resources in this portion of Mokuleia.

RECOMMENDATIONS

After a brief field inspection, the collection of informal testimony, review of archival maps and documents and a reasonable overview of what is known and what still needs to be known regarding Mokuleia, I present the following recommendations.

To begin with, it is important to realize that Mokuleia represents a near blank spot on the archaeological map of Oahu. McAllister's initial inspection of the area in the 1930's was a good starting point (basic description of what sites remained in the area at that time, and a partial list of what had been destroyed); however, it is important to recall that this survey was conducted more than 50 years ago and the advance of archaeological techniques (e.g. radiocarbon dating methods and obsidian hydration dating) together with a clearer understanding and definition of the important issues in the interpretation of Hawaiian prehistory, make it essential that substantive follow-up take place.

From this report and the early work of E.C.H. Handy, we do know that Mokuleia was a locus of substantial prehistoric activity and that a considerable amount of this activity centered around terrace agriculture. It is quite clear, I believe, that the development and intensification of agriculture (particularly taro) and the study of this process, is one of the chief indicators of archeological interpretation in Oceania. In Hawaii, the key to the development and rise of the Chieftain culture may well rest in the excavation and interpretation of buried taro terraces. It is important to recall that valuable information may remain underground well after visible above-ground manifestations have disappeared.

At this writing, we have no dates whatsoever for this region of Oahu and all indications point to Mokuleia as being especially fruitful in this area. Beyond this, the number of religious sites in the area (and most likely habitations sites to go along with them) make the area all the more attractive.
If all this were not enough, tax records indicate no less than 34 grants for the subject property and so we may be able to learn quite a bit about the prehistoric transition period in a subject that has already produced evidence results in nearby Anahulu Valley.

An evidencer earlier in this report, there is also some question as to the extent of remaining above-ground archaeological sites and the true location of those that do remain. Neither Barrera's report or this, or both in combination are sufficient to make an adequate judgement.

Based on the information listed above, I think it important that prior to actual development:

1. A more complete survey be conducted on the subject parcel. This survey should be directed at the presentation of data that would locate and map all known sites (fixing their exact location on a workable map). In addition, representative areas at least, should be surveyed intensively to insure the protection of unknown, but not unexpected additional sites.

2. In addition to this surface survey, a systematic sub-surface examination of representative areas should be undertaken in order to assess the extent and potential of buried deposits, especially in the agricultural areas outlined in McAllister and Handy. This exercise should be designed to collect soil profiles and, if possible, material that can be subjected to dating techniques.

3. Ethnographic and archival material (including tax and Archives records) should be examined with research questions clearly stated in advance.

4. A final report should be prepared to present the results of the aforementioned recommended activity and this report should conform to the standards for intensive or Phase II survey as issued by the Society for Hawaiian Archaeology.

If there are any questions relating to this report, please feel free to contact me. Until then, I am,

Sincerely yours,

Joseph Kennedy

BIBLIOGRAPHY


APPENDIX I

BIOLOGICAL SURVEY
PROPOSED MOKULE'IA PROJECT
MOKULE'IA, WAI-A-LUA DISTRICT, O'AHU

Prepared for
Mokuleia Development Corp.

Prepared by
Char & Associates
Botanical/Environmental Consultants

June 1986
Introduction

Northeastern Mutual Life Insurance Company, through its Nobule'a Development Corporation, proposes to develop a "free-standing" recreational resort community on its property at Nobule'a, Waia'Ala District, Island of O'ahu. The company acquired some 1,000 acres of land from the Dillingham family and proposes to develop roughly 1,000 acres. Tentative plans call for several resorts, residential areas, and condominium units, as well as a small commercial area and two (2) golf courses.

The area proposed for development has long been used for grazing cattle and horses. Traces of an earlier macadamia nut planting can still be seen near the Mike road gate. Sugar cane fields lie on both sides of the project area.

Elevation on the project site ranges from a few feet above sea-level to about 520 feet in the Kapua Gutch section in the back of the project area. Rainfall is roughly 20 inches per year along the coastal areas and about 30 inches per year further inland on the upper sections of the project area. Habitat range from beach or strand environments to lowland, dry forest environments.

A survey to inventory and describe the major terrestrial plant and vertebrate animal communities found on the project area was conducted on 24 and 25 May 1986.

Terrestrial Botanical Survey

No prior record has been found of any extensive botanical survey of the coastal lowlands in or near Nobule'a. Two projects have been
proposed in the area since environmental assessment has been required.

Of these, only the first, a proposal by the Warren Corporation (1973) to
mine sand in what is part of the present study area, generated a full
environmental impact statement. A copy of this EIS has not been seen, but
review comments indicate that a botanical survey was done, though with
some deficiencies noted by Ruth Gay (Botany Department, Univ. of Hawaii).

An environmental assessment was prepared (Anonymous, 1974) for a
proposed agricultural subdivision of tax parcel 6-8-05: 01, 07, 14, and
31. For this report only the briefest of floral surveys was made. In
its broadest form, it correctly conveys the general aspect of the flora,
but there is no check list of species and problems with some of the
identities of specific plants listed only by common names arise.

The remaining three projects did not require botanical surveys.

Two detailed floristic studies (Hatway 1955; Virnson 1972) have
been conducted on a remnant dry forest located on the slopes of a hill in
Kapuna Gulch at about 1,180 feet elevation. This area is located on the
former Dillingham ranchland just outside the Hokule‘a Forest Reserve
fence. It is not in the area proposed to be developed. Hatway (1952)
found that the forest contained 26 species of native trees with 'ulu
(EGLESIA OAHUENSIS) being the most abundant. Two smaller shrubs found
here, moloka'U (CAREX ANGULATA) and huli'i (HOUTCHINSON VIRIDE) are
listed by the U. S. Fish and Wildlife Service (1980) in their review of
endangered or threatened plants.

Virnson (1972) conducted a survey of Hatway's plot 20 years later
and found most of the species listed by Hatway. He found the plants
in the Kapuna Gulch plot maintaining their populations.

Kojata (1980) conducted an intensive ecological study of the dry
and mastic forests in nearby Pohole Gulch. His study area is located in
the forest reserve outside the project area.

Survey Methods

Prior to undertaking the survey, a search was made of the
pertinent literature to familiarize the investigators with previous studies
conducted in the area.

Existing topographic maps were examined prior to field work to
determine access, terrain characteristics, and potential logistical and
technical problems which might be encountered during survey work. Later,
a recent colored aerial photograph (1" = 7,000') was used to delineate
the boundaries of the different vegetation types found on the project
area.

An intensive walk-through survey method was used. Particular
attention was focused on the least disturbed areas such as the strand
and hillside vegetation. Access into the Kapuna Gulch section was by the paved
Nike road. Access onto the other areas was via of Farrington Highway was
by paved and unpaved (4-40) roads. The malih (or beach) areas are easily
accessible from the highway.

Species identifications were made in the field. Plants which could
not be positively identified were collected for later determination in
the laboratory and herbarium. Notes were made of the species present
in each vegetation type. The species recorded are indicative of the time
and environmental conditions under which the survey was conducted. A few
of the more annual species had already flowered and died when the survey
work had started. A survey taken at a different season and under varying
environmental conditions would no doubt yield slight variations in the
species list, especially of the annual species.

Description of Vegetation Types

Eight vegetation types or plant communities are recognized in the
study area (Fig. 1). These are based on the species which dominate in
a given locale and their structure. A look at the species list would
convey little about the distinctiveness of each plant community, due to
the general ubiquity of many of the species as trace elements at least.

For this reason, the treatment which follows, only the dominant components
of each vegetation type (or otherwise noteworthy plants) are discussed.

For the minor elements, reference should be made to the species list.

Certain areas have been excluded from the study. These areas are
in current cultivation or landscaped areas adjacent to dwellings. Abandoned
plantings and plants escaped from nearby excluded plantings are included.

Plants found on rights-of-way are also included because of their potential
for undetected presence in, or for subsequent dispersal to, the adjacent
study area.

1. Strand vegetation. In the unconsolidated sand of the beach, the dominant
plant is naupaka-kahakai (Grewia occidentalis), which forms extensive, low,
windbreak stands, especially on the top of the dune. Only two species
extend down the face of the dune toward the water—the exotic Bermuda grass
(Cynodon dactylon) and the native beach morning-glory (Ipomoea pes-caprae).

Three native plants share the top of the dune with naupaka-kahakai.

They are the 'akoko (Ipomoea leucantha), pohabili (Ugni marina), and

polinosia (Vitis vinifera). The 'akoko is found only near the westernmost
section of beach within the study site, adjacent to a beach park and
heavily traveled by vehicles. The largest patches of polinosia are found
at the easternmost section of beach, which is relatively remote and little-
used. Pohabili is scattered along the entire length of beach. In
addition, New Zealand spinach (Tetragonia tetragonioides) is common throughout.

Where there are not trees immediately behind the beach, the dune
vegetation extends for some length. In these areas, the back dune
vegetation is much richer in both native and exotic species. Most of these
are annuals or small, non-woody perennials. Larger shrubby plants are
represented mainly by Psoralea indica, Psoralea odorata, and the natural
hybrid of the two, Psoralea x demergens. Small Christmas berry shrubs
(Schinus terebinthifolius) are rare in this zone and are usually found
growing among Psoralea or naupaka-kahakai. The ground is covered to a
greater or lesser degree by Bermuda grass, New Zealand spinach, 'aha
(Acacia falcata), Australian saltbush (Atriplex hexaphylla), aloha (Hapalostyla
diffusa), and pau-u-ilima (Hapalostyla mesembrianthemoides). Other major
components are golden crowfoot (Ranunculus aurea), weedy heliotrope
Heliotropium procumbens), or brown (Hydrangea polymorpha), yellow sweet-
clover (Melilotus officinalis), Ceanothus sarmentosus, false yellow (Caleanthes
compendiosa), and Asystasia alata. Relatively minor components,
which usually are more common farther inland, are wild tomatoes (Lycopersicon
pseudocitrullus), Aerva angustifolia, bunched bottle (Scolopia verticillata),
scarlets-tined passionflower (Passiflora acutifolia), and hairy weaveria
(Aerva longifolia). A couple of native and exotic plants, koa-kal
(Ipomoea multiflora) and Polygonum viviparum, are found in this
vegetation type, though they appear to be quite rare. Both are fairly charateristic components of the strand flora, whose rarity may be attributed to long disturbance by man.

2. Maritime wooded assemblage. Further back from the beach, or where trees come down to the beach, strand vegetation gives way to plants more common in the dry lowlands. Within the study area, the only tree that tolerates exposure to the elements, especially salt spray, and thrives at the beach is ironwood (Casuarina equisetifolia). It is widely planted and also comes up spontaneously from seed. Although not common, seedlings of another exotic tree, the tree heliotrope (Heteroschistia argentea) can also be found. It is planted in the beach parks adjacent to the study area. Under the ironwood trees the ground is usually littered with fallen "needles," and a few scattered plants of Chamaedorea murale may be present.

Away from the trees other plants increase. The vegetation may take three forms—thicket, scrub, or grassland. Thickets are of two kinds: a dense thicket composed of either Positivas or Christmas berry (Scolopia thoroghiplana) which is so dense that little else can grow among or under them, and a semi-open thicket composed of boa-hocele (Lavannia leucophaea), which supports a large number of other plants beneath. Around the margins and in openings, Avatanea argentea and wild tomato (lycopersicon plumpifolium) is predominant. The wild tomato is especially noteworthy, as it is frequently a minor component of coastal vegetation types, but it has never been observed as a major component before. Its predominance can be attributed to fruit-eating birds common in the area, especially the red-vented bulbul. This is supported by the almost total lack of any other berrited plant in the vicinity that would support such large numbers of birds. Other plants of the open areas in and around thickets are milo (Theropogos pungens), cotton gum (Eucalyptus camaldulensis), and pantamas (Lantana kurzii). A number of vines can be found covering the thicket plants; these include wild bitter melon (Momordica charantia), anna-tos (Convolvulus catharticus), bulli-mauna (Ipomoea indica), Phascolus atropurpureus, Phascolus labiosides, and passion fruit (Passiflora edulis). Two additional vines deserve special mention. The exotic Calypogonium monogynum festoon trees and shrubs in the eastern portion to such an extent as to suggest a potential serious weed problem. The native kahaua (Acrocomia microcarpa) similarly festoons trees throughout the study area. It is, however, a winter annual that dies in the spring and summer and does not return until the winter rains of the next season. It poses no threat to other vegetation.

There is no assemblage of plants unique to the thickets, only subsets of the vegetation of the surrounding area, tolerant of the proximity of the sea on the one side, and of the dense shadew of the trees on the other. As stated earlier, the only large trees of the area are ironwood (Casuarina equisetifolia). Several shorter-statured tree species found in this community include isolated individuals of kio (Hypsea gallidea), Chinese banyan (Ficus microcarpa), monkeypod (Samanea saman), and "cotton" (Phascolarctium decoy). Several clumps of coconut (Cocos nucifera) remain in places from former plantings. The greatest diversity of trees is found at the eastern end of the study area.

This boa-hocele forms extensive scrub and thickets, while Christmas berry and Positivas form fairly small, localized thickets, especially in
the western end of the area. A single plant of *Iwaamae* (*Capparidium
oligoneurum*) was found in the undergrowth of a koa-huile thicket. This is a
species characteristic of the sea cliffs behind *Hokulau*.* It is totally
unexpected so near the beach. Perhaps some centuries ago, when the islands
were still somewhat pristine, it normally occurred all the way down to the
beach.

Where koa-huile is more open, it produces a scrub which grades into
grassland with a further decrease in woody cover. In the scrub areas koa
(*Acacia koa*) occurs as an occasional woody shrub. A number of herbs
characteristic of the more upland sites are found where the scrub cover is
sufficiently open. These include rattlepod (*Crotalaria micrantha*), orange
lava'-weed (*Lamotia rupetrafolia*), *'Ilima* (*Gilia acuta*), cheeseweed (*Oxalis
parviflora*), and wild cucumber (*Lamotia diphylla*).

In places where the woody species do not predominate, Colorado grass
(*Panicum maximum*) and sour grass (*Eragrostis ciliaris*) form grasslands.
These are not extensive and grade into, or alternate with, scrub and
thicket. In a few places Kataw grass (*Eragrostis purpurea*) forms brakes
or small stands, especially where fresh water is at least seasonally
abundant. In drainage areas with running water, California grass (*Buchloe
dactyloides*) grows in a narrow band adjacent to the water's edge. Wetland
areas are discussed in detail in the following section.

