December 30, 1987

Marvin T. Miura, Ph. D
Interim Director
Office of Environmental Quality Control
State of Hawaii
Kekuanaoa Building, Room 104
465 South King Street
Honolulu, Hawaii 96813

Dear Dr. Miura:

Final Environmental Impact Statement (EIS)
West Loch Estates, Ewa, Oahu
Tax Map Key: 9-1-17: 06

We are notifying you that the above is an acceptable EIS document, pursuant to Chapter 343, HRS, and Title 11, Administrative Rules, Department of Health, Chapter 200, Environmental Impact Statement Rules.

A copy of our Acceptance Report is attached. If there are any questions, please contact Art Challacombe of our staff at 523-4648.

Very truly yours,

[Signature]
JOHN P. WHALEN
Director of Land Utilization

JPW:fm
cc: DPW
15508
A. BACKGROUND

The City and County of Honolulu Department of Housing and Community Development (DHCD) is proposing to develop a master planned residential community to meet a portion of the housing needs of the residents of Oahu. The Master Plan provides for 1,500 residential units on approximately 255 acres to meet the needs of the following types of home buyers: elderly, gap group, and market. In addition to the residential development, the plan provides recreational opportunities, a small commercial center, a day care facility, a park and ride facility and an extensive open space/green belt network. The proposed project is located approximately 17 miles west of the Primary Urban Center of Honolulu on the Ewa Plain south of Waipahu.

The City and County of Honolulu, in its issue paper "Oahu's Affordable Housing Crisis (1987)," has estimated that approximately 40,000 affordable housing units are needed to meet the housing needs of the residents of Oahu. In order to meet a portion of this housing demand, the DHCD is proposing to use the provisions of Chapter 46-15.1 (HRS) which allows the City to plan for a housing mix of 60 percent affordable units and 40 percent market units. Under this concept, net income derived from the sale of the market units within the development would be used to maximize the affordable housing objectives of the project.

The City and County is targeting the affordable units in this project for the gap group housing market. The DHCD has defined the gap group household as one whose income is too high to qualify for government assisted rental housing, but is often too low to qualify for conventional financing of a market priced house. The targeted gap group family's income falls within the 81-120 percent range of the County's median family income.

The Master Plan provides for the development of this project in two increments. These units will include a variety of housing opportunities primarily for gap group buyers. Throughout both increments a mix of housing types (market and affordable) will be integrated although certain overriding factors will determine placement of each housing type. The
market units will be located in areas where views of the golf course and shoreline are enhanced to maximize their desirability and in turn command the highest sales prices.

Increment I is bordered on the east by OR & L Railroad right-of-way, on the north by the Waipahu Industrial Park, Fort Weaver Road on the west, and on the south by the proposed 18-hole municipal golf course. Increment I will consist of approximately 600 units. A major feature of Increment I will be its access to the proposed shoreline park and golf course. Another feature of this increment is the proposed open space/green belt network, which can be accessed by all homeowners.

Increment II is bordered by Fort Weaver Road to the west, the proposed golf course to the north, West Loch to the east, and the railroad right-of-way to the south. Increment II will consist of approximately 900 units of which 150 will be elderly rental units. The elderly housing complex will be conveniently located close to the major access roads, public transportation and commercial facilities. The features are intended to encourage their interaction with the surrounding community to participate in a variety of activities.

Community facilities have been located along the major loop road to allow convenient access via auto, bicycle, and pedestrians. A proposed district park located near the entry of Increment II will serve a growing region with active recreation facilities such as a gymnasium, play fields, courts, and a recreation center. The park and ride facility is strategically located in the same area as the district park and day care facility so that it can be utilized on weekends to support park activities, in addition to providing convenient access to the mass transit system and reducing traffic congestion.

B. PROCEDURE

1. An EIS Preparation Notice (EISPN) was published in the "Office of Environmental Quality Control (OEQC) Bulletin" of July 8, 1987 under the Register of Chapter 343, HRS documents. The applicant distributed copies to 65 parties including Federal, State and City agencies.

2. Comments on the EISPN were received from 25 parties. The applicant transmitted responses to these comments and addressed them in the EIS. The comments and responses on the EISPN are included in Chapter XI of the Final EIS.

3. On October 1, 1987, the DHCD submitted copies of the Draft EIS to the OEQC and the DLU pursuant to the requirements of the Chapter 343, HRS. The Notice for the Draft EIS was published in the "OEQC Bulletin" of October 8, 1987. The deadline for comments was set for November 23, 1987.

5. The Final EIS was submitted to the DLU on December 17, 1987. Notice of the Final EIS was published in the December 23, 1987 "OEQC Bulletin."

In conclusion, the DLU finds that the applicant has complied with the EIS procedures in accordance with Chapter 200 of Title 11, Environmental Impact Statement Rules, Sub-Chapter 7, Sections 11-200-20, 21, and 22.

C. EIS CONTENT

The Final EIS consists of a single volume, containing the EIS, the comments, and ten other appendices. The latter include: Botanical Study; Wildlife Study; Noise Study; Air Study; Archaeological Study; Traffic Study; Social Impact Study; Market Study; Geotechnic Study; and Agricultural Economics Study.

The Final EIS includes additions, revisions, and clarifications. These principally include the following:

1. Subsection 4.1.3 "Soil Types & Ratings," has been updated to state that the project parcels are located within the designated flood zones as revised by the Federal Emergency Management Agency (FEMA) on September 4, 1987.

2. Figures 4 and 5 representing "Prime" agricultural lands under the ALISH system (Agricultural Lands of Importance to Hawaii) and under the Detailed Land Classification System have been added to the text of the EIS.

3. Paragraph 3 of Section 5.2, "Soils" has been deleted.

4. Section 5.3, "Traffic" has been revised to state that the West Loch Estates project will have only a slight impact on regional transportation facilities and that the long-term cumulative impact of the project on Farrington Highway was not examined because of insufficient information on planned and proposed projects in the leeward area.

Also added to Section 5.3 is a statement acknowledging that access to and from the H-1 Highway will be impacted to a limited degree by development of the project.
5. Section 5.7, "Wildlife" has been revised in response to concerns expressed by the U. S. Fish & Wildlife Service. The revisions state the following: there may likely be increased numbers of stray cats, dogs and mongooses as a result of the project; however, identifying mitigation measures that are cost-effective and practical is difficult; the Waiawa National Wildlife Refuge is surrounded by a fence and contains nesting islands for endangered birds; and these measures and the landscaped buffer provided by the developer should further discourage animal intrusion and predation, as well as minimize the adverse effects of light and noise associated with the project. As noted below, this remains an unresolved issue.

5. In response to comments from the City Department of Public Works, Subsection 5.10.2, Sanitary Sewer System, has been revised to state that all sewer system improvements will be designed, built, and installed to City standards for capacity, operating efficiency, maintenance and economy.

In conclusion, the DLU finds that the EIS fulfills the Content Requirements set forth in the EIS procedures in accordance with Chapter 200 of Title 11, Environmental Impact Statement Rules, Sub-Chapter 7, Sections 11-200-20, 21, and 22.

D. RESPONSES TO COMMENTS

The DHCD made point-by-point responses to all comments submitted before the deadline. These are reproduced in Chapter XI, "Comments & Responses," of the Final EIS. The EIS therefore fulfills the public review requirement in accordance with Chapter 200 of Title 11, Environmental Impact Statement Rules, Sub-Chapter 7, Section 11-200-22.

E. UNRESOLVED ISSUES

In reviewing the EIS, the DLU has identified one unresolved issue: the potential impacts to the National Wildlife Refuge by pet dogs and cats from the housing project. The EIS recognizes this as a concern; however, it implies that practical and cost-effective mitigation measures which can be incorporated into the project may not exist. The EIS further states that the Refuge contains deterrents to dogs and cats such as a chain-link fence surrounding the Refuge site, as well as substantial water areas which surround the nesting locations. In consultation with the U. S. Fish and Wildlife Service, the applicant should continue to explore mitigation measures which can be successfully incorporated into the development and at the same time effectively deter stray animals.
F. DETERMINATION

The Final EIS is determined to be acceptable under the procedure established in Chapter 343, HRS.

This determination in no way implies a favorable recommendation on any application for subsequent permits which may be required for this project.

APPROVED

JOHN P. WHALEN

Director of Land Utilization

JPW:sl
WEST LOCH ESTATES
ENVIRONMENTAL IMPACT STATEMENT

City and County of Honolulu
Department of Housing
and Community Development

December 1987
Office of Environmental Quality Control
235 S. Beretania #702
Honolulu HI 96813
586-4185

DATE DUE

7-19-99
8-2-99
Sept. 27, 1999
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR
WEST LOCH ESTATES

West Loch, Ewa, Oahu, Hawaii

This document is prepared pursuant to Chapter 343, HRS.
PROPOSING AGENCY: Department of Housing and Community Development

RESPONSIBLE OFFICIAL: Robert Wehner
For Mike Moon, Director 12-15-87 Date
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</table>
I. INTRODUCTION

1.1 INTRODUCTION

The City and County of Honolulu's Department of Housing and Community Development (DHCD) is proposing to develop an innovative, master planned residential community located approximately 17 miles west of the primary urban center of Honolulu, on the Ewa plain south of Waipahu. The City's goal is to help alleviate the county's affordable housing shortage. Approximately 40,000 such affordable housing units are needed according to "Oahu's Affordable Housing Crisis," an issue paper prepared by the City in March 1987. As a means to achieve this goal, the DHCD is proposing to acquire fee title to approximately 255 acres of land to master plan and develop this community. These plans will be in concert with the new Secondary Urban Center as designated by the City and County's General Plan.

Chapter 46-15.1, of the Hawaii Revised Statutes (HRS) allows the DHCD to plan a 60/40 housing unit mix whereby no less than 60 percent of the units would be sold in price ranges affordable to families targeted by the DHCD, and the remaining 40 percent would be sold at market prices. Under this concept, net income derived from the sale of market units within the development would be used to maximize the affordable housing objectives of the project.

The Master Plan provides for 1,500 residential units. These units will be developed in two increments and will include a variety of housing opportunities primarily for gap group buyers. Ten percent or 150 of the housing units will be set aside as elderly housing. Increment I, the mauka portion of the project is bordered on the north by Waipahu's industrial park and Farrington Highway and on the south by a proposed 18-hole municipal golf course, will consist of approximately 600 single-family units. Increment II, the makai portion of the project is bordered on the north by the anticipated municipal golf course, consists of approximately 900 units of which 150 will be elderly, multi-family rental units. The balance of the units will be single-family homes.
Other land uses in this project are a district park, an elementary school site, a daycare center, a small commercial area, and a Park and Ride facility.

Throughout both increments a mix of housing types will be provided. Residential unit types will be integrated although certain overriding factors will determine placement of each housing type. The market units will be located in areas of unimpaired views of the proposed golfcourse, shoreline park, and West Loch, to maximize their desirability and in turn command the highest sales prices.

The elderly housing complex will be conveniently located close to the major access roads, public transportation and commercial facilities. These features are intended to encourage interaction with the surrounding community and provide opportunities for participation in a variety of activities.

Community facilities have been located along the major loop road to allow convenient access via auto, bicycle and on foot. The district park located near the entry of Increment II at the old Ft. Weaver Road will serve a growing region with facilities for active recreation such as a gymnasium and recreational center. The Park and Ride facility is strategically located in the same area that it can be utilized on weekends to support park activities such as neighborhood sporting events and social occasions, in addition to both providing convenient access to the mass transit system and reducing traffic congestion within the H-1 corridor.

* The gap group household is one whose income is too high to qualify for government-assisted rental housing, but is often too low to qualify for conventional financing of a market priced house. The DHCD is targeting the gap group family whose income falls within the 81-120% range of the county's median family income. As defined by the Department of Housing and Community Development, the upper limit; 120%, of median income is defined as shown below:

<table>
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<th>Family Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
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<td>$32,775</td>
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<td>$43,500</td>
<td>$46,050</td>
<td>$48,600</td>
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</tr>
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</table>

I-2
1.2 PURPOSE

This Environmental Impact Statement is prepared pursuant to Chapter 343, Hawaii Revised Statutes and intended for submittal to the State Land Use Commission as a part of a petition for reclassification of the lands designated as a part of the project site from the Agricultural District to the Urban District. The expenditure of public funds for the project also triggers the applicability of this chapter.

1.3 SECONDARY URBAN CENTER

Campbell Estate's Ewa Master Plan states that the decision to direct urban growth to the Ewa area became the official policy of the City and County of Honolulu when Ewa was first designated as the Secondary Urban Center (SUC) for Oahu in the 1977 General Plan. The policy was reaffirmed in 1982 when the location of the SUC was more specifically defined as being in the West Beach-Makakilo area.
II. PROJECT SUMMARY

2.1 PROJECT LOCATION

The proposed project is situated on approximately 255 acres located on the Ewa Plain at Honouliuli, Ewa, Oahu. A portion of the property fronts the West Loch of Pearl Harbor while Fort Weaver Road serves as the Wai'anae boundary for the residential areas. The Ewa and Waipahu communities are located adjacent to the subject project (Figure 1, 2).

The land area affected by the proposed project are listed by owner, Tax Map Key, and acreage listed below:

<table>
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<th>Tax Map Key</th>
<th>Average</th>
<th>Total</th>
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<tr>
<td>Ownership: City and County of Honolulu</td>
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<tr>
<td>TOTAL ACREAGE</td>
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</table>
West Loch Estates
AREA MAP
Ewa, Oahu, Hawaii

Figure: 2

II-3
The project acreage is less than that specified above as only portions of several parcels are being utilized.

2.2 PHYSICAL SETTING

The site is comprised of extensively modified lands, which in recent times, have been primarily utilized for sugarcane cultivation.

Increment I of the proposed residential development occupies the northern portion of the site, and is bounded by Fort Weaver Road on the west, Waipahu and part of the proposed shoreline park development and West Loch on the east. In this area, the topography is gently sloping down toward the southeast towards the ocean (West Loch). Ground elevations generally vary from about 65 feet near the Farrington Highway/Fort Weaver Road intersection to approximately 25 feet near the southwestern edge of the project site. In general, most of the area consists of fallowed cane land with poorly maintained dirt roads and drainage ditches.

Increment II of the proposed residential development occupies the southwestern portion of the site, and is bounded by Fort Weaver Road on the west, the old Oahu Railway and Land Company (OR&L) easement on the southeast and the Honolulu Stream flood plain (the site of a planned municipal golf course) on the north. In general, the topography in this area is undulating, sloping eastward. West-east and north-south trenching remnants of old sea bluffs (approximately 30 feet high) separate the northern lower one-third of the site (elevations 14 to 26 feet) from the remaining Increment II project area. Most of the area is used for growing sugarcane with many cane haul roads, drainage ditches and irrigation trenches located throughout the site.

2.3 PROJECT DESCRIPTION

The Master Plan consists of 1,500 residential units (Figure 3). These units will be developed in two increments and will include a variety of housing opportunities primarily for gap group buyers. Ten percent or 150 of the housing units will be set aside as elderly housing. Increment I, the northern portion of the project, is bordered on the north by Waipahu's industrial park.
West Loch Estates
SITE PLAN
Ewa, Oahu, Hawaii

II-5
and Farrington Highway and on the south by a proposed 18-hole municipal golf course, consists of approximately 600 single-family units.

Increment II, the southern portion of the project is bordered on the north by the anticipated municipal golf course, consists of approximately 900 units of which 150 will be elderly, multi-family rental units. The balance of the units will be single-family homes.

Other land uses in this project are a district park, an elementary school site, a daycare center, a small commercial center, and a Park and Ride facility.

A planned shoreline park will also separate the residential development from the waters of West Loch.

2.4 PROJECT ALTERNATIVES

The project site was selected because of its location adjacent to an urbanized area which provides ready access to existing infrastructure thereby minimizing development costs. Its proximity to the planned municipal golf course and shoreline park proposed by the Department of Parks and Recreation also enhances the feasibility of such a residential community.

Alternative sites and configurations have been considered within the City and County's designated second urban center, but these alternatives would involve higher development costs which would ultimately result in higher housing prices or increased densities with the associated adverse impacts on the quality of living desired for the area.

The non-project alternatives must generally assume continued agricultural use consistent with the present State Land Use designation and zoning of the property. Increment I has been followed by the Oahu Sugar Company for sometime and Increment II is scheduled for following in 1990. Under these circumstances, the "no project" alternative is likely to leave the site without productive use and result in it becoming an eyesore or a blight to the area.
due to the dumping of trash and discards. This would be a detriment to the owner of the site, adjacent properties, and the community as a whole.

2.5 PROJECT TIMETABLE AND PHASING

The project will be phased in two increments over a three year construction period with the first increment beginning in 1988. Construction activities will begin in the northern half of the project and then progress southward over the construction period.

Increment I will involve a total of approximately 86 acres and is expected to produce about 600 housing units over 71 acres, 8.2 acres of greenbelts, and 6.7 acres of roadways. Increment II will total 163 acres. This will include approximately 900 housing units on 100 acres, 23 acres of recreation space, 14 acres of buffer and setbacks, 10 acres of civic uses such as the elementary school, day care facility and park and ride, 3.5 acres of commercial uses, and another 9.7 acres of roads.

Financing of the project is a critical part of ensuring that the final product (a house and lot "package") is affordable. An estimated amount of $66 million will be required to fund the land acquisition and site improvements. The use of General Obligation Bonds would provide a means of assuring the lowest possible interest rate and ultimate project costs over the planned development period.

Development of additional off-site water resources, storage and transmission facilities and sewerage facilities including a pump station, are required to accommodate the subdivision within the context of existing and planned development in the area.

The development budget, which is provided for budget planning purposes only, is comprised as follows. (These figures are preliminary and subject to change; anticipated costs listed are approximate and do not reflect confirmed estimates.)
Land Acquisition $6,200,000
Planning and Engineering 5,700,000
Site Improvements Construction 40,800,000
   Off-Site $10,600,000
   On-Site 30,200,000
Indirect Costs 2,000,000
   Sales Processing
   Escrow and Closing
   Construction Management
   Administrative Costs
Interest @ 8% 3,600,000
Relocation Costs 200,000
Contingency 7,500,000
Total $66,000,000

2.6 PROJECT RATIONALE

The City's goal for the proposed project is to help alleviate the county's affordable housing shortage, which is estimated to be approximately 40,000 units, according to the "Oahu's Affordable Housing Crisis" issue paper prepared in March, 1987. As a means to achieve this goal, the DHCD is proposing to acquire fee title to approximately 255 acres of land to master plan, and develop this community. This will be in concert with the new Secondary Urban Center as designated by the City and County's General Plan.

Chapter 46-15.1, HRS allows the DHCD to plan a 60/40 housing unit mix whereby no less than 60 percent of the units would be sold in price ranges affordable to families targeted by the DHCD, and the remaining 40 percent would be sold at market prices. Under this concept, net income derived from the sale of market units within the development would be used to reduce the cost of some or all of the affordable units also in the project.
2.7 IMPACTS AND MITIGATING MEASURES

The proposed project is not expected to have any significant adverse environmental impact, nor will it be environmentally controversial. Air quality and noise impacts, which are associated with the increase of vehicular traffic, will be minimal and will be mitigated through design and measures intended to encourage the use of mass-transit and multiple ridership of private vehicles. Increased demand on public facilities will also result, however, adequate sewer, water, and roadway capacities are available or planned. The project will provide much needed gap group and elderly housing, and is expected to have widespread community benefit in the areas of housing, employment, the economy, and for long range, planned population growth. The project generally conforms with all applicable plans, policies, and controls.

2.8 RELATIONSHIP TO PLANS AND POLICIES

The proposed project, in accordance with Chapter 343, HRS, relating to Environmental Impact Statements (EIS), constitutes an agency action requiring preparation of an EIS. This EIS will be subject to review and acceptance by the City Department of Land Utilization.

As indicated by the State Land Use Map, most of the project site is designated for agriculture with a portion of Increment I designated for urban usage.

The site is also designated for both agriculture and residential use on the Ewa Development Plan Land Use Map. The residential designated portion of the site is located in Increment I of the project.

The site is zoned AG-1 with a small portion of Increment I zoned for R-5 use.

The project generally conforms with the State Plan, the State Functional Plans, and the City and County of Honolulu General Plan, and is expected to conform with/and fulfill the policies and objectives outlined by these plans.
The project lies within the Special Management Area and will be subject to applicable controls in Act 205-A, Coastal Zone Management.
III. PROPOSED PROJECT DESCRIPTION

3.1 LAND USE

The project Master Plan encompasses approximately 255 acres and provides for 1,500 residential units. Both northern and southern increments are separated by a flood plain which is proposed to be developed as a 175-acre, 18-hole municipal golf course by the City's Department of Parks and Recreation as part of a separate project. Included in the proposed Department of Parks and Recreation project is a 39-acre shoreline park which will be located along the two residential communities and the golf course along the shores of the West Loch, of Pearl Harbor.

3.1.1 Residential

The most extensive land use is residential, occupying 68 percent of the project area.

Market Units. Market units occupy 41 percent of the residential land areas. The master plan accommodates 590 market units on a total of 71.1 acres of land distributed over a number of sites located throughout Increments I and II. Many of the market units have been placed on lots with unimpaired views of the golf course, the shoreline park and West Loch to maximize their desirability and amenity value. The net or residual income derived from the sale of the market units will be used to "write-down" the cost of the affordable housing units within the project.

Affordable/Gap Group Units. The affordable or gap group units comprise 53 percent of the residential land areas. Approximately 760 gap-group houselots have been located on 91.7 acres of land situated throughout the two increments of the project.

Elderly Housing. Multi-family elderly housing units comprise 6 percent of the total residential lands. The master plan accommodates 150 units on a
10-acre parcel. This elderly project is conveniently located adjacent to major public and commercial facilities and has easy access to public transportation.

3.1.2 Civic

A 1.7-acre day care center site has been located adjacent to the district park, the Park and Ride facility and the school site. The sites have been selected for their high visibility and convenience to encourage high use levels by the residents of this project as well as others in the region. It is envisioned that parents may wish to drop their children off at the day care center and/or elementary school while leaving their cars at the Park and Ride facility and joining rideshare programs to commute to work.

3.1.3 Schools

A 6-acre site for an elementary school is located within the civic and public activities corridor in Increment II of the project. This school is intended to be accessible to the adjacent neighborhoods in the Ewa plain. However, should the school in the Ewa by Gentry subdivision be developed first, an elementary school in West Loch Estates may not be necessary.

3.1.4 Commercial

One commercial area is located within the project. The 3.6-acre site is located at the corner of Ft. Weaver Road and the major access loop road of Increment II. This will be a "neighborhood" convenience shopping area.

3.1.5 Transportation

A 2.8-acre Park and Ride site (capacity: 350 vehicles) has been located adjacent to the southern increment's main entry on Ft. Weaver Road and its major access loop road. The Park-and-Ride facility is sited adjacent to a commercial area and a day care center for purposes of convenience and efficiency.
3.1.6 Recreation, Parks and Open Space

District Park. A district park is planned for Increment II of the project and will offer such amenities as a recreation center, ball fields, and courts. The park will serve the needs of a growing community as well as those of adjacent developments such as Ewa by Gentry and Ewa Village. A portion of the park is situated within the 100-year flood plain as an alternative use of an area that is not suitable for residential use. The park will also function as a storm runoff retention area to mitigate impacts on West Loch's receiving waters.

Entry Features/Buffer. An entry feature at the northern increment's Ft. Weaver Road intersection will signal arrival at the West Loch Estates. Landscaped buffer areas will be established on Ft. Weaver Road stretching along the mauka boundary of both increments and the cane haul road that traverses the makai portion of the project to create an aesthetically pleasing edge to the development and to insulate residences from adjacent roadway activities. Buffer areas total approximately 14.3 acres, or 6 percent of the entire project. Well-landscaped greenbelts running throughout both areas of residential development and through the center of the elderly housing project constitute a total of about 13 acres.

3.1.7 Anticipated Adjacent Land Uses

Shoreline Park and Golf Course. The City Department of Parks and Recreation is proposing to develop a 39-acre shoreline park which will be located along the eastern boundary of Increment I of the residential development. A 175 acre municipal golf course will be located between the two residential increments of the West Loch Estates. These proposed adjacent projects are expected to parallel or follow the residential development project. A rationale for the golf course is its' ability to function as the retention and recharge basin for stormwater drainage flows generated from the project site and major drainage areas mauka of the project site.
3.2 INFRASTRUCTURE

3.2.1 Circulation Systems

Residential units in Increment I will be served by a major access loop road, with a 108-foot wide entry on Ft. Weaver Road, narrowing to an 80-foot right-of-way width through the residential areas, and providing an alternate, secondary entrance on to Leokane Street within the abutting Waipahu industrial park. In addition to the main loop, a secondary loop road will be routed through the development with direct feeder roads flowing into this loop. A landscaped greenbelt system will run through the central portion of Increment I to provide access to the shoreline from Ft. Weaver Road. The greenbelt will provide for pedestrian and bicycle circulation throughout the project. The use of cul-de-sacs has been utilized to discourage high traffic speeds and through traffic. Many of the interior cul-de-sacs terminate near the loop roads and greenbelts to allow pedestrian and bicycle access.

A major access loop road will serve Increment II of the project with a 108-foot wide entry on Ft. Weaver Road that will also serve the Park-and-Ride facility. This loop road will run in a curvilinear north-south direction through this portion of the development, narrowing to 80 feet in width through the residential neighborhoods, and providing access on the southern end of this increment at Ft. Weaver and Renton Roads. The internal green-belt system providing pedestrian and bicycle circulation is also utilized in this area. This system is designed to fully utilise the panoramic views of the West Loch and the area beyond West Loch. The use of cul-de-sacs will again be utilized to discourage high speeds and through traffic. The cane haul road, which traverses Increment II, will be buffered by a landscaped setback area on both sides to minimize the effects of cane hauling activities along this route.

3.2.2 Water

Potable water demand for the project is estimated to be 800,000 gallons per day. The Board of Water Supply will supply the demand required by both Increments I and II of the project. A new well at the Waipio Heights III
site will provide the water. Storage will be provided by a new 228' reservoir to be constructed in the Waipahu-Honolulu area. Utilization of non-potable water to fulfill the irrigation requirements of the project is also planned. An approved water allocation from the State Department of Land and Natural Resources (DLNR) is required and an application is pending before that agency.

3.2.3 Sewage Treatment

Anticipated sewage flow of 550,000 to 600,000 gallons per day (GPD) from the project site will be accommodated by the City and County's Ewa and Waipahu sewer systems. The first increment will connect with the Waipahu system and a 1,200-foot long, 12-inch relief sewer is planned to extend from the site to the Kunia Wastewater Pump Station. The line may be upgraded to a 15-inch trunk sewer if necessary. The second increment of the project require connection to the Ewa sewers through lines running under Ft. Weaver Road to an 84-inch interceptor line at Geiger Road. Waste will be treated at the Honolulu Waste Water Treatment Plant (WWTP). A wastewater pump station will be constructed at or near Increment II of the project to accommodate flow requirements. Both the Ewa and Waipahu sewer systems have the necessary capacity with the specified improvements. The Honolulu WWTP currently has the capacity necessary to treat and dispose of the effluent generated by the project.

3.2.4 Drainage

Onsite drainage will be managed by a street drainage system consisting of underground drain lines, drain manholes, and intake boxes. Runoff from the system will be discharged into the proposed municipal golf course drainage system. The design of the golf course drainage system will provide the capacity necessary to effectively retain and settle surface runoff from the residential increments, the golf course itself, and drainage areas mauka of the project, prior to discharge into West Loch receiving waters. This is expected to minimize the effects of increase runoff and possible alterations of constituent quality due to urbanization.
3.2.5 **Telephone and Electricity**

Telephone service to the project will be provided by Hawaiian Telephone Company, and electricity will be provided by Hawaiian Electric Company.

Project electricity demand has been estimated at about five million volts per day. Two sets of electrical lines abut the project. An existing elevated line runs along Ft. Weaver Road, containing one 46-KV circuit and one 12 KV circuit. Another electrical line with two 46-KV circuits and one 12-KV circuit runs along the West Loch shoreline and the OR&L right-of-way. Electrical power for the site will come from either the Kahe or Wai'au generating plants. It is anticipated that Hawaiian Electric will need a new transformer station at or near the project site. Definitive engineering design will be coordinated with the respective utility firms during the final offsite improvements planning.

Telephone service will be provided by existing switching stations which are located near Waikiki Street and Renton Road. An underground telephone cable linking Hickam Air Force base and Kauai also crosses the mauka portion of the project site. Connections to both increments will be planned with Hawaiian Telephone Company during offsite improvements planning.

3.3 **PROJECT PHASING**

The project will be phased in two increments over a three year construction period with Increment I beginning in 1988. Construction activities will begin in the northern half of the project and then generally progress southward over the construction period.

The first increment will total approximately 86 acres. This phase will include approximately 600 housing units over 71 acres, 8.2 acres of greenbelts, and 6.7 acres of roadways. The second increment scheduled for construction in 1990, will involve 163 acres. This will include about 900 housing units on 100 acres, 23 acres of recreation space, 14.3 acres of buffer and setbacks, 10 acres of civic uses such as the elementary school, day care facility and park and ride, 3.5 acres of commercial uses, and another 9.7 acres of roads.
Affordable and market units will be developed in each increment. The 150 elderly housing units will be developed in the second increment.

Increment I, expected to begin construction in 1988, includes a total of 86 acres and is bordered to the north by the Ft. Weaver Road/Farrington Highway corner. A total of 600 housing units will be developed in the first increment consisting of 310 gap group single-family units, and 290 market single-family units. The entry feature located at the Ft. Weaver Road/ major access loop intersection, the remaining portion of the loop, and greenbelts comprise the other land uses within the first increment.

The second increment (163 acres) will begin construction in mid-1990. It will consist of 450 gap group single family units, 300 single family market units and 150 multi-family elderly units. An approximately 18-acre district park and 5 acres of greenbelts will be included. 14.3 acres of road buffers and setbacks will be developed; while an elementary school, day care center, and park and ride facilities will be constructed over 10.6 acres in this increment. Another 3.5 acres of commercial space will be built; while the remaining 9.7 acres will go to roadways.
IV. AFFECTED ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Topography

The project site consists of gently sloping lowlands with grades ranging from 0 to 5 percent. Ground elevations within the project site range from sea level along the coastal areas to approximately 65 feet above sea level at the northern region and 40 feet above sea level at the southern region.

4.1.2 Hydrology

The proposed project site is located within the Pearl Harbor Ground Water Control Area (GWCA), which is regulated by the State Board of Land and Natural Resources (BLNR). In 1980, the BLNR certified the sustainable yield of the Pearl Harbor GWCA at 225 million gallons per day (MGD). In 1985, the BLNR established three subareas within the Pearl Harbor GWCA: the Koolau subarea; the Waianae subarea; and the coastal caprock subarea. The sustainable yield for the Koolau subarea was set at 200 MGD. The Waianae subarea included the Waianae basal aquifer and was determined to have a sustainable yield of 25 MGD. A sustainable yield for the coastal caprock subarea will be determined in the future for brackish water and sea water withdrawals. At present, the Koolau subarea has an unallocated water resource of 90,000 GD and the Waianae subarea has an unallocated water resource of 5,96 MGD.

The project site is located within the coastal caprock subarea boundary of the Pearl Harbor GWCA.

4.1.3 Soil Types and Ratings

The project site contains a variety of soil types including silty clays, mottled
clays, massive clays, coral deposits, as well as mixed soil types. Generally, permeability and runoff are slow, with only slight erosion hazards. Colors of the different soils include dark brown, dark reddish-brown, dark grayish-brown and very dark gray soils. The soils are neutral to slightly acid and workability of the soil is considered difficult.

Ratings for the different soil types are listed in the Land Study Bureau's (LSB) Detailed Land Classification. The classification system ranks soils in five overall productivity categories ranging from the best rank, "A" to the worst rank of "E". Factors involved in the ranking process were machine tillability, stoniness, texture, clay properties, drainage, rainfall, elevation and slope.

According to the Department of Agriculture, the project lands are largely classified "Prime" and "Other Important" according to the Agricultural Lands of Importance to the State of Hawai'i (ALISH) system.

It should also be noted that according to the Flood Insurance Study for the City and County of Honolulu, the project parcels are located in the following designated zones:

Other Flood Areas

Zone AE. Base flood elevation determined.

Zone X. Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

Zone X. Zone X (previously Zone C) is an area determined to be outside 500-year flood plain.

Zone D. Zone D represents unstudied areas under the Federal Insurance Administration study and is an area of undetermined but possible flood hazards. No information on potential flood hazards has been identified for this area.
The following are brief descriptions of the soil types on the site and their LSB ratings.

HxA (0 to 2% slope), HxB (2 to 6% slope), Honouliuli Series

The Honouliuli soil series consists of well-drained soils on coastal plains in the Ewa area. These soils developed in alluvium derived from basic igneous material. They form in gently sloping elevations ranging from 15 to 125 feet above sea level. Average annual rainfall in these areas is approximately 18 to 30 inches per year and occurs mainly between the months of November and April. The mean annual soil temperature is 74° F. Honouliuli soils are geographically associated with Ewa, Lualualei, Mamala, and Waialua soils.

The HxA and HxB soil profile consists of dark reddish-brown, very sticky and very plastic clay throughout. The surface layer is about 15 inches thick. The subsoil and substratum have subangular blocky structures and many slickensides. The soils are neutral to mildly alkaline.

Permeability of these soils is moderately slow. Runoff is slow and the erosion hazard is no more than slight. These soils are principally used for sugarcane, truck crops, and pasture. Workability of the soil is considered slightly difficult due to the very sticky and plastic characteristics. The shrink-swell potential is high. The natural vegetation consists of kiawe, koa haole, fingergrass, bristly foxtail, and bermudagrass. The LSB ratings for these soils are B16i and C17i.

HeB (2 to 6% slope), Haleiwa Series

The Haleiwa soil series consists of well-drained soils on fans and in drainageways along the coastal plains. They developed in alluvium derived from basic igneous material. They are nearly level to strongly sloping. Elevations range from sea level to 250 feet. Annual rainfall is 30 to 60 inches per year, most of which occurs in the months between November and April. The mean annual soil temperature is 73° F.
Haleiwa soils are geographically associated with Waialua and Kawaihapa'i soils on the Island of Oahu.

A representative profile of the HeB soil type includes a 17-inch thick surface layer consisting of dark brown silty clay. The subsoil and substratum layers, which may reach a depth of more than 5 feet, are dark brown and dark yellowish-brown silty clay with a subangular blocky structure. The soil is neutral to slightly acid.

The HeB soil is characterized by slow runoff and slight erosion hazards. Uses of the soil include sugarcane, pineapple and truck crops. Natural vegetation occurring with this soil includes koa haole, lantana, guava, Christmas berry, bermudagrass and fingergrass. The LSB rating for these soils are B16i and C17i.

HLMG (30 to 90% slope), Helemano Series

The Helemano soils are well-drained soils on alluvial fans and colluvial slopes on the sides of gulches. They developed from alluvium and colluvium derived from basic igneous rock. Slope percentages are steep to extremely steep with elevations ranging from 500 to 1,200 feet above sea level. Average rainfall for these soils is 30 to 60 inches per year and soil temperatures average 72° F. Helemano soils are geographically associated with Lahaina, Leilehua, Manana, Molokai, and Wahiawa soils.

A representative profile of the HLMG soil type includes a dark reddish-brown surface layer approximately 10-inches thick. The subsoil, approximately 50-inches thick, is dark reddish-brown with a dark-red silty clay that has a subangular blocky structure. The substratum is soft, highly weathered, basic rock. The soil neutral in the surface layer and neutral to slightly acid in the subsoil.

Permeability of the soil is moderately rapid. Runoff is medium to very rapid, and the erosion hazard is severe to very severe. This soil is used for pasture, woodland, and wildlife habitat. Natural vegetation occurring with this soil includes bermudagrass, Christmas berry,
eucalyptus, Formosa koa, guava, Japanese tea, Java plum, and koa haole. The LSB rating for this soil is E105.

**Kfb, Kaloko Series**

The Kaloko soil series consists of poorly drained soils on coastal plains. These soils developed in alluvium derived from basic igneous rock and deposited over marly lagoon deposits. The soils are nearly level in slope with elevations ranging from sea level to 20 feet above sea level. Average rainfall for these soils is 20- to 25-inches per year and soil temperatures average 73° F. Kaloko soils are geographically associated with Keaau, Pearl Harbor and Waialua soils.

The Kfb soil type occurs in slight depressions on coastal plains. The surface layer of the soil is very dark, grey clay. The subsoil and substratum layers are massive clay and silty clay. The soil is neutral to slightly acid throughout.

Permeability of the soil is slow. Runoff is ponded to very slow, and the erosion hazard is none to slight. The natural vegetation consists of Klawe, klu, bermudagrass, and annuals. This soil is typically used for pasture and sugarcane purposes. The LSB rating for this soil is B16i.

**KmaB (2 to 6% slope), KmbA (0 to 2% slope), Keaau Series**

This series consists of poorly drained soils on coastal plains. These soils developed in alluvium deposited over reef limestone or consolidated coral sand. They are nearly level and gently sloping. Elevations of this soil range from 5 to 40 feet. Average rainfall is 20- to 35-inches per year with most of the rainfall occurring between the months of November and April. The mean annual soil temperature is 73° F. These soils are geographically associated with Kaloko, Mokuleia, and Pearl Harbor soils.

These soils have a representative profile consisting of a surface layer (about 15-inches thick) of very dark grayish-brown clay. The subsoil
(about 19-inches thick) is very dark grayish-brown and dark brown mottled clay that has a subangular and angular blocky structure. The substratum is white to very pale brown reef limestone or consolidated coral sand. The soil is mildly alkaline in the surface layer and subsoil and moderately alkaline in the sustratum.

KmaB soil is characterized by a sufficient amount of stones to hinder cultivation. Runoff is slow and the erosion hazard is slight. This soil is used for sugarcane and pasture.

KmbA soil is strongly affected by salts within the soil profile occurring where seepage water evaporates. Use of this soil under natural conditions remains idle or is used for pasture. The LSB rating for these soils are E32, C171, and B161.

Ph, Pearl Harbor

The Pearl Harbor soil series consists of very poorly drained soils on the nearly level coastal plains. These soils developed in alluvium overlying organic material. Elevations of the soil range from sea level to 5 feet above sea level. Average annual rainfall is 18- to 40-inches per year with an average soil temperature of 74° F. Pearl Harbor soils are geographically associated with Hanalei, Kaloko, and Keauu soils.