4. **Wetland areas.** These areas adjacent to standing fresh or slightly
brackish water—ponds and drainage ways—are isolated and not
adjacent to the beach or further inland. Usually they would be expected to have a unique flora of their
own, but this is not the case in the study area, as these wet areas have
have been greatly modified by man. The pond areas are former boreal pits
from sand mining operations. For the most part, the vegetation in these
wetland areas consists of those plants already growing in the adjacent
communities, though usually much more lushly than nearby. There are,
however, a few plants characteristic of wetland areas. Four species requiring
the presence of more or less abundant water are restricted to these areas:
cattail (*Typha latifolia*), umbrellagrass (*Urochloa alterniflora*), *'okalua*
(*Schoenoplectus*), and purple willow (*Salix arctica*). In addition,
a number of woody or escaped ornamental species are present in low numbers
only around these wet areas.

5. **Pasture areas.** The vegetation of these areas has been modified by the
introduction of range grasses and some legumes for forage and by the
grazing of horses and cattle. In addition, a number of weedy plants have also
found their way into these areas. In the upper areas the primary forage grass
is Colorado grass (*Panicum maximum*). In the lower areas it is California grass
(*Buchloe dactyloides*). Other grass species were found to be more restricted.

Wet grass (*Eragrostis curvula*) forms extensive mats. In only one area to
the east of the *Hokulau* house, where it occupies a fringe between the
maintained lawn of St. Augustine grass (*Stenotaphrum secundatum*) and an
under-grassed paddock of California grass and thistle grass. Rhode's grass (*Urochloa
gigantea*) and bluegrass (*Festuca clandestina*) are found only in the
lower portions of the project site, adjacent to areas where horses
are worked regularly. Buffal grass (*Codonopsis citrina*) is widely
distributed but is most common. *Schoenoplectus insulatus* and
Bermuda grass (*Cynodon dactylon*) are more common in heavily grazed areas that

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(*This text is a excerpt from a larger document, discussing vegetation patterns and modifications. The page focuses on different types of vegetation and their characteristics within a specific area, highlighting the impact of human activity on the natural environment.)*
their absence would leave the ground largely bare except for scattered shrubs. The Bermuda grass usually occurs in areas where the soil is deeper and retains water during the rainy season; non-turf grasses occur in thin, rocky soil, which drains quickly and which supports little else.

Patches of sour grass (Brachypodium distachyon) are widespread but do not predominate in open pasture. Goose grass (Eleusine indica) is a minor component where the soil has been compacted by vehicular traffic, as along jeep trails.

Besides the grasses, which are the most salient feature of the pasture areas, a number of other plants are significant members of the community. Among the woody plants are black (Fraxinus americana) and Java plum (Syzygium cumini), which occur as scattered individuals, black on the lower, drier areas, and Java plum on the upper, sloping areas. Elaeagnus commutata) and haw-bush (Lonicera _neucophila_) form a very open shrub throughout. In the upper sections of the study area, greaves ( _Psilotum nudum_ ), chinaberry ( _Melia azedarach_ ), and silk oak ( _Grevillea robusta_ ) are occasional. Silk oak becomes much more common on the slopes above the study area, in the area just to the west of the Bilegham house in the remnant of an old macadamia nut ( _Macadamia ternifolia_ ) orchard.

A large number of herbaceous plants are to be found in the pastures. Several degrade the quality of the pasture and, as they are avoided by the animals, they tend to take over when the more desirable plants are overgrazed. These highly undesirable plants are spiny amaranth ( _Amaranthus spinosus_ ), cocklebur ( _Xanthium strumarium_ ), Sudan grass ( _Sorghum Sudan_ ), annual_ _ ( _Convolvulus canadensis_ ), and an as-yet undescribed species of Malvastrum. All of these, except the unknown species, are spiny and quite undesirable for that reason alone. In addition, however, a number of them are more or less toxic. Other weed species avoided by the grazing animals include false spirea ( _Fragaria virginiana_ ), common along waysides and apparently strictly avoided; golden crownbeard ( _Veronicastrum virginicum_ ), which is highly noxious; European centaury ( _Centaurium umbellatum_ ), abundant but still a minor constituent because of its small size; and orange lime's ear ( _Lamium maculatum_ ).

5. _Lonicera neocophila_. These are areas in which the haw-bush ( _Lonicera neocophila_ ) are taller, up to five or six meters tall, and whose crowns meet to form a more or less closed canopy. An infestation of a recently introduced psyllid species ( _Tephrocynda pissa_ ) has severely damaged haw-bush plants in the island. Apparently, plants in marginal habitats have been killed. While large areas of haw-bush shrub on the study site are damaged, it was observed that haw-bush was thriving in several places. Closer examination found high numbers of ladybird beetles ( _Coccinellidae_ ), which were apparently reducing the psyllid infestations.

Often the areas covered by haw-bush are bulldozer-traversed. Panic grass ( _Panicum maximum var. virgatum_ ), a forage grass, is associated with the haw-bush shrub. It does not seem to do as well in the open. Generally, the closed canopy and solid grass-cover do not allow other plants to establish or persist, except where overgrazing, trampling, or other disturbance opens the ground cover. A native species which seems to do well in this vegetation type is the 'Little' ( _Pisonia virgata_ ). It is found in bulldozer-traversed or almost barren rocky areas under the haw-bush shrub. In some areas, the panic grass has been completely replaced by some
grass (Triarrhena insularis), apparently due to severe overgrazing. Animals find this grass unpalatable, a point emphasized by the common name of "sour grass." This is particularly noticeable along the bike road, but it is seen to a lesser degree elsewhere. Where the ground cover has been removed or reduced by disturbance of various kinds, a large number of weedy species have come in.

6. Pinus woodlands. Kawa (Pinus palida) is scattered throughout the study area, but in only two areas does it become a major component. One area is in a mixed scrub/forest near the western extreme of the upland portion; the other is an almost pure stand just to the west of the bike road. In the lower reaches it is clearly an artificial stand with the trees planted in rows. Kawa wood is harvested in this area. In the upper areas of the project site, the canopy open up considerably, and the orderly planting of trees is not apparent. At the very top of the study site, the woodland is quite scrubby with koa-haole (Leucandra bicolorata).

In the scrubby areas, it is little different from the preceding Leucandra plant community type. In pure stands, however, it is a distinct community. The canopy is fully closed, but the small leaves of Pinus alba are a great deal of light. There is no undergrowth, though koa-haole, Pinus solandra, ibu’alu (Mangifera indica), and mule's ears (Helianthemum coronarium) are scattered here and there. The ground is completely covered with Culnea grass (Culnea maxima) and scattered clumps of grass (Triarrhena insularis). Along the very bottom margin of the woodland, the most common weed in purple loosestrife (Lysimachia emersus), a plant not found elsewhere in the study area. Burroch (Triphasia semitriquata) is similarly restricted to this woodland but is not very common. Along the jeep road the same assortment of weeds found in adjacent pasture and scrub are also encountered.

7. Stream bottoms. This vegetation type is of very limited occurrence in the study area. It is also a woodland, extending down the length of every stream with significant seasonal flow, though seldom greater than thirty meters in width. The predominant tree is Java plum (Syzygium cordatum), which forms an almost completely closed canopy. Waterlily, a native tree, is occasional; seedlings and saplings of willow are found in a number of open stream beds in pasture areas. Although large willow trees may be found in the upland pasture areas, the very largest trees occur in the stream bottom woodlands.

Two forms characteristic of stream bottoms are also found here, though the streams are too dry to support them during the summer months. They are Xylosma occidentale and swamp willow (Christiania parvifolia). Flowering plants usually found in this type of habitat include palmate (Eupatorium spuriu), California cupule (Coprosma eucalyptina), and taro (Colocasia esculenta). In the back of the study area, where the foothills come down to the coastal plain, the influence of the streams can be seen on the hillside immediately above.

8. Rocky hilltops. In many regards, these are the same as pastures. They do, however, have a number of species unique to them, which would not be expected in the pastures below. For the most part, the hillside are rockier than the pastures, more steeply sloped, and less heavily grazed.
Shrubs are also more common. Among the species restricted to this community are two dryland forms which prefer arid banks, *Poa annua* and the gold or silver fern (*Pityrogramma colensoana*). Among the flowering plants, there are two native species characteristic of rocky areas. Heke (*Erica lyallii*) is locally fairly common along the foothills all the way to Kaleau Point. *'Aha'a,'a-waui-oat (*Physaria leptostachya*) is virtually restricted to thin pockets of soil on rocky ledges of the steep hillsides. Uliluli (*Erythrina sandwicensis*), while seen occasionally in the pastures and stream bottoms below, is quite common on the hillsides, mostly just outside the study area, although they do extend down into the study area for a short distance. The only other native tree unique to this area is alahe'e (*Cordia tedae*) This species was probably once a major component of the native lowland forests, which have largely been replaced by introduced vegetation. It is much more common at slightly higher elevations and, in fact, can be seen to be much more numerous on the slopes immediately above the study area. Two exotic species, *Hibiscus tiliaceus* and kahalawai (*Cassia heterophylla*), characteristic of slightly wetter hillsides, are found in the back of the study area where it is more moist. Because of the slightly higher rainfall, Texas sage (*Gaultheria procumbens*) and po'ohe'oala (*Ficus cf. impressa*) are also present at the very back of the study area. They are more common at higher elevations outside the project area.

**Endangered Species**

Within the study area no species designated as listed, proposed, or candidate threatened or endangered species (U.S. Fish and Wildlife Service 1980) by the federal and/or state governments were located. In only two areas were significant occurrences of native plants found. The strand vegetation contains some significant native plants which would be worth preserving or even propagating as potential landscape plants. The hillside below the hike road holds vestiges of the prehistoric lowland vegetation that probably once characterized this region. In neither case does the land in question particularly suited to development, the study area coming under the Special Management Area, and the hillside area with slopes greater than 30 degrees. However, it is adjacent to land that could be developed, thereby bringing the plants into jeopardy. On the other hand, neither of these vegetation types is at all pristine, and, as stated above, none of the constituent species is rare, threatened, or endangered, nor likely to be so in the immediate future.

**Discussion and Recommendations**

There are no plant communities or individual species located in the study site in need of protection. That is not to say that some measure of care should not be exercised if the two areas mentioned above are to be developed. There does not appear to be any botanical impediment to the development of the study area. It has a long history of use and alteration, and little of botanical value remains. All vegetation types on the project area, with the exception of the strand, are dominated by introduced (or native) plant species. If development proceeds, pre-development actions should be taken, as far as practical, with native plants adapted to the environment. With sufficient lead time, they can be had on the more overworked and poorly suited landscape plants usually encountered. They should cost no more to procure and less to maintain, and quite a few are of considerable ornamental merit (Fig. 2).
A number of botanic gardens and arboreta in the state, such as the
Hawaii Botanic Gardens, Waima‘a Arboretum, Lyon Arboretum, and Kaulana
Zoological and Botanical Garden, have successfully employed native lowland
species in their landscaping and displays. There are also a number of
measurers which specialize in native species.

**Plant Species Checklist. Wahi‘a‘a Project.‘ O‘ahu**

In the plant species list, families are arranged alphabetically
within each of the four groups: Ferns, Gymnosperms, Monocotyledons, and
Dicotyledons. Taxonomy and nomenclature of the Ferns follows Lamont
(manuscript in preparation). Taxonomy and nomenclature of the Gymnosperms
and flowering plants (Monocotyledons and Dicotyledons) follow St. John
(1973) except where more recently accepted names are used. Hawaiian names
used are in accordance with Porter (1972) or St. John (1973). The follow-
ing information is given:

1. **Botanical name with author citation.**
2. **Common English or Hawaiian name, when known.**
3. **Biogeographic status of the species. The following symbols are used:**
   - K = endemic = native only to the Hawaiian Islands
   - I = indigenous = native to the Hawaiian Islands and also
     in one or more other geographic areas
   - P = Polynesian = plants of Polynesian introduction; all
     those plants brought by the Polynesian immigrants prior
     to contact with the Western world
   - E = Introduced or exotic = not native to the Hawaiian Islands;
     brought here intentionally or accidentally after Western
     contact.
4. **Vegetation types.** Eight vegetation types are recognized on
   the project area and are described in detail in the text.
   The number heading each of the columns refers to the fol-
   lowing vegetation types:

   1 = Strand association
   2 = Maritime wooded association
   3 = Wetland areas
   4 = Palustrine areas
   5 = Leucopepa scrub
   6 = Pisangia woodland
   7 = Stream bottoms
   8 = Rocky hillsides
<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Status</th>
<th>Vegetation types</th>
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<td><strong>Acanthaceae</strong> (Acanthus Family)</td>
<td>Acanthus aspera L.</td>
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<td>pohonme</td>
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<td>Ipomoea cairica (L.) Sweet</td>
<td>kauli</td>
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<td>- R - - - - -</td>
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<tr>
<td>Ipomoea indica (Burm.) Merr.</td>
<td>kauli—mauhia</td>
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<td>huma—zai</td>
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<td>Jacobinia sandwicensis Gray</td>
<td>pa—uo—hi’i’aka</td>
<td>E</td>
<td>C C - - - - -</td>
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<td>hairy nerveria</td>
<td>E</td>
<td>- - - - - - -</td>
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<td>Euphorbia hirta L.</td>
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<td>Euphorbia prostrata Atk.</td>
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<td>Texas scarlet sage</td>
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<td>- - - - - - LC</td>
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<td>West Indian sage</td>
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<td>Erythrina sandwicensis Deg.</td>
<td>wildwilti</td>
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<td>LC LC - - - -</td>
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<td>yellow sweetclover</td>
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<td>* P. pellida (Ramb. &amp; Boul. ex Wills.) HMK.</td>
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<td>maneypoyd, rain tree</td>
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<td>Tigmus marina (Bour.) Merr.</td>
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* = Wild species
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<td><strong>Cuphea xanthogramma</strong> (Jacq.) Vossbride</td>
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### Literature Cited


### Acknowledgements

- The authors wish to thank the following institutions for their support:
  - U.S. Forest Service
  - U.S. Fish and Wildlife Service
  - National Park Service
  - State of Hawaii
  - University of Hawaii
  - Kamehameha Schools

- To all those who contributed to the project, we extend our thanks.

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Note: The text seems to be a catalog or list of scientific names along with related common names and vegetation types, possibly for a specific study or report.
Figure 2. Some native lowland plants which may be used in landscape plantings. Lower left, blackjacks, strand plant; upper right, blackbushes, strand plant.

TERRITORIAL FAUNAL SURVEY

The study area has been and still is used for grazing cattle and, to a lesser extent, horses. Native lands have replaced the original lowland forests in the upper sections of the project area.

Before the influence of Western man and his domesticated livestock on the Moloka'i area, the Hawaiians used the land largely for sweet potato cultivation (Hoddy and Siny 1931). Water from several streams and springs, especially near the foot of cliffs, was used to grow taro, bananas, sugar cane, and 'u'au. Today the vegetation on the project area is dominated by introduced plant species. The faunal communities are likewise composed largely of alien species introduced by man.