A profile of the Ph soil type includes a 12-inch thick surface layer of very dark gray mottled clay. The 19-inch subsoil is very dark gray and very dark grayish-brown mottled clay that has an angular and subangular blocky structure. The substratum is muck or peat. The soil is neutral in the surface layer and mildly to moderately alkaline in the subsoil.

Permeability of the soil is very slow and runoff is very slow to ponded. The erosion hazard is considered slight. While workability of the soil is difficult, the soil is used for taro, sugarcane and pasture. Natural vegetation occurring within this soil includes cattails, mangrove trees,
california grass, and sedges. The LSB rating for these soils are D99 and D99i.

WzA (0 to 2% slope), WzC (6 to 12% slope), Waipahu Series

The Waipahu soil series consists of well-drained soils on marine terraces. These soils developed in old alluvium derived from igneous rock and are nearly level to moderately sloping. Elevations range from sea level to 125 feet above sea level. Average rainfall is 25- to 35-inches per year, mostly occurring between the months of November and April. The average soil temperature is 75° F. Waipahu soils are geographically associated with Hanalei, Honoluluii, and Waialua soils.

A representative profile of these soils consists of a 12-inch thick, dark grayish-brown, silty clay with a prismatic structure and is very sticky and very plastic in the lower part. The substratum is alluvium clay. The soils are slightly acid in the surface and subsoil layers.

Permeability of the WzA soil type is moderately slow and runoff is slow with an erosion hazard of none to slight. This soil is used for sugarcane and homesites.

The WzC soil type has a medium runoff and a moderate erosion hazard. This soil is also used for sugarcane and homesites. The LSB rating for these soils are B161 and C171.

The soils within the project site are classified as "Prime" under the ALISH system (Agricultural Lands of Importance to Hawaii), and "A" and "B" lands under the Detailed Land Classification System (Figures 4, 5).

4.1.4 Climate

The climate of the project area is constant and relatively dry, with prevailing trade winds coming out of the northeast. Wind data gathered from Naval Air Station, Barbers Point (located southwest of the project site) reveals the dominant wind regime is the northeast tradewinds which blow 85 percent of the time at an average of 9 knots per hour.

IV-7
Temperatures in the Ewa Plain area range from 72 to 80 degrees Fahrenheit (F.). Climate data (1986) taken from Honolulu International Airport (located southeast of the project site) reveals the average temperature for the warmest month is 81° F. The average temperature for the coolest month is 72.6° F. Extreme temperatures were recorded at 94° F. as the highest temperature and 53° F. as the lowest temperature.

The Ewa Plain experiences light rainfall amounts of approximately 20-inches per year. Most of this rainfall occurs between the months of November and April.

4.1.5 Flora

A botanical survey for the project site was conducted during July 1987 by Char & Associates. The report is attached as Appendix A and is summarized below.

The project area consists largely of gently sloping lands, most of which are presently under sugar cane cultivation by Oahu Sugar Company.

Abandoned cane fields covered by weedy species occupy the northern portion of the project area. Scattered patches of scrub vegetation are generally found along the perimeter boundaries of the cane fields. Pasturelands are found in the middle portion of the property and wetlands, composed of mangrove swamp and cattail-bulrush marsh, occur along the West Loch boundary.

The vegetation on the proposed West Loch Estates Development is dominated by introduced (or alien) species. Of a total of 164 plant species inventoried, 86.6% or 142 species are introduced; 16 are indigenous, i.e., native to the islands and elsewhere; 1 is endemic, i.e., native only to the islands; and 5 are of early Polynesian introduction. There is little of botanical interest on the project site. The native species are found in similar environmental habitats throughout the islands. Some plants, such as the koali (Ipomoea cairica), koali-lawania (Ipomoea indica), 'uhaloa (Waltheria indica), and hoary abutilon (Abutilon incanum) are considered rather "weedy" natives.
which do well in open, more or less disturbed areas. None of the native
species are considered rare, threatened or endangered.

While the wetlands do not contain any species of botanical significance, they
do provide habitat for a number of endangered Hawaiian waterbirds. The
cattail-bulrush marsh around the Apokeo Fish Ponds is especially valuable as
wetland habitat. This portion of the study area is primarily located in the
non-residential sectors of West Loch Estates.

4.1.6 Wildlife

A study of wildlife within the project site and vicinity was conducted during
August 1987 by Andrew J. Berger. The study is attached as Appendix B
and is summarized below.

The terrestrial vertebrate study indicated that the project area had been
drastically disturbed for more than 100 years and there was no evidence of
an endemic ecosystem in the vicinity of the project area. Amphibians and
reptiles are found throughout the islands; however, all have been introduced
and none are threatened or endangered species.

Many of the endemic birds, which are unique to the Hawaiian Islands are
classified as endangered or threatened species and a Fish and Wildlife Service
(FWS) refuge is situated adjacent to Increment II.

Indigenous birds, which occur naturally in Hawaii and in other parts of the
world, are found in the project area. These primarily consists of Black-
crowned night herons and migratory winter residents such as the golden
plover. No indigenous nesting seabirds are found in the vicinity of the
project site.

Introduced birds are also found throughout the project site; however, none
are considered threatened or endangered species.
Introduced mammals are also likely to be found on the project site. None are considered to be threatened or endangered and most have been proven to be detrimental to man, his buildings, products, agricultural crops and/or to native forests and their animal life.

4.1.7 Noise

Existing noise levels within the project site and vicinity have been subject to study by the U.S. Navy as part of the Air Installations Compatible Use Zone (AICUZ) program for NASBP (U.S. Navy, 1984). An additional noise study was conducted by Y. Ebisu & Associates during August 1987. This study is summarized below and is attached as Appendix C.

Along the Fort Weaver Road Right-of-Way, existing traffic noise levels are in the "Significant Exposure, Normally Unacceptable" category. Existing setback distances to the 65 Ldn contour line are estimated at 235 FT and 128 FT from the centerline of the roadway at the north and south sections of the roadway. In the vicinity of the proposed residential subdivisions of West Loch Estates, which are located on the Diamond Head (east) side of the roadway, existing traffic noise levels are in the "Significant Exposure, Normally Unacceptable" category (approximately 67 to 73 Ldn) along the first row of proposed lots which will front the highway.

In the vicinity of the Renton Road intersection, existing residences of Fernandez Village are in the "Moderate Exposure, Acceptable" category due to the large setback distances (240+ FT) from the centerline of Fort Weaver Road, and due to the lower vehicle speeds near the signaled intersection. To the north, the existing Hale O Ulu School on the west side of Fort Weaver Road is exposed to traffic noise levels of 65 to 70 Ldn, which are considered "Unacceptable" for naturally ventilated schools. Existing quonset huts on the project site and south of the Honolulu Stream Bridge are in the "Significant Exposure, Normally Unacceptable" category (approximately 65 to 70 Ldn). These existing structures will be removed under the proposed project development plan.
Along the existing cane haul road which runs through the southern portion (Increment II) of the project, cane haul trucks are the dominant noise sources during the harvesting season, which occurs on a 2.5 year cycle.

During a peak harvesting day of 24-hour operation, cane haul truck noise levels could exceed 65 Ldn within 190 FT setback distance from the haul road's centerline. However, average Ldn values for the 190 day harvest season or for the 365 day annual period do not exceed 65 Ldn at setback distances of 80 Ft, and cane haul truck noise levels are in the "Moderate Exposure, Acceptable" category at the proposed residential lots along the haul road.

The West Loch Estates project site is located outside the Barbers Point Naval Air Station and Honolulu International Airport Ldn 55 noise contours. The potential impacts are considered negligible due to the sites' distance from aircraft flight patterns.

4.1.8 Air Quality

An Air Quality analysis for the project site was conducted during September 1987 by J.W. Morrow. The study is attached as Appendix D and is summarized below.

The two nearest State Department of Health air monitoring stations to the project area are located at the Campbell Industrial Park about 6 miles to the southwest and at Pearl City, some 4 miles to the northeast. Total suspended particulates (TSP), sulfur dioxide (SO2), and nitrogen dioxide (NO2) were all monitored on a 24-hour basis. Initially, the site was at the Barbers Point Lighthouse, but the proximity to the ocean resulted in very high TSP levels due to salt spray. The station was therefore moved to the Chevron Refinery site about 1.7 kilometers north of the lighthouse on March 17, 1972. In 1976, NO2 monitoring was ceased. On August 7, 1979, the monitoring station was moved to a rooftop location at the same Chevron site.

It should also be noted that total suspended particulate monitoring with a
high-volume sampler was ceased at the site in October, 1985. In November, 1985, a new PM-10 sampler was installed. This instrument measures respirable particulate matter under 10 microns in aerodynamic diameter.

It is evident from existing data that both the National Ambient Air Quality standards (NAAQS) and Hawaii Ambient Air Quality Standards (HAAQS) are being met at those monitoring sites.

Because the Campbell Industrial Park monitoring station is situated relatively close to the elevated sources, i.e., the stacks, located at the industrial park, the data collected may not be representative of the highest ambient pollutant levels resulting from the various industrial sources at the park. Computer modeling done in conjunction with the City's resource recovery facility permitting indicated maximum SO2 concentrations occurring some 1.0 to 1.5 kilometers north of the park in the flat terrain as well as on the hillsides also north of the park.

Unfortunately, there are no routine monitoring data for the primary automotive pollutant, i.e., carbon monoxide. The nearest CO monitoring site is at the Department of Health building in downtown Honolulu some 11 miles east-southeast of the project area. Because the area is presently at an early stage of development, it can be surmised that present CO levels are also relatively low.

A spot sampling of carbon monoxide concentrations along Fort Weaver Road was conducted during two recent a.m. peak hour traffic periods as part of the air impact analysis.

It should be noted that during the September 17, 1987 sampling the monitoring instrument was located upwind of the Fort Weaver Road traffic due to the light northeasterly winds; thus, the low CO levels being measured were due to vehicles operating on the H-1 freeway upwind (northeast) of the sampling site.

During the September 22, 1987 sampling, onsite winds were very light and
at times calm. During the calm periods, CO concentrations leveled off at about 1.0 - 1.5 mg/m³.

4.1.9 Historic and Archaeological Resources

An archaeological reconnaissance survey of the project site was conducted by Paul H. Rosendahl, Ph.D., Inc. and is included as Appendix E. The findings of the study, which is dated September 1987, are summarized below.

The combined surface and subsurface reconnaissance survey of the West Loch Estates, Residential Increments I and II project area confirmed an initial impression that the project area had been extensively and almost entirely modified by decades of historic period sugarcane cultivation. Only four sites were identified during the survey field work (Figure 6). Three of these (Sites T-2, -3, and -4) were found to be historic period in age, while the fourth (T-1) was ambiguous as to whether or not it even was a cultural feature. Two of the historic period sites, the cemetery (T-3) and the surface artifact collection area (T-4) appear to be related to relatively recent sugar plantation occupation, while the third, a small surface artifact collection area (T-2), appears to date somewhat earlier. Study results have been discussed with the State Historic Preservation Office (SHPO) of the State Department of Land and Natural Resources (DLNR) and the Study provided for their review.

4.1.10 Surrounding Land Uses

4.1.10.1 Existing Uses

The Ewa area encompasses the entire Ewa Plain which extends from Kunia Road in the northeast to Kahe Point in the west. Within this area, lie scattered residential communities, a major industrial park, a major destination resort area, a wildlife refuge, two major military installations, and a portion of Oahu's largest sugar plantation. The surrounding land uses that have major influence on the project site are described below.
West Loch Estates

ARCHAEOLOGICAL SITES
Ewa, Oahu, Hawaii

Figure: 6
Waipahu

Waipahu is located northeast of the project site at the northern tip of Pearl Harbor. In 1980, the Federal Census recorded the resident population of Waipahu at 29,139 persons.

Waipahu is an older community which was primarily founded by the location of Oahu Sugar Company's major sugar mill. Many immigrant groups were brought in to work in the sugar industry and many settled in Waipahu. As the sugar industry declined, the U.S. Navy operations in Pearl Harbor began to play a more prominent role in Waipahu. Waipahu's growth as an industrial and commercial center is tied in part to nearby defense activities.

Ewa Beach

Ewa Beach, an older residential community with a small commercial center is located south of the project site along the coastline. Homes in Ewa Beach are moderately priced, except for some oceanfront properties. The Ewa Beach community had 3,465 housing units and a population total of 14,500 residents in 1980.

Ewa Villages

Located southeast of the project site are a number of small plantation villages known collectively as the Ewa Villages. These communities are the Varona, Tenney, Renton, and Fernandez Villages. Their heritage goes back to the Ewa Plantation when it was an active sugar mill town. Most of the housing units within the Ewa Villages are very old and low priced. In 1985, 3,000 people lived in the villages.

James Campbell Industrial Park

The James Campbell Industrial Park, located southwest of the project site, includes 2,400 acres with 1,360 acres in current use and the remaining acreage reserved for future expansion. Uses within the Industrial Park
include a mix of light industrial and heavy industrial activities. The Industrial Park employed approximately 2,500 people in 1985.

**Naval Air Station, Barbers Point (NASBP)**

Also located southwest of the project site is NASBP, which housed approximately 2,900 residents and employed 1,500 civilians in 1985. According to the NASBP master plan 1985, the mission of NASBP is to maintain and operate facilities and provide services and material support operations for aviation activities and units of the operating forces of the United States Navy. Aircraft operations of NASBP are conducted on a 24 hour basis and primarily consist of fixed wing propeller-driven aircraft with most flights occurring within the daylight hours.

**Blast Hazard Zone**

The proposed development is near the Explosive Safety Quantity Distance (ESQD) hazard zone that originates from the ammunition wharves at NAVMAG Lualualei, West Loch Branch. These explosive safety quantity distance arcs or "blast hazard zone," is a known constraint in the planning of the project. It is located approximately 200 feet from the project boundary at the closest point and will be buffered by a shoreline park and setback area related to the FWS bird refuge.

**4.1.10.2 Approved Uses**

Within the Ewa Plain, there are three planned developments which have recently received government approvals. A brief description of these developments are presented below.

**Ko Olina**

The Ko Olina planned residential/resort community is located on the western edge of the Ewa Plain, west of the James Campbell Industrial Park. The total area of the planned community includes approximately 642 acres. Amenities of the planned community include 5,200 housing units, 4,000 visitor
units, a 500 slip marina, an 18-hole championship golf course, a Hawaiian cultural center, two shopping centers, and a number of restaurants.

Ewa Marina

The planned Ewa Marina consists of 727 acres of land and water area designed for water-oriented activities. The dominant element of the planned development is the 98-acre marina. Other elements of the plan include 4.5 miles of waterfront property to accommodate residential and commercial use, 4,850 units within 26 development areas, a retail shopping center, a golf course, restaurants, parks and a school.

Ewa by Gentry (Pearl Meadows)

Ewa by Gentry, previously known as Pearl Meadows is a planned residential development adjacent to the Ewa Villages. Development of the project is expected to create approximately 8,500 housing units consisting of single family detached, single family attached, townhomes, and apartment/condominium units with various densities.

4.2 PUBLIC FACILITIES AND SERVICES

4.2.1 Transportation

A regional traffic impact study was conducted during September 1987 by Pacific Planning and Engineering. The study is attached as Appendix F and is summarized below.

Fort Weaver Road provides the primary access to the proposed development and serves as a major arterial roadway between H-1 Freeway and the existing Ewa Beach Community (Figure 7). The roadway is a four-lane divided highway with a wide grassed medial that provides roadway width for left-turn storage lanes into the proposed subdivision.
West Loch Estates
TRAFFIC ACCESS
Ewa, Oahu, Hawaii

Figure 1

LOCATION MAP

SCALE IN FEET

2000 1000 0 2000

Farrington Highway
Leoku-Leoleole Street
Intersection

Access Road "A"

West Loch Estates
Phase I

Access Road "B"

West Loch Estates
Phase II

Fort Weaver Rd,
Renton-Arizona
Intersection
There are no sight distance or other physical roadway constraints which would result in unusual traffic safety concerns or conditions at the proposed intersections with Fort Weaver Road. The speed limits are 35 and 45 miles per hour. There is a designated bikeway on the east side of the roadway. There are no driveway access points. All access is controlled by the State Department of Transportation, Highways Division.

Intersection improvements for the St. Francis Hospital-West, presently under construction, will provide deceleration and left turn storage lane for north-bound Fort Weaver Road traffic turning left into the hospital site. In addition, a traffic signal system was recommended at the intersection to improve egress during the afternoon peak hour.

Arizona Road is located along the southern portion of the project and will serve as the secondary access for Increment II. It is an extension of Renton Road and is signalized at the intersection with Fort Weaver Road. It is presently an unpaved road servicing the West Loch U.S. Naval Magazine installation.

Leokane Street is located along the Northern portion of the project and serves as the secondary access for Increment I. Leokane Street is intersected by Leoole Street which access Farrington Highway in Waipahu. These streets serve the industrial area located northeast of the proposed project.

4.2.2 Water

The project site is located within the Board of Water Supply's (BWS) Ewa-Waianae district. At present, the BWS has imposed restrictions on potable water connections in the Fort Weaver Road-Ewa Beach area until planned water transmission improvements are completed and in place. The existing system presently draws from the Kunia I Well (6.00 MGD) and the Hoaeae Well (6.61 MGD). The project will draw the projected demand of 0.8 MGD from the Waipio Heights III Well (.85 MGD) currently under construction.
4.2.3 Wastewater

Wastewater from the Ewa Plain area is currently treated at the City and County's Honouliuli Wastewater Treatment Plant (WWTP) and disposed of via the Barbers Point Ocean Outfall. The capacity of the WWTP is 25 MGD. The current flow to the plant is 21 MGD. The Barbers Point Ocean Outfall has a capacity of 112 MGD, the projected peak flow for the year 2020. The County Division of Wastewater Management (DWM) is asking for funds to expand the plant capacity to 38 MGD by the year 1994 to accommodate proposed developments in Central and Leeward Oahu.

4.2.4 Solid Waste

The Ewa Plain area is currently serviced by the City and County of Honolulu. The Department of Public Works, Division of Refuse Collection and Disposal provides solid waste collection and disposal in single family residential areas. Non-residential and multi-family residential areas are serviced by private refuse collection companies. Solid waste is disposed of either at the Palailai Landfill or the Waipahu Incinerator.

The Palailai Landfill is scheduled to close within the next few years and is not expected to provide refuse disposal capacity for the West Loch Estates project. The City and County of Honolulu is exploring new means and locations for disposal of solid wastes. A new landfill site at Waimanalo Gulch is being implemented. Also, a Garbage-to-Energy H-POWER facility, to be located in the James Campbell Industrial Park, is scheduled to become operational in late 1990.

4.2.5 Power and Communications

The Ewa Plains area is serviced by the Hawaiian Electric Company for power generation and transmission facilities. Existing power facilities within the project area and vicinity include the Kahe and Waiau Power Plants.

Hawaiian Telephone Company maintains communication facilities for the project site and vicinity.
4.2.6 Police and Fire Protection

Police service for the Ewa Plains area is provided by the Pearl City station, which is staffed by 161 officers who rotate on three different shifts. Three districts are patrolled by the Pearl City station: Waianae Coast; Waipahu/Ewa Beach; and Alea/Pearl City.

Fire protection services for the project area and vicinity are provided by the Waipahu station, which houses one engine company (5 fire fighters), and one ladder company (6 fire fighters). Additional fire protection services are available from the Ewa Beach and Pearl City stations. A new engine company is planned for Ewa Tenney Village in 1991.

4.2.7 Medical Facilities

Current medical facilities serving the project area and vicinity are provided by the Waipahu Clinic, staffed by 70 doctors, nurses and aides. The Waipahu Clinic offers a variety of services including physical, occupational, speech therapy, public health nursing, children's health, Hansen's disease clinics, and complete mental health services. The nearest hospital/emergency services are provided by the Moanalua Kaiser Medical Center.

The new St. Francis Hospital-West is also planned for the immediate vicinity which should significantly increase health service capabilities in the region. The St. Francis Hospital-West facility, when completed, will include a comprehensive emergency and ambulatory care center, a full service hospital, a major medical office building, a medical education center, day care facilities, and a "wellness" center.

4.2.8 Schools

The State Department of Education has indicated that Ewa Elementary, Iliima Intermediate, and Campbell High, currently service the project area. The Department also indicated that Iliima Intermediate and Campbell High Schools are currently operating at capacity, therefore, additional budgeting will be
required to expand the facilities at both of these schools. A new elementary school site of 6.1 acres is planned adjacent to the District Park in Increment II of the West Loch Estates Masterplan.

4.2.9 Recreational Facilities

Currently, there is only one existing recreation facility located within the immediate area. Asing Field consists of a medium-sized baseball field area and one basketball court.

From a regional perspective, surrounding recreational facilities are numerous with many smaller neighborhood parks located in nearby communities, as well as larger community parks located in Ewa Beach and Waipahu. Other existing facilities include beach parks located in Ewa Beach and NASBP, and golf courses located in NASBP and Waipahu.

4.2.10 Energy Corridor

The State Department of Transportation has indicated that a small portion of the northern end of the West Loch Estates Increment I is located in the PRI energy corridor. This corridor consists of fuel lines which link Campbell Industrial Park with Pearl Harbor. The County will maintain coordination with the State DOT in any actions affecting the energy corridor. A second energy corridor is located within the OR&L right-of-way and provides connection from Campbell Industrial Park to Nimitz Highway for Chevron USA. There will be no impacts on either energy corridor from the West Loch Estates project.

4.3 SOCIO-ECONOMIC ENVIRONMENT

A socio-economic study was conducted for the proposed project by Community Resources, Inc. and is dated September 1987 (Appendix C). A summary of the demographics of the area is presented below.

Data presented are from the 1970 and 1980 U.S. Census. This time period
was one of significant population growth in the study area. Ewa, which had 24,037 residents in 1970, grew by more than 50 percent to 36,234 in 1980. The population of the Waipahu census designated place (CDP) grew from 24,150 to 29,139.

The most recent estimate of population in the study area is for 1985. The City and County Department of General Planning (personal communication, Steve Young, planner, September 14, 1987) estimates the Ewa Development Plan Area population as 37,400 and the Waipahu CDP population as 29,400. If correct, these estimates suggest much slower study area population growth rates in the 1980's than in the 1970's, possibly due in part to the high interest rates and general slowdown in housing construction experienced during much of the early 1980's.

4.3.1 Ewa

Ewa's largest civilian community is Ewa Beach, located a few miles south of the project site. With a 1980 population of 14,400, Ewa Beach is partially a military support community and partially a bedroom community of commuters to Honolulu. Proximate to Ewa Beach are the military housing areas of Iroquois Point (1980 population of 3,900) and Barbers Point Housing (1980 population of 1,400). In western Ewa, the major community is Makakilo (1980 population of 7,700, with ongoing construction and population growth).

Caucasians and Filipinos are the largest ethnic groups among Ewa's population. Almost half of the area's residents are Caucasian (44.5 percent) and almost one quarter are Filipino (24.8 percent); these shares are higher than the 33.1 percent and 12.8 percent shares, respectively, for all of Oahu.

The Ewa area has a relatively young population. Greater percentages of Ewa residents are under five years of age (10.7 percent) and between five and 17 years of age (27.8 percent), as opposed to Oahu as a whole (7.9 percent and 24.2 percent, respectively). The proportion of residents aged 65 years and older is especially low in Ewa -- senior citizens constitute 7.2 percent of Oahu's population, but only three percent of Ewa's. The youth
of the Ewa population can be attributed in large part to the substantial numbers of military force members and dependents living there -- 18.5 percent of Ewa residents aged 16 years and above were in the armed forces in 1980, a figure well above the Oahu-wide average of 10.1 percent.

Ewa residents are somewhat more likely than all Oahu residents to have been born elsewhere in the United States; 36 percent were born outside of Hawaii, while 30.1 percent of total Oahu residents in 1980 were born elsewhere in the United States. Ewa's share of foreign-born residents was similar to Oahu's; thus, the percentage of Hawaii-born residents was lower than for the island as a whole.

As would be expected from data on place of birth and age, Ewa residents show greater mobility than the entire Oahu population. Relatively fewer Ewa than overall Oahu residents reported living in the same house or on the same island in 1980 as in 1975. The principal mobility difference was that Ewa residents were markedly more likely (26.1 percent) to have resided in a different state five years previously than were Oahu residents generally (18.4 percent).

The adult population of Ewa contains proportionately fewer highly-educated people than does Oahu as a whole. While a slightly lower proportion of Ewa residents completed eight or fewer years in school and the proportion of high school graduates is higher, the percentage who have completed four years of education beyond high school (12.6 percent) is considerably lower than for Oahu (21.7 percent).

4.3.2 Waipahu

The Waipahu CDP includes census tracts 87.01, 87.02, 89.01, and a portion of tract 88. Several of the more suburban-oriented neighborhoods -- such as Village Park, Waipio and Crestview/Ocean View -- are within the Waipahu Neighborhood Board area, but not within the census designated place of Waipahu.
Waipahu's ethnic characteristics indicate a substantially greater proportion of Filipinos than is the case for the island as a whole. This is consistent with the historic roots of Waipahu as a plantation community comprised heavily of immigrants. More than 40 percent of Waipahu residents (41.6 percent) reported Filipino ancestry, far greater than the 12.8 percent percent for the island as a whole. Each of Hawaii's other major ethnic groups show lower representation in Waipahu than for all of Oahu. Differences are most pronounced for Caucasians, who made up 33.1 percent of Oahu's population in 1980 but just 13.5 percent among Waipahu residents.

Waipahu has a relatively young population. Considerably higher proportions of Waipahu residents are less than five years of age (10.7 percent) than for the City and County (7.9 percent); Waipahu's median age of 24.5 years is much younger than all of Oahu's 28.1 years.

The population of Waipahu contains considerably larger numbers born in a foreign country than is the case for the entire island. More than one in every four Waipahu residents (27.9 percent) was born abroad, compared with 14.8 percent of all Oahu residents. Waipahu also has a slightly higher proportion of Hawaii-born residents (56.9 percent) than the county as a whole (55.1 percent), and only about half as many people who were born elsewhere in the United States (15.2 percent, compared with 30.1 percent for all of Oahu).

Mobility patterns, measured by residence five years prior to the 1980 Census, are similar for Oahu and Waipahu residents. The chief differences, as suggested by differences in birthplace, are that greater proportions of Waipahu residents (9.3 percent) than of Oahu residents as a whole (6.6 percent) lived in a different country in 1975. Similarly, relatively fewer Waipahu residents (8.5 percent) reported having lived in a different state in 1975, compared with 18.4 percent for all of the island's population.

Education levels of Waipahu residents are somewhat lower than for Ewa or for all of Oahu. While 14.4 percent of Oahu's population aged 25 years and above completed eight school years or less, the similar statistic for Waipahu
was 27.5 percent. Less than ten percent of Waipahu residents (8.7 percent) have four or more years of education beyond high school, compared with 21.7 percent for Oahu residents generally. Education levels rose for Waipahu, as for the island as a whole, between 1970 and 1980. The proportion of Waipahu's population with some education beyond high school almost doubled over the decade, moving from 13 percent to 23.6 percent.

4.3.3 Housing

Housing tenure in Ewa resembles the pattern for all of Oahu; 49.8 percent of dwelling units are owner-occupied. Crowded units -- those occupied by more than 1.51 persons per room -- are somewhat more common in Ewa, where 8.5 percent of all homes would be defined as crowded by this standard. This could be related to a larger-than-average family size in Ewa, (3.96 persons per household, compared with 3.15 for all of Oahu). While the 1980 median value of owner-occupied housing was lower than for the island as a whole, median monthly mortgage payments (at $514) were higher than the islandwide average of $494. This would suggest that Ewa homeowners had, in general, purchased their homes more recently than was the islandwide norm, a proposition supported by the fact that Ewa residents were more likely to be in-migrants to Hawaii than Oahu residents as a whole.

Waipahu's housing stock characteristics are similar to those of the entire county so far as tenure (owner- vs. renter-occupied units) and availability of plumbing facilities are concerned. However, Waipahu contains a larger than average number of "crowded" dwelling units, where crowding is defined as 1.51 persons or more per room. The percentage of such units in Waipahu (13.8 percent) was almost twice the islandwide rate of 7.4 percent. More widespread crowding may be related to Waipahu's relatively large household size; average number of persons per household was 4.11 in 1980, compared with 3.15 for Oahu as a whole.

As of 1980, renters in Waipahu were slightly worse off in comparison to all island renters, while Waipahu homeowners were marginally better off than owners on the entire island. Median cash rent was $295 for Waipahu, and
represented 15.7 percent of median family income. For Oahu as a whole, median cash rent was $279, representing 14.9 percent of median family income.

The median value of owner-occupied housing in Waipahu ($112,000) was lower than the islandwide median in 1980 ($130,400). However, Waipahu homeowners had lower median monthly mortgage payments ($420) compared to Oahu as a whole ($494). The Waipahu median constituted 22.3 percent of median family income, well below the islandwide average of 25.2 percent.

4.3.4 Market Analysis

A market analysis was conducted by John Child and Company, Inc. which is dated August 1987. A summary of the analysis is presented below with the complete study included as Appendix H.

The analysis was conducted in two parts. One analysis addresses the 600 market priced single-family units and the other addresses the 750 gap group units. The analyses exclude the 150 multi-family units for elderly housing. Section I of the report summarizes methodology and findings for the 600 market priced units. Section II of the report summarizes the analysis covering the 750 gap group single-family units.

The projected residential housing requirements for market priced units were compared to the projected available inventory in Ewa and Central Oahu. Currently housing supply exceeds demand; however, within one or two years, the existing and planned inventory would be insufficient, and an additional 900 to 1,000 units would be required. However, assuming Waiaua, Millani Mauka and Ewa by Gentry receive necessary land use and zoning approvals and development proceeded as proposed, the total available inventory would exceed demand from 1990 through about 2000.

As a result, major projects would be expected to delay or decrease the proposed phasing to minimize the surplus inventory. By 2001, housing requirements would be expected to exceed available inventory. Major
residential projects would be expected to accelerate development. About 5,000 units in Ewa Marina and Pualoa Estates would be expected to be developed between 2001 and 2005. In addition, several thousand residential units could also be developed in Ewa Town Center.

There is a current demand for 30,000± gap group housing units on Oahu. Public and private developments have been oriented to the gap group over the recent past and have enjoyed overwhelming market response. However, there have not been a sufficient number of gap group units marketed over recent years to significantly reduce overall demand.

A consequence of this imbalance of supply and demand for gap group housing is a very strong market for all single-family gap group housing projects which are located within reasonable travel times to employment. The relatively few proposed single-family projects on Oahu which will be oriented to the gap group market will not significantly change this supply/demand relationship over the foreseeable future.

The market outlook for market price units at West Loch Estates supports development of the 600 units over the next three years. The projected housing requirement is expected to remain relatively strong. The most competitive available inventory would be, Ewa by Gentry, Kapolei Village, and Village Park.

Although Makakilo would be in a position to offer competitively priced units, their new inventory is most likely to be priced higher than West Loch Estates. Millani is also expected to be priced higher and would not be directly competitive. Based on the current and projected sales prices of competitive developments, the average sales prices of the West Loch Estates single-family market units at $140,000 to $150,000 would be reasonable.

The outlook for the 750 gap group housing units in West Loch Estates is more optimistic. The island-wide market demand for gap group housing is expected to remain very strong over the foreseeable future. While most residential developments in the Central Oahu/Ewa area will have small
portions of their inventory oriented to the gap group market, there is sufficient demand to accommodate all anticipated supply. Currently, the major competing gap group project would be Kahi Kani, a proposed 290+ unit single-family project in Whitmore Village.

Based on current income qualification levels, mortgage interest rates, and sales prices in competitive gap group projects, the typical sales prices of West Loch Estates gap group single-family units would range between $100,000 and $120,000.
V. ANTICIPATED IMPACTS AND MITIGATIVE MEASURES

Impacts of the proposed project can be viewed in the short- and long-term. Short-term impacts, beneficial and adverse, generally result from construction-related activities. Consequently, these impacts should last no longer than the duration of the construction. Long-term impacts, beneficial and adverse, result from the implementation and operation of the proposed project.

5.1 TOPOGRAPHY AND SOILS

Impact on the physical terrain of the proposed project area should be minimal. The sites are generally level with gentle slopes and will require only typical site preparation. Cutting and filling will be kept to a minimum.

Prior to beginning of any grading operation it will be necessary to strip all existing vegetation from areas to be developed. The material exposed after the stripping operation may be used for engineered fill. After stripping, building slabs and pavement sub grades and areas to receive engineered fill should be excavated of any and all loose soils.

To minimize the occurrence of soil erosion, temporary soil erosion and sediment control measures will be designed and implemented during the construction phase in accordance with Chapter 23, Grading, Soil Erosion, and Sediment Control, Revised Ordinances of Honolulu, 1978, as amended; the City & County of Honolulu's Grading, Grubbing, and Stockpiling Ordinance No. 3968, 1972; and the USDA Soil Conservation Services Erosion and Sediment Control Guide for Hawaii, 1981. Approval by the City & County of Honolulu Department of Public Works will be required to ensure proper grading and erosion control.

5.2 SOILS

A geotechnical engineering reconnaissance was conducted by Geolabs-Hawaii in August 1987 and is attached as Appendix I. This study indicated the findings presented below.
Based on the preliminary borings, probings and laboratory tests performed, and from a soil engineering point of view, the site is, in general, suitable for the proposed residential development. However, because of the presence of soft ground, high groundwater levels and low to moderately expansive soils in various parts of the project site, special design criteria may be required.

The near surface soils over most of the proposed Increment I and II housing areas mainly consist of hard silty clay to clay having low to moderate swelling potential. Normal excavation and conventional site grading procedures are anticipated for earthwork in these areas. Some of these soils may be moderately to highly expansive and could require special procedures for the house foundation design, such as deep footings, subgrade saturation or capping with non-expansive soil. All site improvements will be in compliance with applicable County standards. Homsite building "pads" will be oriented and improved to reduce potential impacts due to soil conditions.

Coralline deposits were encountered at shallow depths (4 to over 12 feet) in the southeastern quarter of the Increment II housing area. The coral may be hard and may require moderately hard ripping for excavation. The excavated coral material can provide a good source of low-expansive structural fill. Cavities of varying sizes are often found in coral formation. If encountered, backfilling of the cavities with grout or compacted fill may be required.

5.3 TRAFFIC

The traffic study, conducted by Pacific Planning and Engineering and dated September 1987, assessed traffic impacts measured by the change in level-of-service (LOS) for the intersections planned for West Loch Estates. These intersections are described below. The traffic impact assessment projects anticipated traffic volumes along Ft. Weaver Road to 1991 when the project is expected to be completed. Traffic volumes increases beyond 1991 are assumed to result from other projects in the area.
The analysis was conducted for the following intersections:

1. Fort Weaver Road and Road "A" (Access to Increment I),
2. Fort Weaver Road and Road "B" (Access to Increment II),
3. Fort Weaver and Renton-Arizona Road (Secondary Access to Increment II), and

The Critical Movement Analysis Planning Application from the revised (1985) Highway Capacity Manual (HCM) was used to estimate the capacity for the above intersections. It was assumed that those intersections not now signalized would be for the purposes of analysis.

The 1991 volume forecasts for Increments I and II were assigned to the intersections to estimate pm peak hour turning movements at each of the four intersections. These were added to existing volumes and traffic generated by other residential development to be occupied prior to 1991.

The method to analyze the level of capacity attainment consists of comparing the higher sum of conflicting straight and left turn movements for one roadway and adding the greater to its complement for the other roadway. The analysis was made for the four intersections for the present, 1991 without West Loch Estates, and 1991 with West Loch Estates.

The analysis stated that only the Farrington/Leoole Street intersection is operating near capacity. During the pm peak hour level in 1991 none of the intersections would be operating at or over capacity. With the West Loch project, the intersections of Ft. Weaver Road with Increment I and Increment II would operate near capacity in 1991.

The result of the 1991 forecasts show that the proposed West Loch Estates project will increase traffic volumes along Fort Weaver Road during the pm peak period. The critical traffic flows are expected to occur during the afternoon peak hour, when both the ambient traffic and projected traffic are
at a peak. Based on the capacity analysis results, it is concluded that West Loch Estates traffic will not bring an intersection to over-capacity levels.

With the anticipated growth in future years, it is recommended that turning lanes on Fort Weaver Road be considered for the Increment I and II intersections. Such improvements will contribute to better flow and less delay at the intersections, as well as smoother merges onto Fort Weaver Road.

During Increment I development, it is recommended that the contemplated traffic signal operation of Fort Weaver Road and the access Road "A" intersection be upgraded to provide for a protected left turn for southbound traffic turning left into Phase I of West Loch Estates. Provision should be made for a left turn storage lane on Fort Weaver Road for that movement.

Access from the Increment I development through the Waipahu Industrial lots will increase traffic volumes slightly along Leokane and Leole Street. To provide increased traffic capacity at the signalized intersection of Leole Street and Farrington Highway, a possible action would be to modify the existing pavement markings on the south leg to two northbound lanes and one southbound lane. Given the proportion of turning movements, the right lane should be made to allow left, straight and right turns. The left lane should be an exclusive left turn lane.

Traffic signal warrants for interruption of traffic flow are likely to be met for the Access Road "B" intersection with Fort Weaver Road which serves the Increment II development plans for West Loch Estates. Signals should be considered and plans developed based on future traffic patterns. It is recommended that new developments south of Renton Road be included in the traffic signal timing plans.

Access for the Increment II development on Arizona and Ft. Weaver Roads will not require any significant remedial action since the signalized intersection is expected to operate under capacity with completion of Increment II. Improvements on Arizona Road are being contemplated for serving internal access needs.
The West Loch Estates project once completed will not have a significant impact on Farrington Highway and H-1 Freeway. The long-term cumulative impact of the project on these regional transportation facilities cannot be realistically assessed, since adequate information regarding planned and proposed projects in the Leeward and Ewa areas is not available.

5.4 AIR QUALITY

Impacts from the air quality study conducted by J.W. Morrow are summarized below and are attached in Appendix D.

Residential development such as the proposed is not normally considered a direct source of air pollution. It is, however, an "indirect" source of air pollution as defined in the federal Clean Air Act because of its inherent ability to generate motor vehicle traffic. The development also has an offsite impact on air quality due its demand for electricity and the need to burn fuel in order to supply that electricity. Disposal of the refuse generated by the residents will also result in offsite impact as it will most probably be burned in the City's proposed resource recovery facility. Finally, construction of the project will have short-term impacts on air quality in terms of fugitive dust and construction vehicle activity.