Native and migratory bird species are found in two faunal habitats within the project area. Two endangered waterbird species are found in the pond areas, while the coastline and pond areas provide habitat for migratory shorebirds.

Survey Methods

The faunal survey was conducted on 26 and 27 May 1965; most of the field work was conducted between the hours of 0830 and 1700.

Transect counts were used to determine bird densities and distribution within the different habitat types. Birds were detected both by sight and by their vocalizations. In addition, the presence of bird species was determined by their tracks, nests, droppings, etc.

Hawaiian, amphibian, and reptilian species were recorded when sighted or heard. Their presence was also indirectly determined by tracks, nests, remnants, etc.
Results

Forestal habitats--Six general forestal habitats--pasture lands, low-bush scrub, forested woods, pond areas, beach area, and mixed maritime scrub/grassland--are recognized on the project area. A more detailed classification system of vegetation types is presented in the botanical report.

The predominant forestal habitat on the project area is pasture land, which consists of open to semi-open grassy areas. In the open-open areas, scattered trees and shrubs of kahiw (Pseudopanax colensoi), Java plum (Syzygium cumingii), low-bush (Gaultheria procumbens), and kia (Baccharis farnesiana) are frequently observed. The dominant grasses are two species of Paspalum and California grass (Bromus sect. muticosus). The pasture area provides grazing for both beef and dairy cattle (Bos taurus) as well as horses (Equus caballus). Cattle egret (Bubulcus ibis) was often seen associated with horses and cattle in the lower pastures. Bird densities and diversity are high in this habitat, with a number of granivorous (seed-eating) species present. Birds and several smaller mammal species such as the mongoose (Herpestes smithii) and the house mouse (Mus musculus) are frequently encountered around the livestock watering troughs scattered throughout the paddocks.

The low-bush scrub and kahiw forest are the second and third forestal habitats. These habitats occupy the inland portions of the project area. Species density and diversity are not as great as in the pasture areas. The red-created cardinal (Paroaria cornix) is common in this habitat. Kangaroo, the metallic skink (Tiliqua sylvestris), and the storming sparrow (Plectrophenax lamini) prefer these wooded areas.

The pond areas around the Crocker Ranch were surveyed intensively, as endangered waterbirds are known to frequent the area. Seventeen (17)

Hawaiian coot or 'ula 'ula ('Fulica atra') were observed on the largest of the ponds, which has been modified for waterfowl; two (2) were observed in the reservoir pond behind the corrals; and one (1) was observed on the pond located on the west-lua side (southeast) of the ranch facility. This pond area consists of one irregularly-shaped pond which has been incompletely separated by an earth and coral rubble berm. Four (4)

Hawaiian duck or 'nāvahine (Aix sponsa) were found on this pond. The birds are probably captive-bred birds released in this or a nearby area. We were not able to get close enough to see if the birds were banded.

The beach or coastline area is the fifth habitat and is used by a number of migratory species which winter over in the islands. The survey was conducted after most of these species had already left for their summer breeding grounds in North America or the Arctic. Migratory species which would probably be seen here during the late fall, winter, and early spring months include the Pacific golden-plover or hula (Pluvialis fulicaria), wandering tattler or 'uhi (Heterocephalus incanus), ruddy turnstone or

'akekeke (Arenaria interpres), and sanderling or hina-kai (Calidris alba). These species would also utilize the pond areas and some of the pasture areas, especially those low-lying spots periodically flooded during heavy rains.

The maritime mixed scrub/grassland habitat located near the beach has a fauna community similar to those of the low-bush scrub and pasture areas. The house sparrow (Passer domesticus), however, is more common to these areas. The red-vented bulbul (Pycnonotus cafer) was common in this habitat and was often observed searching among the grassy areas for ripe wild tomato fruit (lycopersicum pimpinellifolium). The tomato plants are
abundant here, and the birds are attracted to the area by the fruit; the
birds would probably be less common in this area when the tomato plants
are not fruiting.

**Annotated species list**—The following list includes all those "undomesticated"
species observed on the project area. Cattle, horses, dogs, and the
domesticated ducks found around the pond area are excluded. For each
species, the scientific and common names are provided. Endemic species
(considered to be species native to and occurring only in the Hawaiian Islands)
are indicated by "H"; species introduced (native to the islands but not evolved
significantly from parent stock) are indicated by "I"; non-breeding
regular migrants or visitors are indicated by "V"; and species introduced
to the islands by man are indicated by the letter "F" (foreign).

A. Birds

1. *Pelecanus occidentalis*  
   Hawaiian Coot, 'Alae-kai-'o
   
   This subspecies of the American Coot is found on all the main
islands except Lana'i (Audubon Society 1984). Twenty birds were observed in
the pond areas around the Coudhar Ranch. They may also frequent the areas
near the mouth of streams. The dark slate-gray birds with white bills
and frontal shields fly only rarely, and then close to the water. No
young were observed, although nests and young have been recorded in all
months from April through September (Berger 1972). The coot is classified
as Endangered and is protected by state and federal law.

2. *Anas wyvilliana*  
   Hawaiian Duck, Koho, Eholo-wa-'o
   
   These small brownish ducks with plumage mottled in shades of brown
and buff were once found on all the main islands except Ka'ala'i (Berger
1972). Ka'ala'i, which is mangrove-free, supports the largest number of
birds. Captive-bred birds have been released on O'ahu and Kaua'i (Hawaii
Audubon Society 1984). Four ko'a were observed moaning themselves on a
fallen coconut tree by the easternmost (Malae-la side) pond. The birds
then took to the air in rapid flight, circled the pond below once, and flew
off in the direction of the sugar cane reservoir located on the Ka'ala'i side
of the project area. The ko'a is classified as Endangered.

3. *Philemon mysticormis hoactli*  
   Black-crowned Night Heron
   
   Found on all the main islands, the heron is not recognized as
subspecifically distinct from the American continental birds (Audubon
Society 1984). Two birds were observed feeding along the largest of the
ponds near the Coudhar Ranch, while one bird was observed on the mud flats
near the mouth of the stream located adjacent to the polo field.

4. *Anhinga anhinga*  
   Cattle Egret
   
   Introduced in 1984 to help control cattle insect pests, the birds
are now common in some areas of O'ahu and Kaua'i. These small, white
herons with yellowish legs and bills are common in the lower pasture areas.
The birds can often be seen following the cattle and horses, searching for
Insects which the larger animals have disturbed. The birds frequently gather in the trees around the pond areas. Birds are sometimes seen in the upper pasture areas, although their presence there is rather uncommon.

5. **Acidotheres tristis**  
*Common Nuna*

Nunas are found on all the main islands, generally at lower elevations (Hawaiian Audubon Society 1965). Although nunas are normally abundant in residential areas, very few birds were observed around dwellings on the study site. The birds, however, were common in the middle pasture areas which had scattered trees. They were uncommon to occasional throughout most of the other habitat types.

6. **Streptopelia chinensis**  
*Spotted Dove, Blue-Winged Dove*

Spotted doves are found on all the main islands, from sea level to about 4,000 feet and are abundant in residential areas (Hawaiian Audubon Society 1965). These birds were found frequently in the open pasture areas feeding on small weed and grass seeds lying on the ground. They were occasional in all of the other habitats except the beach and maritime scrub/grassland. In this habitat they were uncommon to rare.

7. **Passer domesticus**  
*House Sparrow, English Sparrow*

Released on O‘ahu in 1871, the house sparrow now occurs on all of the main islands (Hawaiian Audubon Society 1965). The house sparrow is common in the maritime scrub/grassland habitat and around the ranch buildings and homes. It is occasional around the pond areas, but in the remaining habitats it is uncommon. It seems to prefer those areas in the lower portion of the study site.

8. **Carpodacus mexicanus fortunei**  
*House Finch, Papaya Bird, Linnet*

The house finch was observed in small flocks of about 3 to 6 birds. It prefers the open grassy areas, feeding on grass and weed seeds. The birds are also fond of soft fruits, especially papayas (*Carica papaya*).

9. **Hymenolaimus polyglottos**  
*Northern Mockingbird*

The mockingbird is uncommon on the project area and was only observed in the lower forest, living from perch to perch. It was introduced to O‘ahu and Maui in 1911 to 1913 and has spread to the other islands (Hawaiian Audubon Society 1965). It prefers drier lowland areas.
12. Lonchura malacca
Chestnut Munia, Black-headed Munia
The chestnut munia is uncommon to rare on the project area. A few birds were observed in the open, grassy, upper pasture area only.

13. Amadina amandava
Strawberry Finch, Red Munia, Red Avadavat
Three groups of about a dozen birds each were observed in the scrubby area between the ponds and the lower pasture area. The birds were among several large pisonia shrubs (Pisonia odorata) which had abundant seed.

14. Pycnonotus cafer
Red-Vented Bulbul
The red-vented bulbuls are an unauthorized cage release, 1965 or before (Hawaiian Audubon Society 1966), and it has spread rapidly since then on O'ahu. It is common throughout all habitats except the beach, where it is uncommon to rare. Birds have also been observed feeding on strawberry guava (Psidium cattleianum) fruit in the Mokule'ia Forest Reserve above the project area (pers. obs.). It is noisy and gregarious; several birds were observed harassing a red-vented cardinal. It is largely a fruit eater and is considered a pest, as it relishes mangoes, papayas, and other fruits grown by homesteaders.

15. Cardinalis cardinalis
Northern Cardinal, Kentucky Cardinal
Pairs of cardinals (male and female) can be observed in all habitats except the beach on the project area. They are occasional on the project area and can frequently be heard vocalizing.

16. Passerina cayennae
Red-Crested Cardinal, Brazilian Cardinal
After the red-vented bulbul, the red-crested cardinal is the most common bird on the project area. It occurs in all habitat types except the beach. Small flocks of birds are frequently seen in the low-land brush, kahuku scrub, kahuku forest, and semi-open pasture areas.

17. Zosterops japonicus
Japanese White-Eye, Mejito
The white-eye is occasional in areas with shrub and tree cover on the project area. Old nests were observed in these areas. It was originally introduced to O'ahu from Japan in 1929 and is common in both dry and wet habitats, from sea level to tree line on Kauai and Kauai'i (Hawaiian Audubon Society 1964).

18. Alacrites chukar
Chukar
Only one bird was observed on the Lost of the Dillingham Ranch. It is probably rare on the project area.

19. Francolinus virchowi
Eckel Francolin
Francolines are quite common in the upper pasture areas and in the Mokule'ia Forest Reserve. The loud rattle of male birds is conspicuous.
20. Phasianus colchicus
Ring-Necked Pheasant

The birds are occasionally found in the open to semi-open pasture areas. Three males were observed separately in the grassy upper pasture area; one female was observed near the largest pond area.

21. Pavo cristata
Common Peacock

Peacocks were heard in the pasture areas above the project site. About half a dozen birds, peacocks and peahens, can be seen occasionally near the watering trough located near the Hokusia Forestry Reserve gate (pers. obser.). The relatively level area with forestry plantings of Norfolk Island pine, which can be seen from below, is known as "Peacock Flat" because of the presence of the birds. Although the birds were not observed on the project area during this survey, they may utilize the upper pasture areas within the site occasionally.

B. Reptiles

1. Rana catesbeiana
Frogs

Frogs are also relatively common in the area. Frogs are probably attracted to this area as the beach and maritime habitats are used by crabs and beach goers. Snails are common in the overgrown areas behind the beach.

2. Hemidactylus lineatus
Small Indian House Gecko

The gecko is frequently encountered throughout the project area. They are often seen darting across the paved and unpaved roads. Monkeys are often seen around the water troughs in the pasture areas.

3. Mus musculus
House Mouse

The house mouse was observed in the maritime scrub/grassland. One mouse was found feeding on the fruit of New Zealand spinach (Spinacea oleracea). Mice are also found near the trash dumps in this area. Mice were occasionally observed in the open, grassy pasture areas. Mice probably occur throughout the project area, as they are known to colonize a number of diverse habitats (van Riper and van Riper 1982).

C. Reptiles and Amphibians

An intensive search was not conducted for these two classes, as none of the terrestrial and pond species are native to the islands nor are any considered endangered.

1. Rana catesbeiana
Bullfrog

Three bullfrogs were heard near the largest pond area. The amphibians, which were basking near water's edge, were startled and made a squawking noise before splashing loudly into the pond to escape. The Wrinkled Frog (Rana rugosa) has been observed in the streams found in the forest reserve above the project area (pers. obser.). They may also be present...
In some of the pond areas, however, the bullfrog is an aggressive feeder and will eat anything smaller than itself, including the wrinkled frog (McKown 1978).

2. Gekko gecko

 mourning gecko

The gecko was found on both habitats such as the blaise forest and tall haw-base grass. Geckos were found in the cracks and crevices of bark on the trees and larger shrubs. They may also be found under rocks. Other gecko species are also present in the project area.

3. Lekolopisma metallicum

 metallic skink

This skink is active during the day and is occasionally seen among the leaf litter and debris in wooded areas such as the blaise forest and the clumps of ironwood (Casuarina equisetifolia) trees on the project area. It is the most common species of skink in the islands (McKown 1978).

Discussion and Recommendations

The vegetation on the project area has been greatly modified, especially by cattle ranching practices. Introduced plant species predominate. Likewise, the vertebrate fauna present on the project area is also composed largely of introduced species.

Development of the pasture areas, blaise forest, haw-base grassland, and maritime shrub/grassland will probably reduce the habitat size of a number of introduced bird species, especially finch and grass bird species. Opportunities for range expansion of species common with man, such as the house sparrow (Passer domesticus) and the common pigeon (Columba livia), will increase. The vertebrate fauna affected by the development in the preceding four areas is of minor environmental concern, as they are introduced species, and none is considered endangered by federal or state governments. Some, such as the mongoose and cat, prey on the native waterbirds found in the pond area.

The pond area and the coastline, to a lesser extent, support a number of native bird species. The pond areas provide habitat for, and are utilized by, two endangered waterbird species. The koloa (Anas wyvilliana) seems to prefer the irregularly-shaped pond which is shallow in one section with emergent California grass. The Hawaiian coot (Fulica americana sila) utilizes the largest pond more frequently than the small ponds.

The Final Draft Revision of the Endangered Hawaiian Waterbirds Recovery Plan has identified the ponds around the Crowbar Ranch as important habitat for the recovery of endangered Hawaiian waterbirds (K. Kusaka, USFWS, in letter to W. Vakal). The pond areas should be incorporated into the design of the development, and managed to preserve the habitat. Trees and shrubs around the ponds should remain. Additional plantings should be made in these areas of the pond which are without a shrub buffer zone.

Alterations to or modifications of the pond areas should only be done in close consultation with the U.S. Fish and Wildlife Service.
APPENDIX J

AIR QUALITY STUDY
FOR THE
PROPOSED DEVELOPMENT AT MOKULEIA
OAHU, HAWAII

Prepared for
Mokuleia Development Corp.