The air analysis focused primarily on the potential cumulative long-term impact of traffic on local air quality. EPA recommended emissions and dispersion models were employed along with the traffic projections to estimate maximum carbon monoxide concentrations in the vicinity of the principal intersections which serve the project area along Fort Weaver Road. Morning peak traffic hours were analyzed because of the higher probability of adverse meteorology coinciding with high traffic volumes.

The results indicated possible exceedance of state but not federal 1-hour carbon monoxide standards within 10 - 40 meters of each of the intersections studied. The probability of such exceedances was in the 6-10% range based on the frequency of "worst case" meteorological conditions during the 6:00 to 8:00 a.m. peak traffic period. Despite the projected increase in traffic,
there was a slight downward trend in carbon monoxide concentrations over the 1991 - 1997 period. This is an indication that the traffic increase did not completely offset the expected decrease in emission rates due to the federal motor vehicle emissions control program.

Estimates of 8-hour carbon monoxide levels derived by applying a "persistence" factor of 0.6 to the highest 1-hour concentrations indicated exceedance of the state standard out to 40 meters from the intersections studies. It also indicated possible exceedance of the federal 8-hour standard within 20 meters of the intersections.

The results of the traffic impact report indicating "at-capacity" conditions along Fort Weaver Road and the elevated near-roadway carbon monoxide concentrations also suggest that the occupants of vehicles would also be experiencing elevated carbon monoxide levels during their morning commute to work or school. While there is no standard model for predicting such exposures, previous studies have indicated carbon monoxide levels of the same order of magnitude as indicated for modeling receptors within 10 meters of the roadway.

The increased fuel combustion to meet the project's electrical demand will result in less than a 0.1% increase in island-wide emissions of the primary regulated pollutants. Combustion of the project's refuse will likewise result in a relatively small increment of increase in county emissions.

There is a potential fugitive dust problem during construction due to the relatively low rainfall in the area and the moderate silt content of the soil. This will be especially true during the drier, windier summer months. Strict application of dust control measures will be needed in order to avoid complaints of existing residents and possible violations of state air pollution control rules.

5.5. NOISE

Impacts and mitigative measures from the noise study conducted by Y. Ebisu and Associates are summarized below and are attached in Appendix C.
The existing and future traffic noise levels in the vicinity of the proposed West Loch Estates were evaluated for their potential impact on present and future residences in the project environs. The traffic noise level increases along Fort Weaver Road were calculated for the Calendar Year (CY) 1991 and 1997 time periods, and traffic noise increases associated with project and non-project traffic were assessed. Increases in traffic noise of 3.8 to 4.2 Ldn (Day-Night Average Sound Level) are predicted to occur as a result of project and non-project traffic on Fort Weaver Road. Traffic noise increases of 0.4 to 1.3 Ldn are projected to occur as a result of project traffic on Fort Weaver Road.

Project traffic noise impacts on existing residences along Fort Weaver Road in the vicinity of Renton Road are predicted to be relatively small, with project related increases in the order of 0.5 Ldn. Although significant increases in non-project traffic noise levels are predicted to occur by 1991, existing residences should remain in the "Acceptable, Moderate Exposure" category due to the large setbacks of the residences from Fort Weaver Road.

The existing Hale O Ulu School on the west side of Fort Weaver Road is currently in the "Normally Unacceptable, Significant Exposure" category. Projected increases in non-project traffic by 1991 are expected to increase traffic noise levels at the school by 2.0 Ldn. Project related traffic is not expected to be a significant noise source at the school, with the contribution from project traffic is predicted to be 0.5 Ldn.

Future traffic noise impacts on West Loch Estates residents can be minimized by the use of buffer zones of adequate depth on the Diamond Head side of Fort Weaver Road, and along the internal roadways of the development. In order to maintain eligibility for federal assistance on the project, it is suggested that minimum setback distances to the future 65 Ldn contour be used when practical in siting future residential units. Because these setback distances are primarily along certain sections of Fort Weaver Road, the use of other noise mitigation measures may be desirable. These mitigation measures include the construction of sound attenuating berms or walls along Fort Weaver Road, or the use of sound attenuating windows for two story homes.
The West Loch Estates project site is located outside the Barbers Point Naval Air Station (BPNAS) and Honolulu International Airport Ldn 55 noise contours.

The potential impacts are considered negligible due to the site's distance from aircraft flight patterns.

5.6 FLORA

The summary of findings from the botanical study conducted by Char & Associates are presented below and are included in Appendix A.

The vegetation on the proposed West Loch Estates Development is dominated by introduced (or alien) species. Of a total of 164 plant species inventoried, 86.6% or 142 species are introduced; 16 are indigenous, i.e., native to the islands and elsewhere; 1 is endemic, i.e., native only to the islands; and 5 are of early Polynesian introduction. There is little of botanical interest on the project site. The native species are found in similar environmental habitats throughout the islands. Some plants, such as the koali (Ipomoea calirica), koali-awania (Ipomoea indica), 'uhaloa (Waltheria indica), and hoary abutilon (Abutilon incanum) are considered rather "weedy" natives which do well in open, more or less disturbed areas. None of the native species are considered rare, threatened or endangered. The proposed project is not expected to have a significant impact on the total island populations of these species.

While the adjacent wetlands do not contain any species of botanical significance, they do provide habitat for a number of endangered Hawaiian waterbirds. The cattail-bulrush marsh around the Apoeko Fish Ponds is especially valuable as wetland habitat. This portion of West Loch Estates is primarily located in the non-residential sectors of the subject parcel.

5.7 WILDLIFE

Impacts on wildlife are summarized below from the Andrew J. Berger report of August 1987. The entire report is included as Appendix B.
In its present condition, the project area can properly be called a "waste land" as far as endemic or native vegetation and its animal life is concerned. There are no endemic forest birds in the project area. The adjacent Honouliuli and Waiawa National Wildlife Refuges are of special value to the endangered Hawaiian stilt and, to a lesser degree, for the other Hawaiian waterbirds. The report stated that it is of utmost importance that no polluting substances reach these sanctuaries. The report also recommended that plans for any improvements within the adjacent wetlands be coordinated with personnel of the U.S. Fish and Wildlife Service and the Corps of Engineers. The Increments I and II residential sectors will be sufficiently distant from the Refuge areas with greenbelt buffer areas providing adequate setback distances sufficient to prevent impacts on the endangered avifauna species.

Concerns have been expressed by the U.S. Fish & Wildlife Service on the potential impacts to the Refuge by pet dogs and cats from the project. The likelihood of increased numbers of stray cats, dogs and mongooses is a recognized concern; however, identifying mitigation measures that are both cost-effective and practical, is extremely difficult.

At present, we note that the Refuge is surrounded by a chain-link fence and that recent changes, increasing the use of "nesting islands" should discourage intrusion and predation by feral animals. These measures would be supplemented by the substantial landscaped area that will act as a buffer between the Refuge and the residential subdivision to further discourage entry and minimize any adverse effects of light, noise, and activity associated with urbanization.

None of the 20 species of introduced or alien birds found in the proposed housing project area are endangered species and a number have proven to be serious pests in Hawaii.

All of the mammals, land reptiles, and amphibians that occur in the project area are introduced or alien mammals. Many of them are predators on birds and several are destructive to agriculture and forest lands and/or to man,
his buildings, and products. None of these animals were considered to be of any significance or environmental concern.

5.8 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The archaeological reconnaissance survey, included as Appendix E, presented the following conclusions.

Based on the findings of the combined reconnaissance survey field work, the cultural remains identified within the West Loch Estates - Residential Increments I and II project area appear to be, for the most part, of minimal significance in terms of potential information content. In view of the essentially negative results of the reconnaissance survey, it is concluded that, with the exception of appropriate treatment of Site T-3, no further archaeological work of any kind is necessary. The information recovered during the present survey from Sites T-1, -2, and -4 is considered adequate and sufficient to warrant recommending that no further archaeological work is necessary for any of these sites. Only one site (T-3), an apparently modern cemetery complex, is believed to be culturally significant; preservation "as is," if at all possible, is recommended as the more desirable treatment for this site. If this course of action is not practical, then proper disinterment and reburial in accordance with State Health Department regulations and procedures should be carried out. The latter alternative should include an attempt to locate any living relatives of individuals buried at Site T-3, as it is considered likely that such relatives may still reside in the Ewa District.

It is also recommended that a qualified archaeologist selectively monitor initial grubbing activity and/or vegetation clearing within the project area. The general significance evaluations and recommended general treatments presented in this report are based on the findings of the combined reconnaissance survey field work, which involved only minimal subsurface testing. Therefore, these evaluations and recommendations are given with the general qualification that during any development activity involving the extensive modification of the land surface, there is always the possibility—however remote, that previously unknown or unexpected subsurface cultural features, deposits, or
burials might be encountered. In such a situation, immediate archaeological consultation should be sought.

5.9 **SOCIO-ECONOMIC CONDITIONS**

A summary of socio-economic impacts from the Socio-economic Impact Assessment conducted for the project is presented below and can be found in Appendix G.

5.9.1 **Population**

New housing development at the project site will add to the population of the Ewa development plan area. Estimating the size of project population depends upon assumptions about the average household size of future residents.

Households sizes will differ among residents of the elderly and single-family units. Elderly families are assumed to average 1.8 persons per household -- a figure equal to the average household size of elderly families in public housing managed by Hawaii Housing Authority (Hawaii Housing Authority, 1987).

For single-family housing, the Department of General Planning assumes 3.3 persons per unit in assessing population impacts. This figure may be somewhat high, as household sizes in Ewa and Central Oahu, as reported by developers, tend to show smaller families. At Millani, 3.03 persons per unit were reported for single-family homes priced between $115,000 to 164,000 (John Child & Co., 1987). Therefore, the population impact is calculated using 3.0 persons per unit as the lower range for single-family units and 3.3 persons per unit as the upper range.

Utilizing these averages, it is projected that the project will produce an Ewa population higher by 4,320 to 4,725 persons than in the absence of the project.
The Oahu General Plan population guideline for Ewa, coupled with projected population, provides sufficient room for new housing to accommodate the project. Project impacts, then, will principally be to provide new housing at an earlier time than could be completed by other projects, and to cause a greater proportion of Ewa's new population to consist of households in the gap group.

5.9.2 Employment

Employment impacts at the project site will result from development of certain non-housing uses at the site. Employment opportunities created will include:

- 46 to 51 positions at the elementary school site, if it is accepted by the Department of Education (personal communications, Ed Hasegawa, Business Specialist, Hawaii State Department of Education, September 15, 1987).

- A maximum of 200 retail and service jobs at the commercial center, based on an islandwide average of one employee per 250 square feet of leasable area and a planned leasable area of 50,000 square feet;

- Up to 20 positions at the day care center (personal communication, Lynn Koga, Supervising Principal, KCAA Pre-Schools of Hawaii, September 15, 1987);

- A possible single additional job at the park and ride bus transportation facility (personal communications, Howard Takara, Chief, Bus Systems Division, Department of Transportation Services, September 3, 1987).

Thus, potential employment at the completed West Loch Estates project totals approximately 270 positions.
5.9.3 General Overview of Community Issues and Concerns Related to the West Loch Project

This section provides an indication of community reaction towards the project as of mid-August to mid-September, 1987, very early in the overall EIS process. Only some of the persons interviewed were aware of all of the project's components; their response were therefore often based on their initial reactions to information presented to them for the first time during the interviews. Changes in attitude and issues may occur in time, given changes in the project and other events or influences in the community.

Because the interviews were conducted for issue identification only, no attempt was made to quantify the responses, or to assess the extent of project support or opposition.

In general, the project's concept was well received by almost all interviewed. The regional leaders, in particular, liked the proposed land uses because these were appropriate to the current needs of the community.

The project's concept was less important, however, to those who would be more directly impacted. Those who live near the project site tended to be more specific about their concerns about property value impacts, physical infrastructure, and public services.

On-site informants understandably placed more importance on their potential displacement than on regional benefits. Both nearby residents and on-site informants tended to express a dissatisfaction with their access to project information.

The housing component was the aspect of the project which the community tended to view most favorably. Regardless of one's opinion of specific project components, almost everyone acknowledged the need for housing.

Regional community leaders and organizations tended to appreciate the proposed "60/40 housing mix," in which 60 percent of the proposed units
would be tailored to the income levels of gap group families and the remaining would be offered at market value. Recommendations for effective management and design controls were seen as possible ways to ensure a quality, planned development.

West Loch's recreational component was also seen by many as an asset to the community. Again, some made recommendations intended to retain the overall quality and family-oriented characteristics in recreational areas, including the golf course. Potential displacees did not appreciate the proposed recreational uses, however, mostly because, at the time of the interviews, such uses would occur on their present sites.

Traffic headed the list of concerns related to infrastructure, followed by drainage (a concern expressed primarily by nearby residents). People also asked about the preparedness of public schools to meet the demands of this and other Ewa proposals.

An issue raised mostly by nearby and on-site residents is a lack of information about the project. Potential displacees were especially critical of receiving no project information prior to notices of potential site entries and preliminary relocation schedules.

A few regional leaders expressed concern about the City's ability to implement the West Loch Estates plans as proposed.

5.9.4 Compatibility With Surrounding Uses

The project's relationship to the surrounding communities was seen from two perspectives. On one hand, the nearby Honolulu and relocated Ota Camp residents have distinct and independent community identities. Some nearby residents were wary that their status quo would be disturbed by a new community and that existing small businesses might have difficulty competing with the proposed commercial area.
Nearby residents also anticipated some changes which may benefit them, however. Increase in property values, access to new shopping and recreational facilities, more customers for existing businesses, elimination of some incompatible agricultural uses (such as those related to cane burning)--these were seen as potential benefits, providing these nearby communities could retain a separate identity.

Reactions of Honouliuli, the "new Ota Camp," and Ewa residents are summarized as follows:

- Because of social ties with on-site residents, initial reactions generally focused on residential displacement. It is noted, however, that on-site residents do not belong to any of the four established community organizations and associations in the area.

- Honouliuli informants were particularly concerned about the acquisition of lands owned by Honouliuli residents. The lands of three families are currently intended for acquisition if the project is implemented, and Honouliuli informants wanted assurances of equitable and fair settlements.

- The Honouliuli and "new Ota Camp" informants basically wanted to retain identities separate from the new community.

- These informants also saw potentials for community benefits, however, primarily in the form of terminating incompatible agricultural activities (mostly cane burning) increased land values for properties fronting the golf course, and access to proposed recreational, commercial and public facilities.

- Honouliuli informants were apprehensive about the impacts of proposed commercial establishments on the small Honouliuli establishments, although increased patronage was also seen as a plus.

- Honouliuli informants expressed concern about further drainage impacts because of reported increased runoff due to the construction of the nearby hospital.

V-15
All, including the Ewa informants, were concerned about traffic increases.

Further, regional Waipahu leaders discussed systemic relationships with the proposed West Loch Estates community. They felt that the traffic generated would have more impact on the Waipahu roadway system rather than Ewa's.

On the other hand, it was also felt that until the regional Ewa development is well underway, the new West Loch residents will utilize the closer Waipahu shops, restaurants and service establishments.

5.9.5 Relocation and Other Potential Mitigations

Condemnation procedures require reimbursement of landowners, lessees, and tenants for the fair market value of property acquired by the City. Additionally, relocation assistance measures described below provide further cash and in-kind measures to displacees, including renters.

At the same time, it may be expected that some displacees -- businesses as well as residents -- may have expectations or needs beyond those which are covered by laws governing relocation assistance. This has yet to be determined in any definitive way. As previously recommended, communication between City agencies and affected residents or property holders needs to be augmented, in order to match the strong efforts being made on the regional level.

The following is a summary of applicable provisions for persons displaced by public projects:

Basis of Relocation and Displacement Provisions

Relocation assistance to displaced individuals and businesses is in accordance with State statutes and administrative rules. The applicable State statute is Hawaii Revised Statutes, Chapter 111. The applicable administrative rule is Hawaii Housing Authority, Title 17, Chapter 503. The following discussion is taken directly from documents provided by the Department of Housing and Community Development.
Relocation Assistance to Displaced Tenants

Individuals who rent housing, either through leases or sub-leases on land to be acquired for the West Loch Estates project, are entitled to relocation assistance. This assistance consists of payments for moving expenses, rental assistance, and aid in finding replacement housing.

Moving assistance may be either a fixed payment for a self-mover or reimbursement, for expenses at the tenant's discretion. If the tenant elects for a fixed payment, he/she would be entitled to payment according to a graduated scale based on the number of rooms of furniture and belongings to be moved. The amount ranges from $135 to $300. If the tenant decides on reimbursement, the tenant need only submit receipts for expenses. The tenant is entitled to either the fixed payment or the reimbursement, whichever is higher.

Mover may also be eligible for rental assistance if they have lived in their homes for at least the last 90 days prior to the City's formal notification of intent to acquire. Tenants will be entitled to the difference between their present rent and the rent of their home, for a period of two years up to a maximum payment of $1,500.

Tenants are also eligible for assistance in locating a new home. Such assistance will be given by the Department of Housing and Community Development.

Relocation Assistance to Displaced Homeowners

Homeowners who are displaced are entitled to money payments as well as assistance in finding a new home. If the homeowner buys and moves into a replacement home, he/she will be entitled to the difference in cost between the price paid for their present home and the new home, up to a maximum of $5,000. If the homeowner decides to rent instead of buying a new home, he/she will be entitled to the difference in cost between 24 months of rent and 12 percent of the price paid for the present home, up to a maximum of $5,000.
Relocation Assistance to Displaced Businesses, Farmers, and Non-Profit Organizations

Businesses, farmers, and non-profit organizations are entitled to choose between either a moving expense payment or a fixed relocation payment. The moving expense payment will reimburse actual expenses up to a maximum of $5,000. If the business does its own moving, it must submit two estimates provided from bona fide moving firms to receive payment. The business may elect to receive a fixed relocation payment instead of the moving expense payment. In this case the payment will equal the average net earnings of the business up to a maximum of $5,000.

5.10 PUBLIC FACILITIES

5.10.1 Potable Water

Potable water demand requirements for the West Loch Estates project consists of .8 MGD and will be provided by the Board of Water Supply (BWS) from the Waipio Heights III Well (.85 MGD) which is under construction. Reservoir storage capacity for the new 228' reservoir is planned for 1.5 MGD with final siting still to be determined. All off-site transmission lines necessary to bring water to West Loch Estates will be designed and installed to meet BWS standards. Utilization of non-potable water to fulfill the irrigation requirements of the project is also planned. An approved water allocation from the State Department of Land and Natural Resources (DLNR) is required and an application will be submitted to that agency. This allocation is for the brackish irrigation water system and is of non-potable quality.

5.10.2 Sanitary Sewer System

The anticipated sewage volume of 550,000 to 600,000 gallons per day (gpd) from the project site will be accommodated by the City and County's Ewa and Waipahu sewer systems. This figure is based on a peak hour flow of 2,313,750 gpd.
Increment I of the project will connect into the Waipahu sewage system and a 1,200-foot long, 12-inch relief line is planned to extend from the site to the Kunia Waste Water Pump Station. The line may be upgraded to a 15-inch sewer if necessary. Increment II of the project will connect into the Ewa sewer system through lines running under Ft. Weaver Road to an 84-inch interceptor line at Geiger Road. Waste will be treated at the Honolulu Waste Water Treatment Plant (WWTP). A waste water pump station will be constructed at or near the Increment II of the project to accommodate flow requirements. Both the Waipahu and Ewa sewer systems have the needed capacity with the identified improvements above. All proposed improvements will be designed, built, and installed to meet City standards for capacity, operating efficiency, maintenance and economy.