Prepared by
Barry D. Root

June 23, 1986
AIR QUALITY STUDY
FOR THE
PROPOSED DEVELOPMENT AT MOKULEIA
OAHU, HAWAII

Prepared by
Barry D. Root
Kaneohe, Hawaii

June 23, 1986
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SUMMARY

1. The proposed Mahalaile Development involves site preparation and construction of a recreational residential/resort complex on about 1,019 acres of land in Mahalaile on the northeastern portion of Ohio.

2. Present air quality in the project area is estimated to be very good since there are no major contributing sources of air pollution emissions other than vehicles traveling on nearby highways and isolated sugar cane fires.

3. Except for dust emissions during the construction phase of the development, no significant short term direct air quality impacts are expected. Adequate control measures exist to limit the impact of windblown dust, but special care will have to be exercised to ensure that previously developed residential areas are not subjected to excessive levels of particulate pollution from construction activities.

4. Indirect air quality impacts are expected to result from non point source electrical energy. This impact is most likely to occur in the vicinity of existing power plants such as the Eddle Plant on the Walloonee coast where increased levels of particulates and sulfur dioxide can be expected. Maximum use of solar energy designs proposed project development can at least partially mitigate the magnitude of this impact. New methods of generating electrical power such as wind or ocean thermal energy conversion may eventually play a mitigative role in this regard.

5. Increased traffic generated by the Mahalaile Development will increase emissions of carbon monoxide along Perrington Highway in the project area. Modelling of current and projected weekend peak hour road work case concentrations of carbon monoxide at the intersection of the main project access road and at Tomson Corner indicates that projected levels will be well within allowable State and National ambient air quality standards with or without project development. For that reason no specific air pollution mitigation measures other than those proposed in the traffic impact study for the project are deemed to be necessary.

6. The modeling study does indicate, however, that installation of a traffic light at the intersection of the main project access road and Perrington Highway sometime before project completion should result in lower concentrations of carbon monoxide than would be the case without such a signal.
1. PROJECT DESCRIPTION

The proposed Kalaeloa Development involves site preparation and construction of a recreational residential/resort complex on about 1,010 acres of a 2,900 acre parcel of land in Kalaeloa on the northeastern portion of Oahu as shown in Figure 1.

Of the acreage to be developed, 313 acres are slated for resort use consisting of approximately 2,400 hotel units and 1,200 condominium units; 231 acres are to be used for about 700 single-family residential units; 342 acres are planned for golf course use; and 33 acres are designated as commercial space.

Project development is expected to take several years with completion of sales and full occupancy not anticipated until 2005.

Highway access from the development to other urbanized parts of Oahu will be via Farrington Highway to Hookena Corner (the junction of Farrington Highway with Hookena Road) and thence to Waimea via Hookena Road or to Kalihi via Kauhale Circle.

The purpose of this study is to describe existing ambient air quality in the project area and along the major access route leading to and from the project and to estimate the magnitude of any increase in air pollutant concentrations resulting from actions related to the proposed project.

2. AIR QUALITY STANDARDS

State of Hawaii and National Ambient Air Quality Standards (NAAQS) have been established for six classes of pollutants as shown in Table 1. An AQS is a pollutant concentration level not to be exceeded over a specified sampling period which varies for each pollutant depending upon the type of exposure necessary to cause adverse effects. Each of the regulated pollutants has the potential to cause some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration.

National AQS for particulates and sulfur dioxide have been divided into primary and secondary levels. Primary AQS are designed to prevent adverse health impacts while secondary AQS refer to welfare impacts such as decreased visibility, diminished comfort levels, damage to vegetation, animals or property, or a reduction in the overall aesthetic quality of the atmosphere. State of Hawaii AQS for all six pollutants have been set at a single level which is in some cases significantly more stringent than the lowest comparable national limit. In particular, the State of Hawaii one hour standard for carbon monoxide is four times more stringent than the national standard.

National AQS are based on 40 CFR Part 50, while State of Hawaii AQS are set in Chapter 11-20, Hawaii Administrative Rules. This chapter was recently amended (March 25, 1986) to make Hawaii AQS for particulates and sulfur dioxide essentially the same as the most stringent national limits.
3. PRESENT AIR QUALITY

There are no ambient air quality monitoring stations within the immediate vicinity of Waikoloa. Under prevailing trade wind conditions there is no industrial activity for thousands of miles upwind and it is reasonable to assume that present air quality is quite good.

The only significant sources of man-made air pollution in the area are motor vehicles traveling on Farrington Highway and sugar cane growing and harvesting activities. Fugitive dust from cane cultivation and smoke from field burning at harvest time could create periodic high levels of particulates in the project area, but these activities are infrequent enough to present only a minor annoyance to area residents.

Natural air pollutant producers which could affect Waikoloa air quality include the ocean (sea spray), plants (tree-allergens), dust, and perhaps a distant volcanic eruption on the island of Hawaii. Concentrations of pollutants from these kinds of sources should be fairly uniform for most Oahu locations.

The nearest long term air pollution monitoring station to the project is located at Pearl City, 16 miles to the southeast. Only particulates are measured at Pearl City and for the past several years readings there have been running on the order of half the allowable State and National AQS.

Oahu wide air pollution monitoring data indicates that State of Hawaii ambient air quality standards for particulates, sulfur dioxide, nitrogen dioxide, and lead are currently being met at most locations.

On the other hand, carbon monoxide and ozone readings from urban Honolulu indicate that allowable State of Hawaii standards for these vehicle related air pollutants are being violated at a rate of more than once per year. Ozone is an indicator of the formation of photochemical pollutants in the air, a condition which tends to develop if the air mass over the island has been fairly stable with little wind flow for a period stretching over several days.

Concentrations of carbon monoxide are more directly related to vehicular emissions and tend to be highest during periods of rush hour traffic. Carbon monoxide would thus be the pollutant most likely to cause difficulty in meeting allowable State of Hawaii AQS as a result of new residential development on Oahu.

4. DIRECT AIR QUALITY IMPACT OF PROJECT CONSTRUCTION

During the site preparation and construction phases of this project it is inevitable that a certain amount of fugitive dust will be generated. Field measurements of such emissions from existing and proposed construction sites has yielded an estimated emission rate of 1.2 tons of dust per acre of construction per month of activity. This figure assumes medium level activity in a semi-arid climate with a moderate soil silt content. Actual emissions of fugitive dust from this project can be expected to vary daily depending upon the amount of activity and the moisture content of exposed soil in work areas.

One major generator of fugitive dust during project development is construction equipment moving over exposed roadways. This problem can be substantially mitigated by completing and paving roadways and parking areas as early in the development process as possible. Because of the relatively long time frame envisioned for project development, some construction will eventually be taking place in close proximity to existing residential areas. In these instances, dust control will have to be an item of special concern.

Heavy equipment at construction sites will also emit some air pollutants in the form of engine exhausts. The largest equipment is usually diesel powered. Carbon monoxide emissions for large diesel engines are generally about equal to those from a single automobile, but nitrogen dioxide emissions from this type of engine can be quite high. Fortunately, nitrogen dioxide emissions from other sources in the area should be relatively low and the overall impact of pollutant emissions from construction equipment should be minor compared to levels generated on roadways nearby.
5. AIR QUALITY IMPACT OF INCREASED ENERGY UTILIZATION

As proposed, the Nahulela Development would contain the following: 700 single family residences; 1,200 condominium units; 2,100 hotel units; and approximately 100,000 square feet of commercial space.

Estimating about 1,800 square feet average size for the single family residences; 1,800 square feet average size for the condominium units; and 600 square feet average size for the hotel units yields a combined residential/resort floor space of about 3.7 million square feet. Energy consumption rates at the power plant for single family residential units with all-electric kitchens and water heaters are about 11,000 BTU per square foot; for all electrically equipped apartments the rate is 25,000 BTU per square foot; for hotels the rate is 37,000 BTU per square foot; and for commercial space the average rate is 42,000 BTU per square foot. Thus this project would require about 513 billion BTU of energy per year at the power plant; or about 40,000 barrels of oil if the demand were to be met totally by burning fuel oil, to meet the needs of the proposed development by the year 2000.

The major impact of burning fuel oil to meet this increased energy demand will be increased levels of sulfur dioxide, and particulates in the vicinity of existing power plants, primarily the Kaho Power Plant on the Waimea coast.

This energy requirement could be reduced substantially by the installation of solar water heating on all new residential units. It is also possible that the new demand could be met by means other than burning fuel oil. Generation of electrical energy by wind power or by using ocean thermal energy conversion are two such possibilities.

6. INDIRECT AIR QUALITY IMPACT OF INCREASED TRAFFIC

Once construction is completed the proposed project is not in itself likely to constitute a major direct source of air pollutants. By serving as an attraction for increased motor vehicle traffic in the area, however, the project must be considered to be a significant indirect air pollution source.

Motor vehicles, especially those with gasoline-powered engines, are prodigious emitters of carbon monoxide. Motor vehicles also emit some nitrogen dioxide and these burning fuel which contains lead as an additive contribute some lead particles to the atmosphere as well. The major control measure designed to limit lead emissions is a Federal law requiring the use of unleaded fuel in most new automobiles. As older cars are removed from the vehicle fleet lead emissions should continue to fall. In fact, effective January 1, 1980, the Federal Environmental Protection Agency has revised the allowable lead amount in gasoline to 0.1 gram per gallon. At the beginning of 1985 the standard was 1.1 gram per gallon. The EPA is also advocating a total ban on lead in gasoline to take effect as early as 1998.

Federal control regulations also call for increased efficiency in removing carbon monoxide and nitrogen dioxide from vehicle exhausts. By 1995 carbon monoxide emissions from the vehicle fleet then operating are mandated to be about one third lower than the amounts now emitted.
7. CARBON MONOXIDE DIFFUSION MODELING

In order to evaluate the future air quality impact of projected increases in traffic associated with the proposed Nukolika Development in view of the previously described government-mandated decreasing emission rates per vehicle, it was necessary to carry out a detailed carbon monoxide modeling study. The study was designed to yield carbon monoxide concentration values which could be compared directly to allowable State and National Ambient Air Quality Standards.

Two critical receptor sites were selected for analysis: site 1 on the make side of Farrington Highway near the proposed intersection with the main project access road; and site 2 on the make side of Farrington Highway at Thomas Corner. These two sites were selected for analysis because increased traffic related to project development would be likely to show maximum air quality impacts at these two intersections. The particular position of both sites with respect to the interaction was selected because that spot would be most likely to have the highest levels of automobile-generated air pollutants, specifically carbon monoxide, under worst case weekend peak hour traffic and meteorological diffusion conditions. The locations of sites 1 and 2 are shown in Figures 2 and 1 respectively.

Expected worst case weekend peak hour carbon monoxide concentrations at sites 1 and 2 were computed for study years 1986 and 2000. Computations were made for traffic conditions with and without the proposed Nukolika Development.

Traffic volumes for study years were determined using the traffic impact study for the project. Weekend peak hour (Sunday afternoon) traffic volumes were used for air pollution computations because the traffic impact study found these volumes to be higher than weekday peak hour volumes. Traffic mitigation measures proposed in the traffic impact study include constructing left and right turn lanes on Farrington Highway at the intersection with the main project access road (but no traffic signals), and installation of a signal light at Thomas Corner. The air quality study assumes that these modal mitigation measures will be adopted and additionally investigates the potential air quality impact of installing a signal light at the main project access road intersection with Farrington Highway (site 1).

Using a one hour traffic survey conducted by the consultant at Wood Circle on Sunday, May 16, 1986, after the Pole match, the existing weekend peak hour vehicle mix in the project area was evaluated to be 78% gasoline-powered automobiles, 15% light duty gasoline-powered trucks and vans, 7% diesel-powered automobiles, 1% diesel-powered light duty trucks, 1% diesel powered trucks and buses, and 1% motorcycles. The same vehicle mix was assumed for both study years.

Where signal lights would control traffic flow, average vehicle speeds were assumed to be 25 mph upstream from red signal lights and 15 mph downstream from signal or turns. Traffic was assumed to move at 25 mph in unimproved flow.

For all computations a temperature of 68 degrees F was assumed with 20 percent of vehicles operating in the "cold start" mode.

The EPA computer model MOVIE-2 was run using the above parameters to produce vehicular carbon monoxide emission estimates for each of the years studied.

The EPA computer model REFIT-2 was used to calculate carbon monoxide concentrations at both of the selected critical receptor sites for each scenario studied. Stability category 4 was used for determining diffusion coefficients. This stability category represents the most stable (least favorable) atmospheric condition that is likely to exist in a suburban area such as this.

To simulate worst case wind conditions a uniform wind speed of one meter per second was assumed with the worst case wind direction for site 1 from the southwest and for site 2 from the northeast. For each receptor site concentrations were computed at a height of 1.5 meters to simulate levels that would exist within the normal human breathing zone. Background contributions of carbon monoxide from sources or distant roadways not directly considered in the analysis were assumed to be zero.

Results of the carbon monoxide modeling study are presented in Table 2. For both critical receptor sites, existing and projected peak hour carbon monoxide concentrations are computed to be within allowable State and Federal ambient air quality standards with or without the proposed Nukolika Development, even under the worst case meteorological dispersion conditions considered in the study.

While projected peak hour levels of carbon monoxide with project development are within allowable limits, Table 2 does indicate that traffic generated by the project will have a significant impact on air quality at the site studied. At site 1, in particular, carbon monoxide levels are projected to grow from barely measurable to almost half the allowable standard by the time the project is completed. In this case the modeling study indicates that a significant portion of the increase could be mitigated by installing a traffic signal at the intersection of Farrington Highway and the main project access road sometime before the project is completed.
The projected increase in carbon monoxide levels with project development at site 2 is less significant because it is assumed that a traffic signal will be installed at this intersection by the time the project is completed. Present traffic levels at this site are also substantially higher than those in the vicinity of site 1, thereby decreasing the relative air pollution impact of project-related traffic.

Average one hour traffic volumes during the peak eight hour period are about 30 percent of the peak hour level. Eight hour carbon monoxide levels are estimated by multiplying the peak hourly value by this traffic volume ratio and a "meteorological persistence factor" of 0.6 which is recommended in EPA modeling guidelines to account for the fact that meteorological dispersion conditions are more variable (and hence more favorable) over an eight hour period than they are for a one hour period. Multiplying projected peak hour carbon monoxide levels by this combined factor of about 0.3 will yield values that are nearly one half those shown in Table 2. The State of Hawaii eight hour AQS for carbon monoxide is also one half the one hour standard. Thus the conclusions reached above regarding the State of Hawaii one hour standard will hold with respect to the eight hour standard as well.

All carbon monoxide concentrations calculated in the foregoing analysis are well within the less stringent National one and eight hour AQS whether the proposed project is undertaken or not.

B. MITIGATIVE MEASURES

A. SHORT TERM

As previously indicated the only direct short term adverse air quality impact that the proposed project is likely to create is the emission of fugitive dust during construction. State of Hawaii regulations stipulate the control measures that are to be employed to reduce this type of emissions. Primary control consists of wetting down loose soil areas. An effective watering program can reduce particulate emission levels from construction sites by as much as 50 percent. Other control measures include good housekeeping on the job site and planting or landscaping of bare soil areas as quickly as possible.

B. LONG TERM

Once completed, the proposed Mokuleia Development is expected to have little direct impact on the air quality of the surrounding region.

Indirect long term impacts in the form of increased air pollutant emissions from power plants serving new residences in the project area can be mitigated somewhat by planning and implementing solar energy design features to the maximum extent possible.

Other indirect long term air quality impacts are expected in those areas where traffic congestion can potentially be worsened by the addition of vehicles traveling to and from the proposed project. Project planners can do very little to reduce the emission levels of individual vehicles, but the installation of traffic signals at the main intersection of project traffic with Farrington Highway and at Thome Corner could decrease traffic queuing times at these intersections, thereby decreasing projected air pollution impacts at these critical locations.

Carbon monoxide modeling conducted as a part of this report indicates that no special traffic control measures will be necessary to ensure compliance with State and National air quality standards even under worst case traffic and meteorological dispersion conditions.

Because the stringent national vehicular emissions reduction program now being pursued is entirely the product of perpetually changing government regulations, it is always possible that economic conditions or other factors could lead to an early abandonment of the program. If that were to occur, then the projected pollutant levels presented in this study could be too optimistic. On the other hand, it is possible that technological innovation may lead to new vehicular power systems that produce few or none of the currently regulated atmospheric pollutants.
In any case, this study indicates that currently proposed mitigative measures for traffic congestion along roadways leading to and from the project area should be sufficient to meet existing air quality requirements and no further air pollution mitigation measures are proposed. It is noted, however, that tall, dense vegetation can provide some screening of residential areas from larger source particulates generated along roadways and near construction areas. It is thus recommended that wherever possible each vegetative cover be included in landscaping plans with plantings occurring as early in the development process as practicable.

REFERENCES

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**TABLE 2**

RESULTS OF PEAK HOUR CARBON MONOXIDE ANALYSIS (Milligrams Per Cubic Meter)

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STATE OF HAWAII AGO: 30  
NATIONAL AGO: 40

Note: See Figures 1 and 2 for location of receptor sites.
APPENDIX K

NOISE STUDY

Prepared for
Mokuleia Development Corp.

Prepared by
Darby and Associates
L. NOISE

Existing Conditions - The primary land uses that will potentially be affected by the project are public and private beach parks and residences located between the shore and Farrington Highway. Noise sources affecting these areas now are categorized as:

- Surf
- Motor vehicle traffic on Farrington Highway
- Aircraft
- Wind in the trees
- Birds and people activities

In reference 1, measurements of existing noise levels in the area were made continuously over a 2-month period, utilizing a sensor located at two different locations on the Episcopal Church camp property. Once location was midway between the highway and the shoreline, while the other was 54 feet seaward of the highway. Though these measurements were made in 1977, they are considered representative of the existing conditions.

The typical diurnal noise level variation in the populated area had an hourly equivalent sound level (L_{eq}) of 47 dBA at night and a maximum L_{eq} of 65 dBA during the day. At night the noise sources were primarily the surf and wind in the trees. During the day, motor vehicles, aircraft, birds and people activities also contributed to the total noise level.

In reference 1, it was found that occupants of beachfront residences experienced relatively high, continuous noise exposures attributed to the surf. The surf is a high-level, linear noise source that generally attenuates 3 dB each time a person doubles his distance from it. It masks practically all motor vehicle noises in beachfront homes. It was found that, on the average, surf noise exceeded existing aircraft noise by 10 dB at a beachfront location directly under the departing flight path.

Occupants of typical residences directly on Farrington Highway experience a lower level of surf noise and a greater contribution of motor vehicular noise.

In reference 1, it was found that the average total day-night sound level (L_{day/night}) was 61 dBA over a 21-day period. Motor vehicle noise contributed an average of 51 dBA to the total, while aircraft noise contributed an average of 53 dBA. The surf, wind in the trees, birds and people activities were the dominate noise sources, contributing about 60 dBA, L_{DA}, and controlled the average total noise exposures in housing along the highway at that time.

Proposed Action - Development of the project site will involve land clearing, site preparation, construction of infrastructure and buildings, and the installation of landscaping.

Anticipated Impacts and Mitigative Measures - The various construction phases of a development project may generate significant amounts of noise; the actual amounts are dependent upon the methods employed during each stage of the process. Typical construction equipment noise ranges in dBA are shown on Figure 1. Pile drivers; earth-moving equipment such as bulldozers; and diesel powered trucks will probably be the loudest equipment used during construction.

The State Department of Health (DOH) Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu specifies maximum allowable levels of noise for each use zone contained in the City and County of Honolulu's comprehensive Zoning Ordinance. Allowable noise levels from the project site are:

Preservation (P-11) and Residential (R-1 through current A-7)

Daytime (7 a.m.-10 p.m.): 55 dBA
Nighttime (10 p.m.-7 a.m.): 45 dBA.
Traffic noise from heavy vehicles traveling to and from the construction site will be minimized to daylight hours in residential areas and will comply with the provisions of Title II, Administrative Rules Chapter 42, Vehicular Noise Control for Oahu enforced by DOH.

Because sound attenuates with distance, the farther away people are from a noise source, the less the sound will affect them. Thus, during construction in the proposed mauna resort and residential areas, the potential noise impact to persons in the housing and parks along Farrington Highway will be minimal. However, construction operations in the shore resort parcels (numbers 1, 6, 7 and 8) will have greater noise impact on persons in the abutting land use.

After the proposed resorts are completed and are in operation, persons in the abutting land uses will potentially be impacted by noise from the stationary equipment servicing the complex, such as air conditioning and pool pumps. Noise levels from such equipment must not exceed the allowable noise limits in the aforementioned DOH and CIC noise regulations.

As the project develops, there will be an increase in traffic on Farrington Highway causing higher traffic noise levels primarily to housing directly on the highway. Tables I and II show the assumptions used to predict traffic noise levels along Farrington Highway. From the tables it can be seen that presently the maximum hourly averaged noise level [Leq] at 50 feet from the center of the road is about 56 dBA during the weekdays and about 60 dBA during the weekends. Because Farrington Highway has only two lanes and is directly accessed by driveways, the average vehicle speed will be reduced as the traffic
volume increases. Traffic noise increases more rapidly with increasing vehicle speed as compared to increasing traffic volume. Thus, there tends to be a limiting effect on traffic noise levels that can be seen in Tables I and II. For example, the maximum predicted traffic noise level, for the years 2000 and 2005 tends to limit-out at 62 to 63 dBA despite significantly greater traffic volumes. These predicted noise levels are 2 to 3 dBA greater than the presently experienced on weekends, but may be 5 to 6 dBA greater than that presently experienced on weekdays. It is to be noted that the maximum predicted noise levels do not exceed the noise criteria of 67 dBA as recommended by the Federal Highway Administration (FHWA) for "placards, recreation areas, playgrounds, active sport areas, parks, residences, hotels, schools, churches, libraries, and hospitals." Reference 3 Table III addresses the predicted traffic noise levels for proposed housing on the mauka road. Acceptable noise levels will exist if posted speeds of 35 mph are used and if building setbacks are at least 50 feet.

Occupants in the proposed project will be exposed to noise from aircraft operations from Dillingham Airfield. Dillingham Airfield is operated by the State Department of Transportation and has a single runway 5,000 feet long. Only daylight visual flight rule operations requiring good weather and visibility are conducted by civil aircraft. Aircraft operations at Dillingham Air Field are now dominated by single-engine airplanes towing gliders. Military use of the airfield involves helicopters and light fixed wing aircraft. As can be seen in Figure 2, the number of operations at the field has declined; e.g., in 1980 there were 82,408 civilian power operations (ops) and 21,930 military ops; while in 1985 there were 60,494 civil ops and 5,041 military ops.

Aircraft noise contours were provided in reference 1 for various aircraft operation levels that were predicted to occur. This analysis assumes a civilian power operations level in 1995 which is approximately double the number of operations experienced in 1983-1985, see Figure 2. Figures 3 and 4 show the noise contours taken from reference 1 for about 120,000 civilian power aircraft operations that was then predicted to occur in 1990 if improvements were made at the airfield.

The noise contours in Figures 3 and 4 use the day-night noise level (Ldn) which is a time averaged dBA noise level over 24 hours that includes a 10 dBA penalty for any noise events occurring at night (10 p.m. to 7 a.m.). Most federal agencies including the Department of Housing and Urban Development (HUD) and the Department of Defense (DOD) recommend that housing not be located in areas where Ldn 65 is exceeded. For future planning, the Federal Environmental Protection Agency (EPA) in reference 4 has established long range goals of:

"through vigorous regulatory and planning actions, reduce environmental noise exposure levels to Ldn 65 dBA or lower, and ... in planning future programs concerned with or affecting environmental noise exposure, to the extent possible, aim for environmental noise levels that do not exceed an Ldn of 55 dBA. This will ensure protection of the public health and welfare from all adverse effects of noise based on present knowledge."

Because of the open life style in Hawaii, it is often recommended that Ldn 60 not be exceeded for residential and resort areas.

In Figures 3 and 4, it can be seen that all of the proposed residential and resort parcels north of the highway and Resort Parcel 1 should never experience aircraft noise levels exceeding Ldn 55. Also the figures indicate that Ldn 60 should not be exceeded at Resort Parcel 6, 7 and 8. It is also possible to design the
structures on Resort Parcels 7 and 8 such that they will tend to shield persons on the shore side of the buildings from aircraft noise during tradewind takeoffs when the aircraft are on the runway or at very low altitudes. It is estimated that about 90% of the aircraft operations per year are in a tradewind pattern and that there are no operations about 26 days per year due to excessive crosswinds (Reference 1).

As noted in Figure 2, the recent use of Dillingham Airfield by the military is lessening. However, it is possible that in the future there could be sporadic training exercises involving helicopters. Reference 1 addressed this possibility by generating noise contours using techniques mandated in Reference 5. The resulting contours, shown in Figure 5, are considered conservative; that is, they are in excess of actual existing noise exposures and are not necessarily directly comparable with civilian noise contours. The following considerations are involved:

a. Helicopter noise is different in nature from that of fixed-wing aircraft, and "a correction factor of +7 dBA is added to all results to account for helicopter noisiness and turns."

b. The operations at Dillingham Airfield approximate the following parameters used in the methodology of Reference 5: The aircraft mix is 80 percent UH-1, 15 percent AH-1, and 5 percent OH-47 and 10 percent of the operations are at night (from 10 p.m. to 7 a.m.).

c. At Dillingham Airfield, it is estimated that 66 helicopter operations per day represent a typical "busy day." However, the contours must express 100 operations per day in order to allow for possible future growth.

In Figure 5, three zones are defined by the contour set. Zone 1, the smallest in area, has the largest noise impact on people and is the area in which the frequency of exposure and intensity are almost certain to produce difficulties in relation to some other possible uses of the area, particularly where the use, or proposed use, is residential. Zone 2 is a larger area in which similar problems with regard to other uses may occur. Zone 1, all land outside Zone 2, is an area in which essentially no such difficulties may be expected. Note that for civilian aircraft noise contours, all land outside the airport boundary is equivalent to Zone 1, i.e., not expected to create adverse impacts.

Residents in the proposed resort and residential areas abutting (or near) the sugar cane fields will experience noise exposures from cane operations. See Figure 6. Typically, sugar cane fields are harvested every two years involving bulldozers (pushrakes) and clam-shell cranes loading trucks operating over 24 hours per day. At harvesting rates of 30 to 40 acres per 24 hours, the heavy equipment can cause appreciable noise exposures above the background noise for several days.

Land preparation for planting occurs typically every six years if rape is grown and involves a sequence of operations such as harrowing, plowing, leveling, stone removal, etc., averaging a rate of about 13 acres per day based on 8 shifts per day. Thus, noise exposures during land preparation from heavy diesel-powered equipment operating in nearby fields for a total of several days every few years will be experienced by project occupants. The grandfather clause on the aforementioned State DOH noise regulations will allow the sugar operations to make 70 dBA for 10% of the time in any 20-minute period at the property line. Furthermore, the regulations allow conditional use of permits for agricultural field preparation and harvesting as long as 95 dBA is not exceeded at the property line. Thus, some
occupants in the project may be annoyed and complain about the legal periodic 24-hour loud noise events which may interfere with sleep, conversations, and radio/TV listening. It is to be noted that the field operations of land preparation every two to six years and harvesting every two years should not cause the annual average $L_{eq}$ to exceed 65 $L_{eq}$ at the property line. It is recommended that the sales documentation for new housing in the project located near cane fields contain information on the nature of the sugar operations and of the noise exposures to be expected.

Housing and resort facilities located on, or near, the cane haul road shown in Figure 7 will experience 24-hour noise events from passing cane haul trucks when the fields serviced by the cane haul road are being harvested. Tables IV and V provide calculations for predicting noise exposures along the cane haul road caused by cane haul trucks and other vehicles which service the fields near the project. It is estimated that there are 9 fields totalling to about 376 acres. From Table V it is estimated that, on the average, there will be five days (24 hours) per year when cane haul trucks will use the road. Day-night noise levels ($L_{dn}$) on those days are predicted to be 55 dBA or less assuming a setback of at least 50 feet from the cane haul road. Though the total noise exposure does not exceed the aforementioned criteria, persons may complain of noise from the large cane haul vehicles which will be much greater than the ambient noise level (typically 84 dBA at 50 feet).

Another noise event that will be experienced by persons in the proposed project, will be aircraft flyovers when the sugar cane fields are sprayed with insecticides, herbicides, etc.