These will include all transmission lines and pump stations.

The treatment, disposal, and interceptor sewer systems will be adequate to serve the proposed development. Waste water flows receive primary treatment at the Honolulu Wastewater Treatment Plant and the effluent is disposed of by a deep ocean outfall.

The Board of Water Supply notes that "the project is located in the 'no pass zone' where ground disposal of wastewater is not permitted. Therefore, all domestic wastewater should be discharged into the City's sewer system serving the area."

5.10.3 Drainage

The runoff from the project site is presently directed into Honolulu Stream or into West Loch of Pearl Harbor via existing drainage systems. Surface runoff flows to natural drainage outlets located to the south of the property. A portion of the drainage basin runoff flows into the Honolulu flood plain. Ultimately, runoff from the entire drainage area is discharged into Pearl Harbor. Peak discharge from the existing drainage basin for a 100-year storm is calculated at 12,000 cubic feet per second (cfs).
The project area is bordered by Fort Weaver Road to the west, Waipahu Town and West Loch to the east. The site, which is partially cultivated in sugarcane presently, slopes towards Pearl Harbor, with elevations ranging from approximately 65 feet near Farrington Highway to 25 feet near the southwestern edge of the project site.

The project will include the construction of a street drainage system consisting of underground drainlines, drain manholes, and intake boxes designed in accordance to City and County of Honolulu standards. Collected runoff will be directed to the proposed golf course with its settlement ponds and finally into the Honouliuli Stream.

With the development of the project site certain changes to the quantity and quality of runoff can be anticipated. With the increase in paved areas it is anticipated that the quantity of water discharged will increase. As a result, the drainage system will be sized to accommodate a 10-year, 1-hour storm. This water will be directed to settling basins located in the proposed golf course.

It is further anticipated that the constituent quality of the runoff from the project site will change. Based on other studies of urban runoff (Dugan, 1986), it can be generally concluded that incremental changes per storm event for the proposed development could result in a decrease in nitrogen suspended solids as opposed to runoff from the site without the development. Total phosphorus, on the other hand, can be expected to increase.

5.10.4 Telephone and Electricity

Telephone service to the project will be provided by Hawaiian Telephone Company, and electricity will be provided by Hawaiian Electric Company.

Project electricity demand has been estimated at about five million volts per day. Two sets of electrical lines about the project. An existing elevated line runs along Ft. Weaver Road, containing one 46-KV circuit and one 12-KV circuit. Another electrical line with two 46-KV circuits and one 12-KV
circuit runs along the Oahu Railway and Land Co. right-of-way and along the West Loch shoreline. Power to the site will originate from either the Kahe or Waiau generating plant. It is anticipated that Hawaiian Electric will need a new transformer station at or near the project site.

Telephone service will be provided by existing switching stations which are located near Waikele Street and Renton Road. An underground telephone cable linking Hickam Air Force base and Kunia crosses the mauka portion of the project site.

5.11 AGRICULTURAL IMPACTS

Impacts on agriculture were studied by Decision Analysts Hawaii, Inc. in September 1987. A summary of findings are presented below with the complete study included in Appendix J.

The development of West Loch Estates will result in the urbanization of approximately 206 acres of sugarcane lands which are currently under cultivation by Oahu Sugar Company, Ltd. (OSCo). However, the West Loch Estates—individually or in combination with other major projects planned and proposed for Ewa and Central Oahu—will not adversely affect the economic viability of OSCo, nor will it require layoffs of sugar workers. This assumes the continuation of historic development rates for housing projects—rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage with little or no loss in production. Reductions in employment will occur through retirement and voluntary movement to other jobs. Over the long term, OSCo could accommodate a major reduction in acreage and maintain economies of scale by operating just one mill, rather than two in parallel.

If OSCo were to cease operations for whatever reason (most likely because of low sugar prices), the loss of jobs would be less than 490 direct jobs and 550 indirect jobs. This would be the equivalent of the loss of a hotel about half the size of the Hyatt Regency in Waikiki. Immediately following the mill closing, significant economic loss and social disruption would occur. But

V-21
over the long term, the economic loss would be absorbed easily by expanding economic opportunities in the Ewa/Central-Oahu area.

The development of West Loch Estates on sugarcane acreage will eliminate the possibility of using these lands for diversified agriculture (including aquaculture). However, it is extremely doubtful that this will adversely affect the growth of diversified agriculture in Hawaii. There are four reasons for this assessment: (1) an extensive amount of prime-agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some—if not most or even all— of the sugar operations would make their lands available for profitable replacement crops; and (4) compared to the available supply, a very small amount of land and water is required to grow proven and promising crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports. The increasing availability of prime agricultural land in Hawaii is part of a sequence of very long-term and accelerating trend occurring throughout most developed and developing market economies. Productivity and yields have been increasing faster than population growth, and genetic engineering and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases require that labor, land, and other resources be withdrawn from agriculture in order to restore balanced markets and to increase farm income for those who remain.

Since the West Loch Estates will not adversely affect the economic viability of OSCo, and will not limit the growth of diversified agriculture, the project is consistent with the major thrust of the agricultural portion of the Hawaii State Plan and the State Agriculture Functional Plan, which is to preserve the economic viability of plantation agriculture and to promote the growth of diversified agriculture. Also, the project would provide a public benefit (i.e., affordable housing) which would override the proposed "important agricultural lands" designation of the Land and Evaluation Site Assessment (LESA) Commission. Further more, the project would not adversely affect
cultivation of adjacent sugarcane acreage and, therefore, complies with the Hawaii Right-to-Farm Act.

The project is also consistent with County policies of directing population growth to Ewa, which by definition must occur at the expense of sugarcane acreage.
VI. RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

6.1 HAWAII REVISED STATUTES, CHAPTER 226 HAWAII STATE PLAN

The Hawaii State Plan is a guide for the future long-range development of the State which identifies goals, objectives, policies and priorities that are to be pursued. The overall theme of the Hawaii State Plan is:

- Individual and family self-sufficiency
- Social and economic mobility
- Community or social well-being

Specifically, the Hawaii State Plan details objectives and policies in the various areas such as population, the economy, physical environment, facility systems, socio-cultural advancement, agricultural lands, and fiscal management. The West Loch Estates project is consistent with many of the goals and policies of the Hawaii State Plan and substantially fulfills its objectives.

6.1.1 Population, H.R.S. Section 226-5

The West Loch Estates project, as a planned community, fulfills this policy of directing population growth toward Ewa, and provides increased housing opportunities for Hawaii's people.

6.1.2 Economy H.R.S. Section 226-6

The West Loch Estates project as a major development, will involve a substantial amount of construction activity resulting in additional employment opportunities in the Ewa district of Oahu. The project will also include commercial, recreational and educational facilities which will create new secondary employment opportunities over the long term.
6.1.3 Scenic, Natural Beauty and Historic Resources H.R.S. Section 226-13

The West Loch Estates project fulfills the objectives articulated by this part of the Plan by providing and/or improving public access to scenic ocean views through the use of open space and landscaping and limiting building heights. The project concept respects the rural and historic character of the surrounding area and is consistent with development plans for the Ewa Plain.

6.1.4 Water H.R.S. Section 226-16

The development of water sources for the development area is contingent upon approval by the State Department of Land and Natural Resources (DLNR) as the development area is within the Pearl Harbor Groundwater Control Area. Non-potable water will be utilized to irrigate the park, open space and landscaped areas of the project site. Facilities for the development, transmission, storage, and distribution of potable and non-potable water requirements of the project will be installed by the City.

The potable water requirements for Increments I and II of the project will be serviced by the Walpio Heights III project planned by the Board of Water Supply.

6.1.5 Housing H.R.S. Section 226-19

The West Loch Estates project is intended to address the need for affordable housing and the majority of the housing units will be targeted to be sold to this income group. A portion of the project has also been planned for much needed housing for the elderly.

The project is designed to take into account the physical setting, including visual and aesthetic amenities. Its location provides easy access to public facilities and services.
6.1.6 Education H.R.S. Section 226-21

The West Loch Estates project is located in close proximity to existing public school facilities, however, a school site has been included to the plans for the development and will accommodate the expected increase in the number of school age children.

6.1.7 Agriculture H.R.S. Section 226-7

Portions of the West Loch Estates project are located in the State Agricultural District. The site consists of soils having classification ratings of B and C ratings according to the Detailed Land Classification, Island of Oahu study conducted by the University of Hawaii Land Study Bureau in 1972. A substantial portion of the site has already been withdrawn from cultivation and the remainder is scheduled for fallowing in 1990. The proposed West Loch Estates project will not adversely affect the economic viability of OCSO nor limit the growth of diversified agriculture. As such, the project is consistent with the major thrust of the agricultural portion of the Hawaii State Plan and the State Agriculture Functional Plan, which are intended to preserve the economic viability of sugar and pineapple and to promote the growth of diversified agriculture.

6.1.8 Transportation H.R.S. Section 226-17

The West Loch Estates project will incorporate measures that encourage the use of mass transit and multiple ridership of private vehicles. These measures are intended to minimise traffic impacts and address the State Plan objective of integrated multi-modal transportation systems. Additionally, the proposed traffic management plan should facilitate meeting the objective of transportation system support for planned growth objectives.

6.2 HAWAII STATE FUNCTIONAL PLANS

As a means of furthering the Hawaii State Plan, Hawaii Revised Statutes, Chapter 226, the 1984 State Legislature, by concurrent resolution, adopted
ten Functional Plans to serve as guidelines for the State of Hawai‘i. The West Loch Estates project conforms with the applicable objectives and policies of these Functional Plans. While a portion of the site does consist of higher agricultural quality soils, it is either already in fallow or scheduled for fallowing in 1990.

6.2.1 State Housing Plan

The West Loch Estates project will address the need for affordable housing by providing home ownership opportunities to those whose incomes will not permit them to participate in the conventional home buying market. Additionally, the market and elderly housing units that are included as a part of the West Loch Estates Master Plan assures that it will provide a diversity of housing types and serve a wide socio-economic range of households.

6.2.2 State Water Resources Development Plan

West Loch Estates will not impair the capacity of the Pearl Harbor Ground Water Control Area as the potable water demand will be within the stated limits of the PHGWCA due to the decreased requirements of agriculture – primarily sugar cultivation.

6.2.3 State Energy Plan

The West Loch Estates project is located in an easily serviceable and concentrated area that is adjacent to existing urban development. Utilization of energy saving devices and energy conservation will be encouraged through homeowner training and orientation programs provided by the City.

6.2.4 State Health Plan

Residents of the West Loch Estates will have access to health care facilities available at the Waipahu Clinic and the planned St. Francis Medical Center-West. The Waipahu Clinic is designed to serve the basic health needs of those residing in the area from Waipahu to Waianae, and offers a variety of
services such as physical, occupational speech therapy; public health
nursing; children's health services, Hansens's disease clinics; and complete
mental health services. The St. Francis Hospital-West facility, when
completed, will include a comprehensive emergency and ambulatory care
center, a full service hospital, a major medical office building, a medical
education center, day care facilities, and a "wellness" center.

6.2.5 State Agriculture Plan

While the West Loch Estates project will result in a decrease of the availa-
bility of agricultural land, the site is already in fallow or scheduled for
fallowing in 1990, and will not adversely affect the agricultural industry.
The anticipated impact on overall agricultural activity in Hawaii, will be
negligible.

6.2.6 State Transportation Plan

The proposed traffic management plan and ride-share and park-and-ride
facilities being planned as a part of the West Loch Estates project are
expected to contribute significantly towards meeting the State Transportation
Functional Plan objective of developing a balanced, multi-modal transportation
system. A small commercial area and employment centers in the region are
also expected to divert town-bound traffic and thereby minimize interchange
congestion.

6.3 STATE LAND USE

Most of the project site is classified within the State Agricultural District.
A small part of the site adjacent to Waipahu is within the Urban District
(Figure 6).

6.4 GENERAL PLAN

The City's planning policies are embodied in the General Plan which is a
statement of long-range social, economic, environmental and design objectives
for the general welfare and prosperity of the people of Oahu. The General
Plan also contains broad policies intended to facilitate the fulfillment of the
Plan's objectives. The General Plan is implemented by regional Development
Plans which provide relatively detailed guidelines for the physical develop-
ment of Oahu.

The West Loch Estates project conforms with the broad objectives and policies
contained within the General Plan. Although the project does involve the
use of agricultural acreage, there will be no effect upon agriculture on Oahu
as the land is either in fallow or scheduled for fallowing in 1990. As such,
it fully conforms with the requirements of the General Plan. Economic
Activity, Objective C.

Further, the project actively promotes Housing Objective A, "To provide
decent housing for all the people of Oahu at prices they can afford."

In other areas the West Loch Estates project is consistent with the objectives
of the General Plan as it is contiguous with existing urbanized areas, and
has reasonable access to the necessary infrastructure. It should be noted
that the project is located in the Ewa district which is targeted for major
growth and has been designated as the second urban center for Oahu.

6.5 EW A DEVELOPMENT PLAN

The City Development Plan (DP) Land Use Map designates West Loch Estates
Increment I for residential use (Figure 7). A DP Land Use Map amendment
is being processed which would redesignate Increment II from agricultural to
residential use.

6.6 LAND USE ORDINANCE/COUNTY ZONING

Most of the project area is currently zoned AG-1. Minor portions of the
project site are zoned R-5 and reflect existing residential use (Figure 8).
West Loch Estates
DEVELOPMENT PLAN MAP
Ewa, Oahu, Hawaii

Figure: 9
6.7 H.R.S. CHAPTER 205-A COASTAL ZONE MANAGEMENT ACT

Portions of the West Loch Estates Increment II project site are designated as a special management area for which a permit is required pursuant to H.R.S. Chapter 205-A. The entire project site is within an area controlled by the CZMA and is, therefore, subject to H.R.S. Chapter 205-A's objectives and policies.

6.8 ENVIRONMENTAL IMPACT STATEMENT REQUIREMENTS

Prior to Department of Housing and Community Development's implementation of the West Loch Estates project, acceptance of the Final Environmental Impact Statement by the Mayor, through the Department of Land Utilization, is required. This Environmental Impact Statement has been prepared in accordance with Chapter 343 of the Hawai‘i Revised Statutes.

6.9 CITY AND COUNTY OF HONOLULU, CAPITAL IMPROVEMENT PROGRAM (CIP)

The initial funding necessary for implementation of the West Loch Estates project has already been appropriated by the City & County of Honolulu as a part of its' CIP Program for the 1987-88 Fiscal Year. The amount of $19.625 million dollars has been budgeted for land acquisition, planning and engineering, and relocation assistance. (Budget Ordinance 87-71).
VII. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY AND IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES

Implementation of the proposed project will result in the commitment of the necessary construction materials and human resources (in the form of planning, designing, engineering, construction labor, landscaping, and personnel for the sales, management, services, offices, and maintenance functions). Some of the construction materials could be reused if and when the structures are demolished; however, at the present time and in view of the state of our economy, it is believed that the reuse of much of these materials is not practical. The people providing the labor necessary to implement and complete the project will be compensated during its various stages by the developer, construction and related businesses, and the City and State government.

The appearance of the project site will be altered from its present agricultural/fallowed appearance to that of a master planned residential community. The development will be visually prominent but well integrated with the surrounding areas.

The air and noise environment will be affected by the proposed project, however, these impacts are typical of urban residential developments. While ambient air quality and noise levels in the area is relatively good, the proposed development will result in greater number of vehicles going to and from the project areas, resulting in increased vehicular emissions. Compliance with existing State Air and Noise Quality Standards and Federal Air and Noise Quality Standards should not be affected. Relative to Air Quality Standards, the Federal requirement to use unleaded fuel, has resulted in "improved" automobile emission levels.

The project will result in a use commitment of the land for a long-term period. Once a residential use is established, it is unlikely that the land
would revert to a lower use except over a long term. Commitment of land for these purposes will foreclose certain use options for the land, such as open space and agriculture.

The residential and related use provided by the project will benefit its homeowners, the landowner, and commercial enterprises over both the short- and long-term. Furthermore, its affordable housing objectives address a critical need in the community that will potentially benefit all of Oahu's people.
VIII. ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The following adverse environmental effects (both short- and long-term) cannot be avoided.

(1) Large-scale agricultural use of the land will no longer be possible.

(2) The site-clearing and construction work will result in temporary fugitive dust, some disruption to traffic, and high noise.

(3) Traffic will increase due to the number of additional vehicles utilized by residents of the proposed development. Additional impacts associated with increased traffic include probable reduction of air and noise quality. The specialized studies made as a part of preparing this document indicate that adequate setbacks or other mitigation measures such as sound attenuating berms or walls along Fort Weaver Road will adequately accommodate the traffic noise added by the proposed development.

(4) The project will result in additional demand for utility services.

(5) The need for public services such as fire and police protection, schools, and public recreational facilities will increase.

(6) Solid waste and sewage generated by the project will increase the demand for disposal and treatment services and increase total waste output in that locale.

(7) A number of families and businesses will be displaced by the project. Assistance provided by the Relocation Unit of the City Department of Housing and Community Development in the form of relocation services, compensation and financial assistance will serve as mitigation.
(8) Some disturbance of the Wildlife/Bird sanctuary is likely to be caused by the project. Mitigative measures primarily in the form of a 300-foot buffer zone, and landscaping to minimize the effects of noise and lights, fencing, etc. are planned.

(9) The adverse effect of increased storm water runoff and the constituent quality of such runoff on the waters of West Loch will be mitigated by a drainage system within the Honolulu Flood Plain designated to provide the capacity necessary for retention and settlement prior to out flow.

The manner by which the project meets community and social needs and conforms with the policy objectives of the State and County governments are thoroughly described in Chapter VI: "Relationship to Plans, Policies, and Controls." The project is also intended to meet the critical need for affordable housing and fully conforms with the Hawaii State Plan and the General Plan of the City and County of Honolulu.
IX. SUMMARY OF UNRESOLVED ISSUES

State Land Use Boundary Amendment

The majority of the land area within the project site is currently designated for agriculture use by the State Land Use Commission. A petition for boundary amendment will be filed with the Commission to have the site designated for urban. Until this petition is filed and approval granted, the project site will remain in an agricultural use.

Site Acquisition

Most of the project site is owned by the James Campbell Estate, however, a number of smaller parcel owners will also be affected. Negotiations between the landowners and the City and County of Honolulu are currently underway and neither agreement to purchase nor the terms of such agreement have yet been finalized. The City may proceed with the project by utilizing its power of eminent domain and acquiring the property through condemnation.

City Council Approval

Incorporation of the West Loch Estates project is subject to the approval of the City Council of the City and County of Honolulu. That body must authorize the condemnation and appropriate funds for construction before the project can proceed.
X. LIST OF ORGANIZATIONS AND AGENCIES CONSULTED DURING EISPN REVIEW

10.1 ORGANIZATIONS AND AGENCIES

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X-2
XI. COMMENTS AND RESPONSES DURING EIS PREPARATION NOTICE
Mr. Mike Moon  
June 17, 1987

Mr. Mike Moon, Director  
Department of Housing and Community Development  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Subject: Environmental Assessment Notice for  
West Loch Estates Housing Project  
Department of Housing and Community Development  
TAX: 9-1-177: 05, 9-11, 13, 14, 18, 31 & 32  
Eva, Oahu  
Acres: 448

The Department of Agriculture has reviewed the  
Environmental Assessment notice for the subject housing project  
and has the following comments to offer.

According to the project description, the proposed  
development will provide 1,500 residential units, a 187-acre  
golf course, and another 59.4 acres of parks. The proposed  
project consists of three nearly adjacent areas. The subject  
areas are predominantly within the State Agricultural District  
as indicated on the "project description".

The subject lands are largely classified "Prime" and "Other  
Importance" according to the Agricultural Land of Importance to  
the State of Hawaii (ALIH) system, except the proposed  
shoreline park area which is not classified. This information  
should be included in the Environmental Assessment.

The Environmental Assessment should also include discussion  
on the following issues that may be affected by the proposed  
development:

- a complete soils description, with references to the  
Land Study Bureau Overall Productivity Rating system  
and the Soil Conservation Service Soil Survey, which  
indicate the agricultural suitability of the site;

- the impact on the economic viability of Oahu Sugar  
Company resulting from the cessation of sugarcane  
production on the subject lands;

- the impact on the remaining sugarcane fields adjacent  
to the project site (the Hawaii Right-to-Farm Act,  
Chapter 165, RSA, limits the circumstances under which  
pre-existing farming activities may be ceased a  
nuisance);

- the impact of this development on future agricultural  
production and expansion of diversified agriculture;

- the potential of establishing viable alternative  
arable uses on the agricultural-designated lands  
in the project site;

- the broader economic and resource impact on the State  
from the irrevocable loss of prime agricultural lands  
at the site;

- conformity to the State Agriculture Functional Plan  
and its objectives and policies, particularly,  
Implementing Action B(3)(c);

- conformity to the Hawaii State Plan priority  
guidelines 226-104(b)(1) and 226-106(1), which direct  
development into marginal or non-essential  
arable lands to meet housing needs and  
..."maintain" agricultural lands of importance in the  
aricultural district?"

Thank you for the opportunity to comment. We will provide  
further consent upon our receipt and review of the Draft  
Environmental Impact Statement.

Sincerely,

Suzanne D. Peterson  
Chairperson, Board of Agriculture

cc: Mr. William Balfour, President and Manager,  
Oahu Sugar Company
DPED  
ODCC  
DPF
To: Mr. Mike Moon, Director  
Department of Housing and Community Development  

Subject: Environmental Impact Statement Preparation Notice (EISPM) for West Loch Estates Subdivision Development  

The Department of Agriculture has reviewed the subject EISPM and offers the following comments.

According to our records, the proposed project was the subject of an Environmental Assessment Notice to which we provided comments to your department (see attached copy of our letter dated June 17, 1987). Inasmuch as the difference between the earlier project description and that of the subject project in its additional acreage to the golf course, please be advised that the concerns we had earlier remain applicable to the subject project.

To reiterate, the concerns that should be addressed in the Draft EIS are as follows:

- a complete soils description with references to the Agricultural Lands of Importance to the State of Hawaii (ALIS) system, Land Study Bureau Overall Productivity Rating system and the Soil Conservation Service Soil Survey which indicate the suitability of agricultural use of the site;
- the impact on the economic viability of Oahu Sugar Company resulting from the cessation of sugarcane production on the subject lands;
- the impact on the existing sugarcane fields adjacent to an urban development (The Hawaii Right-to-Farm Act, Chapter 165, HRS, limits the circumstances under which pre-existing farming activities may be deemed a nuisance);
- the impact of this development on future agricultural production requirements and expansion of diversified agriculture, as identified in the final report of the Land Evaluation and Site Assessment (LESA) Commission (February, 1988);  
- the potential of establishing viable alternative agricultural uses on the agricultural-designated lands in the project site;
- the broader economic and resource impact on the State from the irrevocable loss of prime agricultural lands;
- conformance to the State Agriculture Functional Plan and its objectives and policies, particularly, implementing Action B(5)(c) and;  
- the relationship to the Hawaii State Plan priority guidelines 226-104(b)(2) and 226-104(1), which direct development into marginal or non-essential agricultural land to meet housing needs and *...* (maintain) agricultural lands of importance in the agricultural district*.

Thank you for the opportunity to comment. We will provide further comment upon our receipt and review of the Draft Environmental Impact Statement.

Mr. Mike Moon  
August 5, 1987  
Page 1-2  

Chairperson, Board of Agriculture  

cc: Mr. William Balfour, President and Manager, Oahu Sugar Company  
DSED  
DEPC  
DSF

Chairperson, Board of Agriculture  

cc: Mr. William Balfour, President and Manager, Oahu Sugar Company  
DSED  
DEPC  
DSF

Chairperson, Board of Agriculture  

cc: Mr. William Balfour, President and Manager, Oahu Sugar Company  
DSED  
DEPC  
DSF
Ms. Suzanne D. Peterson  
September 16, 1987  
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Murai, Project Manager at 527-5321. Thank you again.

Sincerely Yours,

Mike Hoon  
Director

---

Ms. Suzanne D. Peterson  
Chairperson  
Department of Agriculture  
4128 South King Street  
Honolulu, Hawaii 96814-2512

Dear Ms. Peterson:

Subjects: Environmental Impact Statement Preparation Notice for:  
West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 17 and August 5, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact Statement (EIS) for the proposed development. As part of the master planning, we are conducting a special study to assess the impact of this development on the Oahu Sugar Company and sugar production in general, as well as the viability of alternative agricultural ventures in the area.

While we are responsible for the protection of agricultural lands, we are also charged with the responsibility of providing affordable homes for our citizens. We believe that a balance between agricultural needs and the need for affordable housing is necessary. The West Loch Estates development and its location on lands that are largely of lower productivity, represents such a balance.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPIN) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPIN has been prepared and submitted to the Office of Environmental Quality Control by that Department.
Mr. Mike Moon, Director  
Department of Housing and Community Development  
City and County of Honolulu  
650 S. King Street  
Honolulu, Hawai'i 96813

Dear Mr. Moon:

SUBJECT: West Loch Estates Housing Project

Our review of your proposed housing project indicates that it may generate the following additional enrollment in our area schools:

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<th>APPROXIMATE ENROLLMENT</th>
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<td>Ewa Elementary</td>
<td>K-6</td>
<td>200 - 400</td>
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<td>Ilima Intermediate</td>
<td>7-8</td>
<td>90 - 120</td>
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<td>Campbell High</td>
<td>9-12</td>
<td>160 - 240</td>
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Schools at all levels in this service area are operating at capacity. Budgeting for additional classrooms will be necessary to accommodate the anticipated enrollment growth at Ilima Intermediate and Campbell High School.

A site for a new elementary school should be identified within the project. Additional classrooms at Ewa Elementary or housing to nearby elementary schools will be necessary during the initial phase of the project.

Please keep us informed of any changes to your development plans so that we may be able to adjust to changing needs.

Sincerely,

Charles T. Taguchi  
Superintendent

CTT: J1  
attach.  
cc E. Imai, OBS  
E. Nakano, Leeward Dist.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER
Mr. Charles T. Toguchi
September 16, 1987
Page 2

appreciated. If you should have any questions or additional comment and
suggestions, please direct them to Mr. Howard Mural, Project Manager at
527-5531. Thank you again.

Sincerely Yours,

[Signature]
Mike Moon
Director
MEMORANDUM

To: Mr. Mike Moon, Director, Department of Housing & Community Development
   City and County of Honolulu
From: Director of Health
Subjects: West Loch Estates Housing Project, Honolulu, Ewa, Oahu

Thank you for allowing us to review and comment on the subject environmental assessment. The following are our recommendations of matters which should be addressed in the environmental assessment:

Air Pollution

The environmental assessment should include the potential impact on the ambient air quality as a result of the increase in vehicular activity from the proposed project and all other projects which were previously approved but have not started construction. Projections on the increased traffic volume and the impact on the ambient air quality should be for the associated corridors, roadways, and highways. The results should be compared to the State and Federal ambient air quality standards. Should a potential violation be determined, the EIS should address the mitigating actions which shall be implemented.

Wastewater Disposal

The environmental assessment should address how the sewage generated by the proposed project will be collected and treated at the Honolulu Wastewater Treatment Facility.

Note

1. The project includes residential areas adjacent to recreational areas (golf courses and parks). Noise from recreational and ground maintenance activities may adversely affect the residents of the project.
2. Noise from aircraft flights may adversely affect the residents of the project.
3. Construction activities must comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.
MEMORANDUM

To: Mr. Mike Moon, Director, Department of Housing & Community Development  
    City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement Preparation Notice--Proposed West Loch  
    Estates Subdivision Development, Ewa, Oahu

Thank you for allowing us to review and comment on the subject EISPN. We provide  
the following comments:

Vector Control

The proposed development is in a persistent mosquito breeding area. The new  
residents will probably complain even if forewarned about the situation.

Administrative Rules on demolition and clearing of vacant land must be strictly  
adhered to.

Noise

Our noise concerns toward this proposed project were addressed in a memorandum  
to your office dated June 12, 1987. The following additional comment should be included  
to our previous concern. Noise from vehicles traveling along Fort Weaver Road may  
have an adverse effect on residents of the proposed project.

Mitigative measures or provisions for compliance with noise rules must be included  
in the EIS.

Drinking Water

According to the proposal, West Loch Estates I can be serviced by existing and  
planned Board of Water Supply sources and distribution systems; however, West Loch  
Estates Increment II will require the development of new water sources. Please note that  
all new sources will be subject to all applicable terms and conditions of Chapter 20, Title  
11, Administrative Rules.

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  
his or her seal upon submittal.

Bruce Anderson  
BRUCE S. ANDERSON, P. E. D.
September 16, 1987

Dr. John C. Lewin
Director of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin:

Subject: Environmental Impact Statement Preparation Notice for:
West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 19 and July 31, 1987 relating to the
proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact
Statement (EIS) for the proposed development and appreciate your comments
relating to vector control, air pollution, wastewater disposal, and noise. These
impacts will be discussed in specific studies and evaluations conducted as a
part of the environmental process. The findings of our studies will be
presented in the Draft EIS.

The proposed golf course and beach park have been separated from the
original Environmental Impact Statement Preparation Notice (EISP) that was
submitted on June 30, 1987. It was determined that it would be inappropriate
to combine both projects under a single Notice as the projects are not related
to one another, will be administered by different departments and involve
separate funding.

Please provide all comments relative to the Housing projects to this office and
if you have comments specifically concerning the golf course and park, they
should be directed to the Department of Parks and Recreation. A separate
EISP has been prepared and submitted to the Office of Environmental Quality
Control by that Department.

Your willingness to assist in the planning of this development is greatly

Sincerely Yours,

Robert Magbanua
Director

SEP 16 87
States of Hawaii
Department of Social Services and Housing
Hawaii Housing Authority
June 17, 1987

The Honorable Mike Moon
Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Re: West Loch Estates Housing Project

We have reviewed the preliminary information on the proposed project and offer the following comments:

1. The proposed project will include 1,350 single family for-sale units. At what price range will these units be offered and what income group will be targeted?

2. As each planned development in the Ewa area impacts the existing and planned infrastructure, what is the timetable for development of the proposed project?

3. We would appreciate to be kept informed of this project during your conceptual/planning stage so that we can better coordinate our (HSA/City & County of Honolulu) Kapolei Village Development with your project. Perhaps, we should joint venture this project switching the roles as structured in our proposed Kapolei Village Development.

Thank you for the opportunity to review the environmental assessment preparation notice. Should you have any questions, please contact Collette Sakoda of my staff at 848-3226.

Sincerely,

Russell N. Fukumoto
Executive Director
Mr. Russell N. Fukumoto  
September 16, 1987

Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Horal, Project Manager at 527-5321. Thank you again.

Sincerely Yours,

Robert A. Halsey  
Mike Moon  
Director

September 16, 1987

Mr. Russell N. Fukumoto  
Executive Director  
Hawaii Housing Authority  
P.O. Box 17807  
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: Environmental Impact Statement Preparation Notice for:  
West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 17 and July 26, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact Statement (EIS) for the proposed development. As part of the master planning, we are conducting a market feasibility study to assess the housing demand that our proposed project will serve. We do plan to target our for-sale units for those home buyers that are in the gap-group and middle-income housing markets.

The subject of structuring this project as a joint venture with the Hawaii Housing Authority is being explored as the alternative means of implementation. Your offer is greatly appreciated and will be the subject of further discussion.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to the Office of Environmental Quality Control by that Department.
Honorable Michael Moon

Therefore, we recommend that an archaeological survey with some subsurface testing be conducted in the project area. If historic sites are found, then sufficient information should be gathered to evaluate the sites' significance. The study should also offer initial significance evaluations. The study findings, in a report format, and the initial significance evaluations should then be submitted to our Historic Sites Section for review and comment. If significant sites are present, then appropriate mitigation plans will have to be developed.

As Community Development Block Grant Funds are involved, the project must comply with the National Historic Preservation Act. This requires coordination with our Historic Sites Section. The Section's phone is 548-7460. Dr. Joyce Rath, staff archaeologist handling Oahu, should be able to answer any questions.

Water and Land Development Concerns:

We request that the developer (Department of Housing and Community Development) provide the following information in its EA for the above project:

1. quantity of water to be used (in million gallons per day)
2. water sources (type and location)
3. drainage plan
4. stream uses or alterations

The project is located in the Pearl Harbor Ground Water Control Area. Accordingly, any withdrawal of basalt ground water from the area will require the approval of the Board of Land and Natural Resources.

Thank you for your consideration of our concerns.

Very truly yours,

[Signature]
William W. Paty
Chairperson
Board of Land and Natural Resources
State Historic Preservation Officer
Honorable Michael H. Moom

Department of Housing and Urban Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moom:

SUBJECT: Environmental Impact Statement (EIS) Preparations
Notice for West Loch Estates Subdivision, Ewa, Oahu

Thank you for the opportunity to review the EIS preparation notice cited above. We offer the following comments:

Aquatic Resources Concerns:

Proposed park development would improve recreational fishing opportunities by providing increased access for fishing. Since the proposed housing project is inland of the proposed park, adverse impacts to aquatic resources are not expected to be significant. Provided precautions are taken to prevent debris, construction material, petroleum products, and other contaminants from entering coastal waters.

Additionally, the subject document states that waters of West Loch are under Navy Jurisdiction. Since this project proposes to develop shoreline parks, shoreline use by park goers is highly probable (i.e., pole fishing, crabbing, etc.). The EIS should discuss the sanitary quality of West Loch waters and the impact of public use on shoreline resources and clearly determine what the Navy intends to allow in terms of shoreline and nearshore use for the project's shoreline area.

Further, this document has classified Honoluli Stream as perennial; topographic maps show this stream to be intermittent. This should be clarified. Finally, since a proposed golf course would limit access to Honoluli Stream, impacts to present recreational use, if any, should be discussed.

Forestry and Wildlife Concerns:

1. The EIS should include a wildlife survey and discussions on how the project will impact wildlife.

2. In addition to the U.S. Fish and Wildlife Service and the State Department of Land and Natural Resources, the project is concerned with alterations of wetlands and its effect on wildlife both directly on-site and indirectly (run-off into Pearl Harbor).

Historic Sites Concerns:

This project area does not contain sites that are listed on the Hawaii Register or the National Register of Historic Places, or that have been determined eligible for inclusion on the National Register of Historic Places. However, few archaeological surveys have taken place in the area, so it is uncertain if significant historic sites are present. There are several land Court Award parcels within the subject property, an indication of historic era occupation. Thus, we believe there is a possibility that significant historic sites are present.

Therefore, we recommend that an archaeological survey with some subsurface testing be conducted in the project area. If historic sites are found, then sufficient information should be gathered to evaluate the sites' significance. The study should also offer initial significance evaluations. The study, findings, in a report format, and the initial significance evaluations should then be submitted to our Historic Sites Section for review and comment. If significant sites are present, then appropriate mitigation plans will have to be developed.

As Community Development Block Grant Funds are involved, the project must comply with the National Historic Preservation Act. This requires cooperation with our Historic Sites Section. The Section's phone is 808-746-6000. Dr. Joyce Barth, staff archaeologist handling Oahu, should be able to answer any questions.
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

September 18, 1987

Mr. William W. Paty, Chairperson
Department of Land and Natural Resources
P.O. Box 801
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Environmental Impact Statement Preparation Notice for: West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 23, 1987 and August 7, 1987 relating to the proposed West Loch Estates development.

We are in the process of developing a Master Plan for the housing increments and an Environmental Impact Statement (EIS) for the proposed development. We are cognizant of the need to protect our coastal ecosystem and consequently, have separated the proposed golf course and beach park from the housing EIS. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments, and involve separate funding.

Please provide all comments relative to the housing project to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EIS for the beach park has been prepared and submitted to the Office of Environmental Quality Control by that department.

There will be documentation on the wildlife, the archaeological/historic sites, and potable water demand in the Draft EIS. They will be supported by the technical studies prepared by the technical consultants and we look forward to your agency's review and comments. Thank you for your continuing interest and concern.

Sincerely yours,

[Nice Moon]
Director
The Honorable Mike Moon  
Page 3  
June 10, 1987

Historic Resources

The Hawaii CDM statute, Chapter 201A, provides for the protection, preservation and, where desirable, restoration of those natural and man-made historic and prehistoric resources in the CDM area. An assessment of historic and archaeological resources on the site should be made. We recommend that an archaeological survey be conducted. The State Historic Preservation Office of the Department of Land and Natural Resources should be consulted on this matter.

Coastal Hazards

The Federal Flood Insurance Rate Map (FIRM) designates a significant portion of the site along Honolulu Harbor as a 100-year flood hazard area. CDM policies call for controlling development in areas subject to flood hazard; ensuring that developments comply with requirements of the Federal Flood Insurance Program; and preventing coastal flooding from inland projects. Mitigating measures should be proposed and discussed in the environmental assessment.

CDM Federal Consistency

Because this project will be developed under the Federal Community Development Block Grant (CDBG) program, CDM consistency certification is required from HFD. Although we recently issued a general consistency to the U.S. Housing and Urban Development Honolulu Office for the CDBG program in Hawaii, the subject proposal does not qualify because it falls under several of the exceptions.

Hawaii State Plan

An analysis of appropriate objectives, policies and priority guidelines of the Hawaii State Plan and proclaimed State Functional Plans should be conducted to determine the project's consistency with the Hawaii State Plan. The following sections should be included in your review:

Population (Section 234-1, HRS), Physical Environment (Sections 234-11 through 234-13, HRS), Facility Systems (Sections 234-15 through 234-17, HRS), Socio-cultural Advancement (Sections 234-19 and 234-21, HRS), Population Growth and Land Resources (Section 234-104, HRS) and Affordable Housing (Section 234-104, HRS).

Thank you for the opportunity to review this EA proposal.

Sincerely,

[Signature]

Roger A. Stawell

CC: Office of Environmental Quality Control
July 29, 1987

Dear Mr. Moon:

Subject: Environmental Impact Statement Preparation Notice for the West Loch Estates Housing Project by the Department of Housing and Community Development, City and County of Honolulu

We have reviewed the subject proposal and have the following comments.

HAWAII COASTAL ZONE MANAGEMENT (CZM) PROGRAM

The project will be situated within the CZM area and, therefore, the Environmental Impact Statement (EIS) should include an assessment and discussion of the project in relation to the CZM objectives and policies. In particular, the following concerns need to be addressed in the EIS:

Coastal Ecosystem

A CZM policy calls for the protection and preservation of valuable coastal ecosystems of significant biological or economic importance. Relative to this, we note that the Honolulu or West Loch unit of the Pearl Harbor National Wildlife Refuge is situated adjacent to the project site. It serves as a habitat, nesting, and feeding ground for endangered Hawaiian waterbirds and is managed by the U.S. Fish and Wildlife Service (FWS).