References


<table>
<thead>
<tr>
<th>YEAR</th>
<th>PEAK HOURS</th>
<th>VEHICLES PER HOUR</th>
<th>SPEED (MPH)</th>
<th>$L_{eq}(1\ hr)$</th>
<th>$\Delta\ dB$ re 1985</th>
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<tbody>
<tr>
<td>1985</td>
<td>a.m.</td>
<td>101</td>
<td>35</td>
<td>55.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p.m.</td>
<td>541</td>
<td>35</td>
<td>56.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weekend</td>
<td>729</td>
<td>30</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

| 2000** | a.m. | 541 | 30 | 61.0 | 6.3 |
|        | p.m. | 818 | 25 | 61.9 | 5.8 |
|        | Weekend | 1312 | 20 | 62.0 | 2.0 |

| 2005** | a.m. | 729 | 25 | 61.5 | 6.0 |
|        | p.m. | 1165 | 20 | 61.4 | 5.3 |
|        | Weekend | 1783 | 20 | 63.4 | 2.4 |

* Vehicle mix assumed 95% autos, 4% medium trucks, 1% heavy trucks

** Vehicle mix assumed 94.5% autos, 4.5% medium trucks, 1.0% heavy trucks

<table>
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<tr>
<th>YEAR</th>
<th>PEAK HOURS</th>
<th>VEHICLES PER HOUR</th>
<th>SPEED (MPH)</th>
<th>$L_{eq}(1\ hr)$</th>
<th>$\Delta\ dB$ re 1985</th>
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<td>a.m.</td>
<td>101</td>
<td>35</td>
<td>55.5</td>
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<tr>
<td></td>
<td>p.m.</td>
<td>116</td>
<td>35</td>
<td>56.1</td>
<td></td>
</tr>
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<td></td>
<td>Weekend</td>
<td>402</td>
<td>30</td>
<td>60.0</td>
<td></td>
</tr>
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</table>

| 2000** | a.m. | 269 | 35 | 60.3 | 4.8 |
|        | p.m. | 416 | 30 | 61.1 | 5.0 |
|        | Weekend | 858 | 25 | 61.9 | 1.9 |

| 2005** | a.m. | 409 | 30 | 60.6 | 5.1 |
|        | p.m. | 710 | 25 | 61.4 | 5.3 |
|        | Weekend | 1170 | 20 | 61.7 | 1.7 |

* Vehicle mix assumed 95% autos, 4% medium trucks, 1% heavy trucks

** Vehicle mix assumed 94.5% autos, 4.5% medium trucks, 1.0% heavy trucks
## TABLE III
Predicted Traffic Noise Levels
Along Project Hauka Road

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PEAK HOUR TIME</th>
<th>VEHICLES PER HOUR</th>
<th>SPEED (MPH)</th>
<th>$\Delta t_{eq}(1 \text{ hr})$</th>
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<tr>
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<td>a.m.</td>
<td>140</td>
<td>35</td>
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<td></td>
<td>p.m.</td>
<td>290</td>
<td>35</td>
<td>60.2</td>
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<td>Weekend</td>
<td>370</td>
<td>30</td>
<td>59.5</td>
</tr>
<tr>
<td>2005</td>
<td>a.m.</td>
<td>220</td>
<td>35</td>
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<td>p.m.</td>
<td>430</td>
<td>30</td>
<td>60.2</td>
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<td></td>
<td>Weekend</td>
<td>550</td>
<td>30</td>
<td>61.3</td>
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## TABLE IV
Vehicle Count Estimates for the Cane Haul Road

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>OPERATION</th>
<th>PASSING FACTOR</th>
<th>PASSING PER ACRE</th>
<th>PASSING PER 24 HOURS</th>
<th>PASSING 24 HOURS</th>
<th>PASSING / HR.</th>
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<tbody>
<tr>
<td>TYPE 10 AUTOS AND 1/2 TON TRUCKS</td>
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<td>1</td>
<td>1.10</td>
<td>.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>1/3</td>
<td>.57</td>
<td>.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>1/3</td>
<td>.33</td>
<td>.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>2/3</td>
<td>.29</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td>2.73</td>
<td>.30</td>
<td>1,026</td>
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</tr>
<tr>
<td>TYPE 20G GASOLINE 1/4 TON TRUCKS</td>
<td>H</td>
<td>1</td>
<td>1.10</td>
<td>.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>1/3</td>
<td>.57</td>
<td>.24</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>R</td>
<td>1/3</td>
<td>.33</td>
<td>.18</td>
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<tr>
<td>TOTALS</td>
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<td>.19</td>
<td>.01</td>
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</tr>
<tr>
<td>TYPE 20G DIESEL TRUCKS (NOT CANE HAUL)</td>
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<td></td>
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<tr>
<td></td>
<td>LP</td>
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<td>.10</td>
<td>0</td>
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<td></td>
<td>R</td>
<td>1/3</td>
<td>.33</td>
<td>.22</td>
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<tr>
<td>TOTALS</td>
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<td></td>
<td>.31</td>
<td>.22</td>
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</tr>
<tr>
<td>TYPE 20D (CANE HAUL)</td>
<td>H</td>
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<td>3.75</td>
<td>2.25</td>
<td>1,410</td>
<td>846</td>
</tr>
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</table>

### Notes:
- **H**: HARVESTING
- **P**: PLANTING
- **R**: RATIONAL
- **T**: TOTAL ACRES
- **1**: NUMBER OF FIELDS
- Based on 163 operating days per year

**Days:**
- 7 a.m. to 10 p.m.
- 11 p.m. to 7 a.m.
### TABLE V

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>(dB) SEL at 50'</th>
<th>Day Noise Level (N_d)</th>
<th>Night Noise Level (N_n)</th>
<th>Day-Night Noise Level (L_{dn})</th>
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<tr>
<td></td>
<td></td>
<td>%50</td>
<td>%100''</td>
<td>100''</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
<td>29</td>
<td>23</td>
<td>17</td>
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<td>20G</td>
<td>80</td>
<td>.7</td>
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<td>20D</td>
<td>86</td>
<td>.9</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>300</td>
<td>90.2'</td>
<td>3.9</td>
<td>2.3</td>
<td>55</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>55</td>
<td>49</td>
<td>43</td>
</tr>
</tbody>
</table>

\[
L_{dn} = \text{SEL}_d + 10 \log \left( \frac{N_d}{N_n} \right) + 49.4
\]

\[
L_{dn, \text{TOTAL}} = 10 \log \left( \frac{L_{dn}}{L_{dn, \text{TOTAL}}} \right)
\]

* Average of 37 Cane Haul Trucks (21 trucks loaded, 16 trucks empty)
  SEL = 90.2 ± 2 dB
  dBA_max = 83.0 ± 2 dB
  Sound propagation based on spherical spreading only.

**NOTE:** At a harvest rate of 40 acres/day (24 hours), it requires 376 acres x 40 AC/AY x 3.4 DAYS/2 YEARS or about 5 DAYS/FR. for harvesting.

### FIG. 1. CONSTRUCTION EQUIPMENT NOISE RANGES.
(from reference 6)
FIGURE 2 - CIVILIAN POWER AIRCRAFT AND MILITARY AIRCRAFT OPERATIONS AT DILLINGHAM AIRFIELD

FIGURE 3 - DAY-NIGHT NOISE LEVEL (L_{DEN}) CONTOURS - DILLINGHAM AIRFIELD - TRADEWIND FLIGHT PATTERN - CIVILIAN AIRCRAFT - 1995
APPENDIX L

TRAFFIC IMPACT REPORT
MOKULEIA

Prepared for
Mokuleia Development Corp.

Prepared by
Parsons Brinckerhoff Quade & Douglas, Inc.

May 1986
TRAFFIC IMPACT REPORT

Makulele

May 1988

Prepared for: Makulele Development Corporation
Prepared By: Parsons Brinckerhoff Quade & Douglas, Inc.

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<td>14</td>
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</tr>
<tr>
<td>3 Traffic Assignment</td>
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SUMMARY

Mokulele Development Corporation has proposed to develop a recreational project in Mokulele near Waialua, on the north shore of Oahu. The proposed development includes golf courses, camp sites, hiking and equestrian trails, recreational homes, resort hotels and condominiums, and related commercial areas.

The proposed project will increase traffic volumes on Farrington Highway and other roadways in the area. A study of the potential traffic impacts at full and partial development was done to identify needed traffic improvements.

The existing two-lane Farrington Highway has sufficient capacity to serve the traffic expected to be generated by the proposed project. Improvements will be needed to handle turning movements into and out of driveways. Increased traffic volumes are also expected to affect conditions at Thomson Corner (the junction of Farrington Highway and Kaukonahua Road), where signalization would be needed. The remainder of the highway network is not expected to be significantly affected by the proposed project.

TRAFFIC IMPACT STUDY

INTRODUCTION

Mokulele Development Corporation has proposed a project to develop a recreational destination at Mokulele on the North Shore of Oahu, between Kaena Point and the town of Waialua. This report summarizes an assessment of the expected traffic impacts of the proposed project.

The assessment included the identification of the existing traffic conditions in the area and an evaluation of probable future traffic conditions with the proposed project.

The traffic impacts of the proposed 4,000-unit recreational development were evaluated for two cases: full development in year 2005 and partial development of 2,500 units in year 2000. The major traffic impacts are expected along Farrington Highway between the project site and Waialua. Impacts to the highway within the project's limits have also been identified.
EXISTING CONDITIONS

The project site is located approximately three miles west (or toward Kaena Point) of Wai'alu on the north shore of the Island of Oahu (See Figure 1). Farrington Highway connects the project site with Wai'alu. The paved portion of the highway ends approximately four miles west of the project site; Farrington Highway continues around Kaena Point to the Malae'ae coast, but becomes essentially an unpaved roadway. The paved portion begins again near Makena Valley, located approximately 4 miles southeast of Kaena Point.

The portion of Farrington Highway between Kaena Point and Wai'alu is a State highway, presently on their Federal-Aid Secondary System. Current plans show little development in the area and no improvements have been proposed for the highway. No other public roads provide access to the project site.

Near the project, the two-lane Farrington Highway varies in width from 20 to 22 feet. The highway is on level terrain, but shoulders are unpaved or non-existent. Several beach parks, the Camp Erdman recreational area, and Dillingham Airfield (glider port) are located between the project site and Kaena Point. A portion of the project site is presently used for polo matches, which are held on Sunday afternoons during the spring and summer.

In Wai'alu, the highway pavement is wider, and parking is permitted alongside the travel lanes. In the one-mile segment from Wai'alu to the end of Farrington Highway at Thomson Corner (junction with Kaukonahua Road), various cross streets and driveways enter the highway.

Kaukonahua Road is a two-lane highway which continues in two directions from Thomson Corner. In the southeasterly direction, the road
provides access to Kāhului, and connects to Kūlia Road, Kamehameha Highway, and the H-2 Freeway via Wilkins Drive. To the north, Kaukonahua Road feeds Hāloa Circle, a traffic rotary which also serves Kamehameha Highway and Wālālua Beach Road. From the rotary traffic can continue toward Kāhului, Wālālua, or into Wālālua and other points north of Wālālua.

Traffic Conditions

Existing traffic volumes were determined from manual field counts and data from previous counts taken by the State Highways Division. One

Weekday traffic volume (two-way) on Farrington Highway at Kapalua Bridge near the project site was approximately 1,320 vehicles per day (vph) in 1984. Earlier counts were higher, averaging 1,600 vph in the mid-1970s and 1,450 vph in the early-1980s (see Table 1).

Peak hour volumes in the 1984 weekday sample at Kapalua Bridge occurred between 3:45 and 4:45 PM, during which 116 vehicles per hour (vph) were counted. Analysis of conditions on the two-lane highway during the weekday peak hour using the Highway Capacity Manual shows Level of Service A (levels of service are described in Appendix A).

Weekend traffic conditions were sampled on April 5-6, 1985, which coincided with the opening of the polo season (data in Appendix B). Daily two-way traffic volumes at Kapalua Bridge were estimated to be 2,400 vph on Saturday and 3,500 vph on Sunday. Peak hours identified by the field counts are 2:00-3:00 PM on Saturday and 1:15-2:15 PM on Sunday. Two-way peak hour volumes counted on Farrington Highway west of Mānaula Street were 237 vph on Saturday and 402 vph on Sunday.

Analysis of data on Table 1 shows Level of Service B in Saturday's peak hour and Level of Service C during Sunday's peak hour. Field observations indicated better levels of service, probably attributable to the relatively short

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<td>Vehicles/Day</td>
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<td>----------</td>
</tr>
<tr>
<td>Farrington Highway at:</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Year</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>July 1973</td>
</tr>
<tr>
<td>July 1974</td>
</tr>
<tr>
<td>June 1975</td>
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<td>June 1976</td>
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<tr>
<td>August 1982</td>
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Source: State of Hawaii, Department of Transportation, Highways Division, Planning Branch. Count Stations C-23-D and 22.
stretch of highway (approximately 3 miles) and the lack of slow moving vehicles in the traffic stream.

Traffic volumes on the other side of Kailua, near Thomson Corner (Kaanahuna Road Intersection) were also recorded by the State Highways Division. Weekday volume was approximately 6,210 vpd in 1984. A review of the counted volumes indicates an average growth of 1.2 per cent per year [see Table 1].

The weekday peak hour volume in 1984 near Thomson Corner was 819 vph between 6:45 and 7:45 AM; the afternoon peak hour occurred between 4:30 and 5:30 PM, at which traffic volume was 590 vph. The maximum volume at this location was estimated to be 770 vph during the peak hour on Sunday.

Existing highway levels of service near Thomson Corner were computed to be "C" during weekday peak hours and "D" in the Sunday peak hour. However, because of the limited length of this segment of Farrington Highway and the numerous driveways and other crossings, intersection levels of service at Thomson Corner would be a better indicator of conditions in this area. Using estimated turn volumes for the Sunday peak hour, the longest delays are for vehicles wishing to turn left from Kaunahuna Road (from Weed Circle) toward Kailua; Level of Service D would be experienced.

PROPOSED PROJECT

The proposed project (Figure 2) is a recreational development including golf courses, campites, hiking and equestrian trails, and other facilities. In support of these activities, recreational homes, resort hotels and condominiums, and related commercial areas will be provided.

The project is expected to be developed over a period of 15 years, starting about 1990 after the receipt of the necessary governmental approvals. Two 18-hole golf courses and commercial facilities are expected to be developed in the early years, with the recreational homes, hotels, and condominiums being constructed over the entire term of the project. The project is expected to be fully developed by year 2005. Traffic conditions in two future years were evaluated for the following levels of development:

<table>
<thead>
<tr>
<th>Year:</th>
<th>Year 2000</th>
<th>Year 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golf Course (acres)</td>
<td>330</td>
<td>330</td>
</tr>
<tr>
<td>Commercial (gross square feet)</td>
<td>77,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Recreational Homes (dwelling units)</td>
<td>500</td>
<td>700</td>
</tr>
<tr>
<td>Hotel &amp; Condominium (units)</td>
<td>2,000</td>
<td>3,300</td>
</tr>
</tbody>
</table>
FUTURE AND PROJECT TRAFFIC

In order to identify the potential traffic impact of a proposed project, future traffic volumes are projected from existing and planned projects. Estimates of traffic generated by the proposed project are also calculated. Numerical analyses generally rely on available data, averages from surveys of similar uses, and other information.

Future Conditions Without Project

For this evaluation, future traffic without the proposed project is estimated using trends from historical traffic count data. As indicated earlier, traffic volumes on Farrington Highway in the vicinity of the project (Kapalua Bridge) have decreased in the past decade. Future volumes without the project have been assumed to equal the latest available count; i.e., the State Highways Division's 1984 data and the April 1986 weekend count by Parsons Brinckerhoff.

Future conditions along Farrington Highway without the proposed project, therefore, would be the same as existing. Levels of Service would be "A" for weekday peak hours and "C" for the weekend peak hour.

At Thomson Corner, counted volumes show a growth rate of 1.2 percent per year; this rate was applied to the 1984 State count to predict future volumes at this location without the proposed project. The existing unsignalized intersection will continue to adequately serve the increasing volumes; the Kauahuna Road approach from Ted Circle, however, will experience greater delays and shoulder stabilization or widening would be needed to minimize delays to right turn traffic.

Traffic Generation

The traffic generation analyses estimate the increase in traffic caused by the project. These analyses include trip generation, trip distribution, and traffic assignment.
The traffic generated by the proposed development was estimated by applying traffic generation rates to the parameters of the project. Separate rates were used for weekdays and for weekends. Rates for traffic entering and leaving the golf courses and commercial area were derived from data contained in the Institute of Transportation Engineers' *Trip Generation* report. Traffic volumes generated by the recreational homes were also calculated using this report.

Traffic volumes generated by the hotel and condominium units were based on data collected by the City's Department of Transportation Services in 1977 at the entrance to the 487-unit Kuliwana Hotel (formerly Turtle Bay Hilton). The hotel, like the proposed project, is situated in a low-density area. Traffic volumes entering and exiting the hotel were recorded over a one-week period in August. Peak hours and traffic generation rates were derived from this data. The highest hourly traffic volumes were recorded on Sunday, between 12:30 and 1:30 PM. A comparison of counts taken at the Kuliwana resort entrance on July 1984 on a Tuesday and on a Saturday with the 1977 counts indicates that traffic generation rates for the 1984 counts were lower; the rates used in this study, however, are from the higher and more extensive 1977 counts. Table 2 summarizes the rates used.

The traffic volumes estimated for the proposed project's golf courses, commercial development, and the hotel and condominium units represent total traffic expected at their respective driveways. Many of the trips in the proposed development are expected to be internal trips, i.e., both trip ends of a trip, the origin and destination, would be within the development. The following factors were used to account for the internal trips:

- 80% of the traffic generated by golf courses
- 75% of the traffic generated by commercial activity
- 15% of the traffic attracted to hotel or condominium units (5% in year 2000)

### Table 2

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Daily Traffic (veh./day.)</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
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<td>Hotel &amp; Condo</td>
<td>5.59</td>
<td>0.18</td>
<td>0.25</td>
</tr>
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<td></td>
<td>6.16</td>
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<td>Golf Course</td>
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</tr>
<tr>
<td></td>
<td>6.9</td>
<td>0.22</td>
<td>0.08</td>
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<tr>
<td>Commercial</td>
<td>76.9</td>
<td>1.1</td>
<td>3.4</td>
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<tr>
<td></td>
<td>5.2</td>
<td>5.2</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
1. vehicles/unit, derived from 1977 Kuliwana counts
2. vehicles/acre, from ITE, *Trip Generation*, 3rd Edition
5. vehicles/unit, calculated
The estimate of project-generated traffic on the external roadway system was developed by deducting the internal trips. Additionally, 15% of the traffic attracted to the commercial area was estimated to be diverted from traffic already on the highway.

The trip distribution estimated that 30% of the project's external traffic will have origins or destinations in the Makaha to Waianae area. Waianae would account for an additional 30%, with the remainder of the North Shore attracting 10%. Only 30% of the project generated traffic is expected to travel to or beyond Waianae.

Traffic Impacts

The traffic impacts of the proposed project were evaluated for the weekday (PM) peak hour and the weekend peak hour, which based on existing traffic would occur on Sundays in the early afternoon. The significant impacts are expected on Farrington Highway between the project and Waianae, at Thompson Corner, and within the project site.

Table 3 shows the daily traffic generated by the project. Since the proposed project includes various uses on a number of sites, total and net traffic volumes were calculated. The total traffic for each use is the daily vehicle trips at the driveways of the various sites. The net traffic volumes represent the increase in traffic volumes on Farrington Highway at the east limit of the project and were derived after accounting for internal movements within the project.

Table 4 shows the net peak hour traffic volumes. Peak hours on the highway and of the proposed project were assumed to coincide because the peak times were fairly close. The project’s most significant traffic impact would occur during the weekend peak hour.

| Year 2000 |
| Hotel & Condominiums | 11,180 | 5,130 | 13,520 | 6,020 |
| Golf Courses | 2,200 | 460 | 3,650 | 390 |
| Commercial | 4,200 | 590 | 8,390 | 840 |
| Recreational Homes | 2,040 | 5,530 | 7,570 | 1,570 |
| **TOTAL** | **22,320** | **11,790** | **34,120** | **8,430** |

| Year 2005 |
| Hotel & Condominiums | 10,450 | 5,130 | 22,190 | 8,170 |
| Golf Courses | 2,200 | 460 | 3,650 | 390 |
| Commercial | 4,000 | 570 | 10,600 | 1,090 |
| Recreational Homes | 4,670 | 5,240 | 4,440 | 2,150 |
| **TOTAL** | **22,440** | **10,270** | **39,600** | **11,890** |

* Increase in traffic on Farrington Highway at project limit (east or Waianae side)
Table 4
NET TRAFFIC - PEAK HOURS

<table>
<thead>
<tr>
<th>Vehicles per hour</th>
<th>Weekday(A.M)</th>
<th>Weekday(P.M)</th>
<th>Weekend</th>
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<td>In</td>
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<td>In</td>
</tr>
<tr>
<td>Year 2000</td>
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<td></td>
<td></td>
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<tr>
<td>Hotel &amp; Condominium</td>
<td>273</td>
<td>29</td>
<td>215</td>
</tr>
<tr>
<td>Golf Courses</td>
<td>15</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Commercial</td>
<td>0</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Recreational Homes</td>
<td>55</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>351</td>
<td>115</td>
<td>297</td>
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<tr>
<td>Year 2005</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hotel &amp; Condominium</td>
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<td>287</td>
</tr>
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<td>Golf Courses</td>
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<tr>
<td>Commercial</td>
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<td>11</td>
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</tr>
<tr>
<td>Recreational Homes</td>
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<td>35</td>
<td>70</td>
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<tr>
<td>TOTAL</td>
<td>468</td>
<td>140</td>
<td>398</td>
</tr>
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TRAFFIC EVALUATION AND RECOMMENDATIONS

Farrington Highway will provide access to the project; traffic volumes are expected to increase because of the project. The analyses of year 2000 conditions with the proposed project show Level of Service E in the weekend peak hour. Traffic demands on weekdays would be served at Level of Service D or better. For the ultimate development in year 2005, predicted weekday and weekend peak hour traffic demands would result in Level of Service E conditions on the existing highway. Table 5 summarizes the highway conditions.

At Hmoana Corner, the increased traffic demands caused by the project will create very long delays for vehicles turning left from Koolau Circle toward Makaha before year 2000. The analysis also indicates that all of the stop-controlled movements at the intersection will have demands greater than available capacities in year 2005. Signalization of the intersection would alternately assign to the various conflicting movements the right to use the intersection; the analysis show, in all cases, below capacity conditions. Traffic volumes and operating conditions at this intersection should be monitored and signalization provided when warranted.

Traffic impacts beyond the Makaha-Makaha area are expected to be significantly less. Two existing highways, Kualoa Road and Kamehameha Highway, provide service south toward Makaha. Kamehameha Highway, Makaha Road, and the proposed Halsworth Bypass Road provide service northward through Makaha. Within Makaha, existing commercial activities and recreational areas could become destinations for traffic generated by the proposed project.

An earlier study of the daily travel patterns exhibited by persons staying at the Turtle Bay Resort (formerly Kuli'ima) showed that only 30% of the traffic traveled beyond Makaha or Kailua to other parts of the...
Table 5  
TRAFFIC CONDITIONS  
Farrington Highway

|                      | Existing |                          | 2008 With Project |                          | 2005 With Project |                      |                      |
|----------------------|----------|---------------------------|--------------------|---------------------------|--------------------|----------------------|                      |
|                      | Weekday AM Peak Hour | 58 | 43 | 101 | A | 0.05 | Weekday AM Peak Hour | 409 | 158 | 567 | C | 0.22 | Weekday AM Peak Hour | 546 | 183 | 729 | D | 0.47 |
|                      | Weekday PM Peak Hour | 53 | 63 | 116 | A | 0.06 | Weekday PM Peak Hour | 350 | 549 | 899 | D | 0.47 | Weekday PM Peak Hour | 449 | 716 | 1,165 | E | 0.62 |
|                      | Saturday Peak Hour | 123 | 114 | 237 | B | 0.12 | Saturday Peak Hour | 736 | 696 | 1,432 | E | 0.71 | Saturday Peak Hour | 896 | 807 | 1,703 | E | 0.88 |

* for existing 2-lane highway: 10-foot lanes, no shoulders

Island. A similar distribution of the proposed Makahiki project's traffic is expected; this distribution would result in minor impacts to the other highway facilities.

Within the project, Farrington Highway should be widened to provide a median lane for left turn traffic. The highway's traffic volumes in this area will include the project's internal trips between the oceanfront resort parcels and the commercial and recreational activities along the highway. The median lane will improve traffic operations by allowing traffic desiring to make left turns from the highway to vacate the through lane; in addition, traffic desiring to enter the highway from a driveway or side street will have a refuge area available so that only one lane of traffic needs to be crossed at a time.

Turn volumes at the intersection of Farrington Highway and the proposed access road were estimated for the weekend peak hour in years 2000 and 2005 to determine localized improvements that will be needed (Figure 3). The following actions are recommended at the intersection:

- Signalize the intersection when traffic volumes or conditions warrant this improvement; the predicted volumes indicate that the unsignalized intersection will reach capacity in the middle of year 2001.
- The access road (Road A) should be at least four lanes wide; two lanes should be provided on the access road approach to the intersection so that left and right turns onto Farrington Highway can be separated.
- A separate, dedicated left turn lane should be provided for westbound Farrington Highway-to-access road traffic.
- A deceleration lane should be constructed for eastbound Farrington Highway traffic turning right into the access road.
Driveways from the commercial areas, hotels, or other uses should be located as far as possible from the intersection; desirable minimum distances are 400 feet along Farrington Highway and 200 feet along Road A.

Figure 3
Traffic Assignment
Weekend peak hour
CONCLUSIONS

The proposed project will increase traffic volumes on Farrington Highway in the Kahuku-Haleiwa area. Levels of service on the existing two-lane highway will reflect the increased traffic, with the existing Sunday peak hour Level of Service C changing to Level of Service D with completion of the proposed project. The existing highway, however, has sufficient capacity to serve the predicted peak hour volumes.

At Thomsen Corner, signalization will be needed. Without signalization, the increased traffic volumes will cause very long delays to traffic movements which would be controlled by existing stop signs or which must yield to oncoming vehicles.

The traffic increases on other roadways farther from the project will be smaller due to the distribution of demand; the increases will be a small portion of existing traffic and will not have any significant impact on traffic conditions. Within the project limits, improvements are recommended to minimize the adverse effects of the increased traffic volumes.

REFERENCES

1 - State of Hawaii, Department of Transportation, Highways Division.


4 - City and County of Honolulu, Department of Transportation Services.
APPENDIX A

The Highway Capacity Manual defines "levels of service" as qualitative measures which describe traffic operational conditions considering speed and travel time, freedom to maneuver, traffic interruptions and delays, comfort and convenience, and safety. Six levels of service, from "A" (best) to "F" (worst), are defined.

- **Level of Service A** represents free flow. Individual users are negligibly affected by the presence of others. For a two-lane highway, passing demand is well below passing capacity; platooning of three or more vehicles is rare. For unsignalized intersections, little or no delay is experienced.

- **Level of Service B** represents stable flow where the presence of other users in traffic becomes noticeable. On a two-lane highway, platooning is common as passing demand approaches passing capacity. Short traffic delays occur at unsignalized intersections.

- **Level of Service C** describes stable flow with greater constraints on maneuvering. Long platoons and lower speeds are experienced on two-lane highways. Delays at unsignalized intersections are described as "average."

- **Level of Service D** represents high density, stable flow. Significant restrictions in speed and maneuverability begin to occur. The opposing traffic streams of a two-lane highway operate separately as passing capacity approaches zero. Delays at unsignalized intersections are as acceptable gaps in the main traffic stream become infrequent.

- **Level of Service E** represents capacity or near-capacity conditions. Speeds are low and flow is considered unstable. Passing on two-lane highways is virtually impossible and platooning becomes intense where there are slow moving vehicles, at other intersections. Very long delays occur at unsignalized intersections.

- **Level of Service F** describes a condition in which traffic demands exceed capacity. Forced flow, with extreme delays and long queues, occur.

---

APPENDIX B

FIELD TRAFFIC DATA

HONOLUA TRAFFIC COUNTS
INTERSECTION: FARRINGTON HWY. AT KAHINA ST.
COUNT TAKEN ON SATURDAY, 4/25/86 BY LN AND RD

<table>
<thead>
<tr>
<th>COUNT VOLUMES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>TOTAL</th>
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</tr>
</tbody>
</table>

FARRINGTON HIGHWAY A ----> B

- WAIKALUA

MARANOA STREET

KAHINA POINT ----> C

NORTH
## APPENDIX B
### FIELD TRAFFIC DATA

**HONOLULU TRAFFIC CRISIS**

INTERSECTION: FARRINGTON HWY. AT MAUNAWEA ST.
COUNT TAKEN ON SUNDAY, 8/4/63 BY RD AND LU

**PAGE 2 OF 2**

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<th>COUNT VOLUMES</th>
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<th>D</th>
<th>E</th>
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APPENDIX M

Visual Impact Analysis

for

Mokuleia Development Proposal

by

Michael S. Chu, Land Architect

April 1987
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LIST OF EXHIBITS

Exhibit 1: Location Map
Exhibit 2: Mokuleia Conceptual Development
Exhibit 3: North Shore Viewshed Map
Exhibit 4: Visual Impact Zone Map
Exhibit 5: Description of Photos
A. INTRODUCTION

The purpose of the following assessment is to identify existing views and the visual quality of the Mokuleia area, and to determine the extent of possible visual impacts resulting from the proposed Mokuleia development. This assessment is based on the Mokuleia Conceptual Plan as presented in the Draft EIS, Mokuleia Development Proposal, February 20, 1987. This plan contains no specific detail regarding building locations or design features other than a general statement that buildings will be six to seven stories in height. It is therefore assumed that building heights will be in the 60 to 70 foot range and located in the general vicinity as indicated by the plan. Issues such as setbacks (beyond zoning standards), building color, facade treatments, landscaping, etc. are not provided at this point and are therefore not taken into account within this assessment. General bulk, approximate building locations and the existing visual quality of the area are the primary factors under consideration.

B. OBJECTIVES

The primary objectives of this assessment is to determine the probable visual impact zone generated by the project relative and other general concerns (visual) to the overall visual qualities of the North Shore Viewshed, and to provide documentation that will support such determinations.

C. METHODOLOGY

The methodology will focus on the following procedure:

1. Identification of current policies regarding public views and significant land forms
2. Identification of significant view objects, and public viewing points (stationary and road views) relative to the project area
3. Establishment of vertical benchmarks corresponding to stated building heights
4. Photographic documentation illustrating views of the site(s) relative to items 2 and 3 above
5. Determination of visual impact zone

D. PROJECT DESCRIPTION

The proposed Mokuleia development consist of site preparation and construction of a recreational and residential/resort nature on about 1019 acres of land consisting of 5 noncontinuous parcels. Gross land holdings total more than 2900 acres.

Of the areas to be developed, 313 acres are proposed for resort use consisting of 2100 hotel rooms and 1200 condominium units; 331 acres are proposed for 700 single family residential units; 342 acres are proposed for golf course use; and 33 acres are proposed for commercial use.
F. PUBLIC VIEW POLICIES

Development Plans:
The Development Plans state the following in regards to public views:

- Public views include views along street and highways, mauka-makai view corridors, panoramic, and significant landmark views from public places, views of natural features, heritage resources, and other landmarks, and view corridors between significant landmarks.

- Such public views shall be protected by appropriate building height, setbacks, design and siting controls established by the CZC (L00). These controls shall be determined by the particular needs of each view and applied to public streets and to both public and private structures.

- The design and siting of all structures shall reflect the need to maintain and enhance available views of significant landmarks. No development will be permitted that will block important views.

- Whenever possible, overhead utility wires and poles that significantly obstruct public views shall be relocated or placed underground.

Further policy statements regarding public views are found in the North Shore Development Plan, Special Provisions.

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**E. HEIGHT POLICIES**

According to current Development Plan policies, maximum building height controls for the North Shore district are as follows:

- Residential: 25 feet
- Commercial: 40 feet
- Low Density Apt.: 30 feet
- Medium Density Apt.: 40 feet

These are maximum heights which are ultimately set by zoning and SMA conditions, however they serve as the maximum ceiling heights for this assessment.
In order to protect and enhance the rural attractiveness of the North Shore, broad open spaces, views from public places of the agricultural fields, and panoramic and continuous views from public places of the coast and the sea shall be protected whenever possible. Important views to be protected include, but are not limited to the following:

- Panoramic views of Waimea Bay to Sunset Beach from Puakea Highlands.
- Views of Waimea Bay from Kahealani Highway bridge over Waimea River.
- Panoramic views of Waialua Town and Haleiwa Town from the Waialua approach of Kahealani Highway and Keaunui Road.
- Panoramic view of Haleiwa to Kawailoa from the area near the hairpin turn of Kawainui Drive.
- Views of the Waianae Mountains from Keaunui Road and Kahealani Highway in Haleiwa near Waiau Circle.
- Ocean views from Kahealani Highway between Kawailoa and Sunset Beach.
- Views of the Falls known as Kahealani Highway in Sunset Beach.

Chapter 205A contains seven broad policies focusing on a variety of land use and management practices within coastal areas. One of those policies is entitled Scenic and Open Space Resources in which the following statements are made:

- Identify valued scenic resources within the coastal zone management areas.
- Insure that new developments are compatible with their visual environments by designing and locating such developments to minimize the alteration of natural land forms and public views to and along the shoreline.
- Preserve, maintain, and where desirable, improve and restore shoreline open space and scenic resources.
- Encourage those developments which are not coastal dependent to locate in inland areas.

The SMA Ordinance states, "It is the City and County of Honolulu's policy to preserve, protect and where possible, restore the natural resources of the coastal zone of Hawaii." This Ordinance establishes an SMA boundary around Oahu which encompasses parcels B, C, D, and E of the...
proposed Mokuleia development. The Ordinance states:
"The Council shall seek to minimize, where reasonably,
any development which would substantially interfere
with or detract from the line of sight toward the
sea from the State highway nearest the coast."

Conclusion
Efforts to protect scenic coastal resources and views are
clearly a thematic message through all of the above policies
and objectives. The context for these statements however are
inclusive with other policy statements and are not singled
out as having priority over other considerations such as
housing, employment, public utilities, etc. Also noteworthy
are the Special Provisions of the North Shore Development
Plan Ordinance which contains no specific statement
regarding public views that pertain to the Mokuleia area.

G. EXISTING VIEWS AND VISUAL QUALITY OF THE MOKULEIA AREA
Due to its bowed configuration, the entire North Shore is
considered to be one viewshed ranging from Kaena Point to
Kawela Bay with a maximum viewing distance of 18 miles
across.

viewshed- all the surface area visible from an
observer's viewpoint. (Visual Resource Management,
Jones and Jones, 1977).

In order to determine the visual quality of the Mokuleia
area, the entire North Shore Viewshed was studied, beginning
at the farthest reaches of this viewshed and moving inward
towards the Mokuleia site. This procedure is meant to
establish the visual context of the project site and the
degree of its visibility from off-site viewing points.

Off Site Public Stationary Viewing Points-East
Primary public viewing points to the east and the degree of
visibility of the project site are as follows:

Sunset Beach- Viewing distance of approximately 11 miles. At
this distance, the general form of the Waianae Mountains are
the only distinguishable features (see photo #1).

Puakea Beach Park- Viewing distance of approximately 8.5
miles. At this distance, the general form of the Waianae
Mountains are the only distinguishable features (see photo
#2).

Waianae Bay- Viewing distance of approximately 7.5 miles. At
this distance, the general form of the Waianae Mountains are
the only distinguishable features (see photo #2).
Haleiwa Beach Park - Viewing distance of approximately 5 miles. At this distance, no details are visible of the project site however the tree line of Ironwoods at the NHA apartments off of Crozier Drive (viewing distance of approximately 2.5 miles) become noticeable.

Haleiwa Alii Beach Park - Viewing distance of approximately 4 miles. At this distance, still no details are visible of the project site (see photo #4). The tree line of Ironwoods and the 5 to 6 story buildings off of Crozier Drive (viewing distance of 2.2 miles) become distinctly visible. This observation is significant in that the 5 to 6 story apartment buildings off of Crozier Drive are comparable in height to the proposed structures to the proposed Mokuleia development. The stand of adjacent Ironwoods are also comparable site features.

Kualoa State Park - Viewing distance to project site of approximately 3.1 miles. From this distance, details of the Ironwood tree line (such as variation in tree heights) begins to be visible. Highly visible are the 5 to 6 story apartments off of Crozier Drive (viewing distance of 1.1 miles). Views of the Waianae mountains are visible however the Ironwood tree line screen the base of the mountains from view (see photo #6).

Pouiki Park - No views of the site from Pouiki Park.

Park at NHA apts. - Viewing distance to project site of approximately 2 miles. Visibility of the Mokuleia site is quite visible and details such as fences and existing structures can be seen (see photo #7).

Off Site Public Stationary Viewing Points - West
Primary viewing public viewing points to the west, and the degree of visibility of the project site are as follows:

Camp Erdman and beyond - Viewing distance of approximately 2 miles to parcel D and E. Due to the angle of the coastline, primary views are from the shoreline where the Army Beach can be seen jutting out with the Ironwoods on parcel D and E in the background (see photo #14).

Army Beach - Parcel D and E are adjacent to and in full view from the Army Beach. Also visible are lateral views along the shoreline of these two parcels. Mauka views are screened by roadside vegetation.

Roadway Views and Views from Mokuleia Beach Park
Generally, mauka views focus on the Waianae Mountains however the Ironwoods and Hale Koa limit the view to the
Upper ridges. Mazda roadway views into the lower portions of parcel A are only visible from a relatively short section of the highway fronting parcel A at the Crowbar Ranch (see photo #15). This is a fairly significant maula view as it is one of the few opportunities to view the foothills of the Waianae Mountains.

Parcel B contains significant roadway frontage and currently provides views into the open space of the polo field.

Parcel C lies between the residential lots and Mokuleia Beach Park. The site is heavily vegetated with tall Ironwoods and other coastal plant material. Views from the roadway across the site are not significant due to this thick vegetation (see photo #12).

Parcel D and E are located between Mokuleia Beach Park and Army Beach. They are moderately vegetated with Ironwoods and other plant material inhibiting views across the site. (see photos #12 and 17).

Views from Mokuleia Beach Park and the Army Beach are strongly oriented in a maula direction. Parcels C, D and E flank these parks with tall Ironwood trees and emphasize this maula-maula viewing direction.

Conclusion

Parcels A, B, C, D, and E, together with the residential lots and Mokuleia Beach Park, occupy approximately 2.5 miles of highway and coastline frontage. Development of 6 to 7 stories on the coastal parcels will likely be visible from as far away as Kahama Recreational Park, particularly if minimum shoreline setback standards are used. This viewing direction (from the cant) is most critical as the angle of the view provides a broader view of the coastline.

Off-site views from the west (Camp Erdman and beyond) are not as critical because of the shoreline configuration. Parcel E may be visible in the background from western off-site viewing points. Views beyond parcel E and maula views of parcel A appear hidden by vegetation.

The importance of the roadway views are not focused on any particular view corridor or view object. Important is the overall visual experience over the 2.5 miles of highway frontage from parcel A to parcel E (see discussion on Visual Quality).

II. VISUAL QUALITY

Visual quality refers to the visual and physical attributes of a scene. In describing these attributes, the criteria
Intactness- Intactness refers to both the integrity of a visual pattern and the extent to which the landscape is free from visually encroaching features. In a predominantly natural environment, manmade development can be an additive element that does not necessarily encroach on its natural setting. However, the presence of visual encroachment or encroachment contributes to low visual intactness.

It is the quality of intactness (free from visual encroachment) that is the primary ingredient contributing to the visual quality of the Mokuleia area. At a macro scale, there are no encroaching features into the viewshed. At a micro scale, existing manmade features are generally low in height, dispersed and integrated with the natural landscape.

Vividness- Vividness or memorability of a landscape is derived from contrasting landscape components as they combine in striking and distinctive visual patterns.

At a macro scale, the quality of vividness is not a prime attribute of the Mokuleia area. Within the project area the vivid qualities are more apparent at a micro when viewing laterally along the shoreline. Contributing to this are the stands of ironwoods in contrast to the sand beaches and open spaces along the roadway, such as polo field and Mokuleia Beach Park. There are no specific scenic points or visual resources to identify on any of the parcels.

Unity- Unity is the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. One aspect of this criterion is the unity between manmade and natural pattern elements.

There are very few manmade elements to assess the quality of unity within the Mokuleia area. At both the micro and macro scale, unity and intactness are similar.

Conclusion
The Mokuleia area is unique in its intact and unified characteristics. The absence of urbanization, dispersion of manmade elements, and abundance of natural vegetation (particularly ironwood trees) over a substantial stretch of the highway attributes to this character. Qualities of vividness are secondary.
1. VISUAL IMPACT ZONE

The visual impact zone represents the outer limits in which proposed building heights may significantly encroach into and alter the visual quality of a given area.

**Benchmarks**

Important to this determination is the establishment of vertical benchmarks that can be used to represent the approximate building heights proposed by the development.

The first benchmark in determining vertical height involves the usage of telephone poles along Farrington Highway. These poles were determined to be 30 feet tall. However because these poles were often not visible from off-site viewing points, a more visible benchmark was needed. By photographic and mechanical comparison, it was generally determined that many of the on-site stands of Ironwood trees were twice the height of the poles. Since most the parcels are well vegetated with these Ironwood stands, this inferred benchmark was used as a secondary reference point and generally corresponds to the height of a typical 6 to 7 story building.

Further down the Mokuleia coastline (off of Crozier Drive) are several coastal apartment buildings in the five to six story range, with similar stands of Ironwood trees clustered around and behind the buildings. These buildings and their setting were used to establish an indirect benchmark simply to verifying the Ironwood stands as a general height indicator. This benchmark is particularly noteworthy in that it illustrates the relationship in scale between 5 to 6 story buildings and the Ironwoods. One cannot infer however, that the visual impact from this scene is representative of the visual impact on the subject parcels and caution is advised in drawing this conclusion.

**Conclusion**

Based on an inventory and assessment of off-site views and the establishment of several vertical benchmarks, the probable visual impact zone generated by the proposed Mokuleia development lies between the Army Beach to the west and Kalama Recreational Park to the east. Views from the east are the more critical of the two.

Within this zone, visual impacts upon the existing visual quality of the area will probably be concentrated along 2.5 miles of Farrington Highway (wauku and makai) from the eastern side of the Army Beach to the eastern end of Parcel A. The impacts from within this inner zone will relate
primarily to views experienced from the road (moving vehicles) and will likely be generated from the proposed 6 to 7 story buildings, parking lots and other buildings/site development within eye sight of Farrington Highway.

J. SUMMARY AND DISCUSSION

Policies regarding views within the Development Plans, Chapter 205A and the SNA Ordinance are clearly designed to minimize the lost or degradation of scenic resources, particularly at coastal area. It is also quite evident from site visits that the Mokuleia area is unique in its visual qualities and sense of remoteness. Based on the Mokuleia Conceptual Plan, specific visual impacts that may be expected are as follows:

1. The visual quality (particularly the intactness) of each individual parcel and the general Mokuleia area will be noticeably altered.

2. The proposed 6 to 7 story buildings along the coastal parcels will likely be visible and prominent from several off-site public viewing points.Army Beach, Mokuleia Beach Park, park at MDA apartments, and Kailua Recreational Park are within the determined visual impact zone.

3. Existing roadway views from Farrington Highway (between Army Beach and Mahinui Rd.) will be altered to and will likely include substantial views of the proposed development in both the mauka and makai directions.

Visual impact however is an occurrence that accompanies any development irregardless of size or magnitude. The capacity of the Mokuleia area to assimilate urbanization of the nature proposed, while retaining its visual integrity, may rely upon a development concept that de-emphasizes building prominence in favor of visual compatibility. The MDA apartment buildings off of Creeker Drive may be considered a "worst case" example of visual encroachment along the Mokuleia shoreline. Yet other examples such as the Makaha Sheraton and the Kikloa Plantation on Kualoa demonstrate remarkable visual compatibility.

Mitigative measures which may help to reduce visual impact include the following:

1. Reduction in building heights.

2. Increased shoreline setbacks to include angled building envelopes.
3. Retention of existing trees and siting of buildings among/behind the trees for maximum screening.
5. Provide extensive landscaping using plant material that are consistent with the visual quality of the area and will assist in the screening of structures.
6. Use of muted building colors to blend in with the background.