After consulting with FWS, we believe that the project will adversely affect the refuge unless appropriate mitigation measures are taken. For example, fencing and buffer strips should help prevent intrusion into the refuge by domestic animals and humans. Measures to lessen impacts from noise, lighting, and surface water runoff should also be proposed and discussed in the EIS.

In addition, there are fish ponds and wetlands located within the project area. Activities which may alter these resources, i.e., dredge and/or fill, must be coordinated with the U.S. Army Corps of Engineers since such activities may require a Department of the Army permit.

Historic Resources

The Hawaii CZM statute, Chapter 201A, provides for the identification, preservation, and, where desirable, restoration of those natural and man-made historic and prehistoric resources in the CZM area. An assessment of historic and archaeological resources on the site should be made. We recommend that an archaeological survey be conducted and that the State Historic Preservation Office of the Department of Land and Natural Resources be consulted on this matter.

Coastal Hazards

The Federal Flood Insurance Rate Map (FIRM) designates a significant portion of the site along Honolulu Stream as a 100-year flood hazard area. CZM policies call for controlling development in areas subject to flood hazard; ensuring that developments comply with requirements of the Federal Flood Insurance Program; and preventing coastal flooding from inland projects. Mitigating measures should be proposed and discussed in the EIS.

CZM Federal Consistency

Because the project will be developed under the Federal Community Development Block Grant (CDBG) program, the Federal consistency provisions of the National CZM Act will be applicable. The above issues are germane to this certification program and should, therefore, be addressed.

LAND USE DIVISION

Information concerning transfer of title and/or development rights from Campbell Estate should be included in the Draft Environmental Impact Statement (EIS). This information should provide the purchase price of the property and/or any conditions attached to the transfer of title or development rights. The Preparatory Notice (KISM) states that the 468-acre property is currently Campbell Estate property located in Honolulu, Ewa, Oahu.

Areas currently utilized for sugar cultivation by Oahu Sugar Company should be identified in the EIS. The project's impact on existing agriculture and potential for production of diversified agricultural crops should be thoroughly discussed.

Transportation impacts addressed in the EIS should include a discussion on regional employment centers, transportation alternatives, and any special transportation needs required for elderly and low-income residents.
The Honorable Mike Moon  
July 29, 1987

The EIS should include a discussion on anticipated potable water requirements, impacts to groundwater quality and potential impacts of increased water runoff into West Loch. A schematic site plan should also be provided which illustrates the location of structures relative to the flood plain and golf course, the proposed beach park, and public access to West Loch.

The EIS should include a general cost breakdown of anticipated infrastructure costs and a breakdown of pricing of different unit types. Project phasing should be discussed relative to the timing of other Ewa projects. Potential noise impacts from civilian and military aircraft should be discussed.

Thank you for the opportunity to review this EISM.

Sincerely,

Roger A. Ulvestad

cc: Land Use Division

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT  
CITY AND COUNTY OF HONOLULU

September 16, 1987

Mr. Roger A. Ulvestad, Director  
Department of Planning and Economic Development  
P.O. Box 2159  
Honolulu, Hawaii 96804

Dear Mr. Ulvestad:

Subject: Environmental Impact Statement Preparation Notice for: West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 16 and July 29, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact Statement (EIS) for the proposed development. We are cognizant of the need to protect our coastal ecosystem and will comply with applicable federal, state and county laws and regulations as they relate to the coastal environment, historic resources and flood hazards.

Coastal Ecosystems

Meetings have been held with the U.S. Department of Interior, Fish & Wildlife Service to discuss the proposed project and its potential impacts on the Wildlife Refuge located nearby. Their concerns have been identified and will be reviewed and analyzed to mitigate the negative impacts to the extent practicable.

Historic Resources

There will be discussion and coordination with the State Historic Preservation Office (SHPO), Department of Land & Natural Resources (DLNR) in the survey of the project site for historical resources. We share that agency's concern over the possibility of significant historical sites and archaeological resources within the project area. Our technical consultant has already met with their SHPO staff for the purpose of formulating a plan to address these concerns.
Mr. Roger A. Ulveging
September 16, 1987
Page 2

Coastal Hazards

Coastal Zone Management Federal Consistency will be applicable on the basis of Flood Hazard considerations. The project will be required to comply with all applicable standards which will be identified in the Draft EIS.

Hawaii State Plan

All applicable sections of the Hawaii State Plan will be discussed in the Draft EIS under the section "Relationship to Plans, Policies, and Controls."

Land Use Division

Land acquisition data will be provided to the extent that they are available and can be prudently disclosed at the time the Draft EIS is being developed. Funding for the purchase of the project site, in keeping with the City’s Capital Improvements Project budget for the 1981-1982 Fiscal Year (ORD. No. 87-150 p. 13-14).

An analysis of the agricultural productivity of the lands within the project area will be provided in the Draft EIS. As noted in the EIS, those lands situated in Increment II and portions of the proposed District Park are still in cultivation and scheduled for following in 1983. The impact of the project on agriculture will be discussed in relation to the State Agricultural Plan.

A Traffic Impact study will also be provided in the Draft EIS that will review the current traffic capacities of the transportation network servicing the project site and discuss the mitigation measures available which address the traffic impacts of the project.

Potable Water demands have been reviewed by the Board of Water Supply (BWS) which has provided assurance that adequate potable water will be available to the site, subject to the design and construction of water storage and transmission facilities as a part of the project.

A description of groundwater runoff and probable impact on the West Loch receiving waters will also be provided in the Draft EIS for review by the appropriate agencies.

Onsite and Offsite construction costs will be discussed on the basis of preliminary budget estimates, since more definitive cost estimates are unlikely to be available at the time the Draft EIS is prepared.

A Noise Impact study will be developed and included in the Draft EIS for review and comment by State and Federal agencies. These impacts will discuss the traffic as well as aircraft noise impacts on the proposed residential project.

Mr. Roger A. Ulveging
September 16, 1987
Page 3

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5321. Thank you again.

Sincerely yours,

[Handwritten Signature]

Mike Moon
Director
Mr. Michael M.N. Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

West Loch Estates Housing Project

Thank you for your letter dated May 22, 1987 in which you have asked for a preliminary review and comment for the proposed West Loch Estates Housing Project.

Your project's environmental assessment should contain a traffic impact analysis report (TIAR) which addresses the project's local and regional effects on our highway system and any needed mitigation measures.

May we inform you that a portion of Phase II in the vicinity of the intersection of Renton Road and what appears to be Renton Road is in an area of potential aircraft single event noise exposure. Accordingly, the assessment should address this matter.

Thank you for providing this opportunity to preliminarily review your project proposal,

Very truly yours,

Edward V. Hirata
Director of Transportation

July 17, 1987

Mr. Michael M.N. Moon, Director
Dept. of Housing and Community Dev.
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

EIS Preparation Notice
Proposed West Loch Estates Subdivision Development

The development's draft EIS should contain a traffic impact analysis report which addresses the local and regional effects on our highway system and identifies any needed mitigation measures.

Since an existing 40-foot railroad right-of-way is adjacent to Increment II of the development, you should be aware of City Ordinance No. 64-94. This ordinance incorporated a Bilateral Agreement and Declaration for Conditional Toning and was signed by the owners of the land, Campbell Estate, and the developer, Mirano Brothers, Ltd. In the Bilateral Agreement, it was agreed to respect the railroad right-of-way and to design projects adjacent to this right-of-way in a manner compatible with its use for transportation improvements. Further, the parties agreed that structures would be setback a minimum of 40 feet from this right-of-way. We feel, therefore, that similar conditions should be imposed on the subject development.

We also noted that a portion of Phase II in the vicinity of the intersection of Renton Road and what appears to be Renton Road is in an area of potential aircraft single event noise exposure. Accordingly, the draft EIS should address this matter.
Another condition that will need to be considered is the presence of the energy corridor. We have enclosed a map indicating the corridor's relationship with the proposed development. Please note that the affected areas are located at the northern end of Phase I and the mauka golf course. In this regard, close coordination with our Harbors Division is recommended.

Thank you for this opportunity to provide comments.

Very truly yours,

Edward T. Hirata
Director of Transportation

Enclosure
September 16, 1987

Mr. Edward Y. Hirata
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hirata:

Subject: Environmental Impact Statement Preparation Notice for:
West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 22 and July 17, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. As part of our planning efforts, we are preparing a traffic impact analysis report which addresses the development’s local and regional effects on the roadway system in the area. The findings of this report will be presented in the EIS.

We will also investigate the potential impact of aircraft noise and present appropriate mitigation measures if such is found necessary. The relationship of the project with the energy corridors (as both defined in the attachment to your letter and that which runs parallel to the ORAL right-of-way) will also be examined.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPN) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPN has been prepared and submitted to the Office of Environmental Quality Control by that Department.

Sincerely Yours,

[Signature]
Mike Hoon
Director

Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Morai, Project Manager at 527-5321. Thank you again.
May 27, 1987

Mr. Mike Noon, Director
Department of Housing and Community Development
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Noon:

Subject: West Lock Estates Housing Project

Thank you for the opportunity to comment on the subject housing project.

Based on the location map submitted with your letter of May 22, 1987, portions of the proposed project appear to impact fishpools which are currently designated in the State Land Use Conservation District.

Should the proposed project include the fishpools, a "District Boundary Amendment or Conservation District Use Permit" may be required.

Sincerely,

ESTHER UDHA
Executive Officer

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July 24, 1987

Mr. Howard Murai
Department of Housing
And Community Development
650 South King Street
Fifth Floor
Honolulu, Hawaii 96813

Subject: EIS Preparation Notice for the Proposed West Lock Estates Subdivision Development

Thank you for the opportunity to comment on this matter. We do not have any comments at this time except that the EIS Preparation Notice indicates the project site is designated within the State Agricultural and Urban Districts. However, our information indicates there are fishponds on the project site that appear to be within the State Conservation District. The Draft EIS should address impacts of the proposed development on these fishponds.

If you have any questions, please contact our office at 548-3039.

Sincerely,

ESTHER UDHA
Executive Officer
Ms. Ester Ueda  
September 16, 1987  
Page 2  

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Murakami, Project Manager at 523-5321. Thank you again.

Sincerely yours,

Robert Maynard  
Director
May 28, 1987

Mr. Mike Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Subject: West Loch Estates Housing Project

Our primary concerns regarding the project are the availability of water and traffic impacts regarding the development. Thank you for consulting us on this project.

Sincerely,

John C. Levin, M.D.
Director of Health
for Director, DEQC

September 16, 1987

Dr. Marvin T. Niiura, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Niiura:

Subject: Environmental Impact Statement Preparation Notice for West Loch Estates Development, Ewa, Oahu

Thank you for your comments of May 28, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan for the proposed development and appreciate your comments relating to traffic impacts and the availability of water for the project.

The Board of Water Supply has advised us that water service can easily be made available at the project site. The necessary approvals are also already being sought from the State Department of Land & Natural Resources. A plan for water storage and distribution will be developed as a part of the master planning process. Further, a traffic impact analysis will also be prepared as a part of this process and the report will be included in the Environmental Impact Statement (EIS).

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPN) that was submitted on June 15, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPN has been prepared and submitted to the Office of Environmental Quality Control by that Department.
TO:  MICHAEL M. H. MOON, DIRECTOR
    DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
FROM:  KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
        BOARD OF WATER SUPPLY
SUBJECT: YOUR MEMORANDUM OF MAY 22, 1987 ON THE WEST LOCH
        ESTATES HOUSING PROJECT, TOS: 9-1-17: 6, 9-11, 13,
        14, 16-29, 34, AND 44

Thank you for the opportunity to review and comment on your
proposed housing project.

We have the following comments:

1. The development will require the installation of a
   storage reservoir and transmission mains. The City
   will be required to pay a proportionate share for the
   development of a new source.

2. A Water Master Plan should be submitted for our
   review and approval.

The comments are in addition to other information sent to you
in April 1987 regarding the project.

If you have any questions, please contact Lawrence Whang at
527-6136.

KAZU HAYASHIDA
Manager and Chief Engineer

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TO:  MICHAEL M. H. MOON, DIRECTOR
    DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
FROM:  KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
        BOARD OF WATER SUPPLY
SUBJECT: YOUR LETTER OF JULY 6, 1987 ON THE ENVIRONMENTAL
        IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR
        PROPOSED WEST LOCH ESTATES SUBDIVISION DEVELOPMENT
        PROJECT IN EWA

Thank you for allowing us to review the EIS Preparation
Notice.

We concur with the comments on water for the proposed
development (page 3).

If you have any questions, please contact Lawrence Whang at
527-6136.

KAZU HAYASHIDA
MEMORANDUM

TO: KAZU HAYASHIDA  
MANAGER AND CHIEF ENGINEER  
BOARD OF WATER SUPPLY

FROM: MICHAEL H. MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR: WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

September 16, 1987

Thank you for your comments of June 9 and July 10, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate knowing that water service will be available at the project site. As more detailed information is developed on the project, we will be consulting with your agency as to the specific details for water service. These details are being developed by the Master Planning Consultant, and will be provided in the Draft Environmental Impact Statement currently under preparation. We look forward to your review of this document.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comment specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.
MEMO TO: MR. HIME MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: WEST LOCH ESTATES HOUSING PROJECT

Thank you for the opportunity to comment on the proposed West Loch Estates Housing project.

We understand that park-and-ride and child care facilities will be included in this development. We feel that the Environmental Assessment should address these facilities.

HERBERT K. MURAOKA
Director and Building Superintendent

cc: J. Harada

MEMO TO: MICHAEL M. H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE
PROPOSED WEST LOCH ESTATES SUBDIVISION DEVELOPMENT
PROJECT SITUATED IN EWA, OAHU

Thank you for the opportunity to review the Environmental Impact Statement Preparation Notice for the West Loch Estates Subdivision.

We understand the Park and Ride facilities and a Child Care Center will be included in the proposed West Loch Estates Subdivision Development project. The EIS should address the Park and Ride facilities and the Child Care Center.

HERBERT K. MURAOKA
Director and Building Superintendent

cc: J. Harada
MEMORANDUM

TO: HERBERT K. HURAKA, DIRECTOR
BUILDING DEPARTMENT

FROM: MICHAEL H.B. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR: WEST LOCH ESTATES DEVELOPMENT, EMA, OAHU

September 16, 1987

Thank you for your comments of June 2 and July 13, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. As more detailed information is developed on the project, we will be consulting with your department as to the specific details for the park and ride and child care facilities. This data will be provided in the Draft Environmental Impact Statement, and we look forward to your review of this document.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPN) that was submitted on June 16, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPN has been prepared and submitted to the Office of Environmental Quality Control by that Department.
MEMORANDUM

TO: MICHAEL M. H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR THE PROPOSED WEST LOCH ESTATES SUBDIVISION
DEVELOPMENT PROJECT SITUATED IN EWA, OAHU

This is in response to your request for comments on the
Environmental Impact Statement Preparation Notice for the
proposed West Loch Estates Subdivision development in Ewa.

The following points should be addressed in the preparation of
the Draft Environmental Impact Statement:

1. Vehicular Access and Traffic

The applicant should prepare a traffic study which
discusses the proposed development's impact on Fort
Weaver and Punahele Roads and its impact on downstream
traffic on the H-1 Freeway and Farrington Highway.

2. Sewage Treatment and Disposal

The availability of capacity at the Honolulu Wastewater Treatment Plant to service the proposed
development should be discussed.

3. Water System

The water needs of the proposed development and its
impact on the water resources in Ewa should be
discussed.

4. Drainage System

The West Loch Estates Subdivision Development may
affect the quality and quantity of runoff flowing
into Pearl Harbor's West Loch. The drainage impacts
should be reviewed.

5. Public Schools

The Draft EIS should discuss the adequacy of school
facilities to support the proposed development.

6. Parks and Recreation

We concur with the applicant's intent to coordinate
plans for the shoreline park with the Navy and the
Department of Land and Natural Resources.

7. Other Public Facilities

The project's impact on solid waste collection and
disposal, electric, telephone, police, fire and health
care services should be discussed.

8. Social Impacts

A social impact study should be prepared to include
plans for relocating existing residents.

9. Environmental Characteristics

A. Agriculture: The Draft EIS should address the
impact of agricultural land and its impact on the
agricultural industry on Oahu.

B. Environmental Quality: The project's impact on
air quality and noise levels should be discussed.

10. Flora, Fauna, Archaeological and Historic Resources

A survey of the site should be required to protect any
rare or endangered plants or animals and to preserve
any archaeological or historic sites or remains.
Michael M. H. Moon, Director
Department of Housing and Community Development
Page 3
July 27, 1987

We concur with the applicant's plan to address Corps of Engineers and U.S. Fish and Wildlife Service concerns regarding the alteration of wetlands and impacts on the Pearl Harbor National Wildlife Refuge Honolulu Unit.

Thank you for giving us an opportunity to comment on this matter.

Donald Clegg
DONALD A. CLEGG
Chief Planning Officer

MEMORANDUM

TO: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: MICHAEL M.H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: CHAPTER 36, HAWAII REVISED STATUTES ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED WEST LOCH ESTATES DEVELOPMENT, Ewa, O'ahu

September 10, 1987

Thank you for your comments dated July 27, 1987 relating to the proposed West Loch Estates Development Environmental Impact Statement Preparation Notice. Staff review of the specific comments made in your memorandum have been completed and we will be addressing these concerns in the Draft Environmental Impact Statement (DEIS) currently under preparation.

As you are aware, there have been scheduled meetings with both Cabinet level and senior staff representatives from the appropriate departments as well as the retained consultants responsible for the development of the Project Master Plan and the DEIS. Your office's concerns have been discussed on an ongoing basis with this group and also with concerned Federal and State agencies.

Please be assured that the DEIS will provide specific analysis and adequate discussion on these items.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the housing projects to this office and if you have comments specifically concerning the golf course and park, submit them to the Department of Parks and Recreation. A separate EISP is being prepared and submitted to the Office of Environmental Quality Control by the Parks Department.
Mr. Donald A. Clegg  
September 16, 1987  
Page 2  

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5223. Thank you again.

Robert Magrac  
Mike Moon  
Director  
5/16/87
MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FROM: JOHN P. WALEH, DIRECTOR

SUBJECT: WEST LOCH ESTATES HOUSING PROJECT, EWA, OAHU
NKA MAP KEYS: 8-1-171; VARIOUS; 9-0-480; 70

The Department of Land Utilization has completed its review of the above referenced Development Plan public facility amendment and offers the following comments:

1. A portion of the proposed project lies within the Special Management Area (SMA) established in Chapter 33 and will require a Shoreline Management Permit (SMP).

2. The study, An Ornithological Survey of Hawaiian Wetlands Vol. II, indicates that there are significant wetland habitats on the proposed park site. These habitats should be protected. They could be incorporated into the park as wildlife preserves with an effective management program.

3. The proposed park will be located adjacent to the Honolulu Unit of the Pearl Harbor National Wildlife Refuge. Depending upon the nature of the park design, there may be possible construction related impacts to the Refuge such as drainage diversion, water table modification and disturbance to wildlife due to noise and lights. These potential impacts should be mitigated and solutions coordinated with the U.S. Fish and Wildlife Service.

We hope these comments will be a help to you in your preparation of the environmental assessment. If you have any questions, please contact Art Challicome of our staff at 523-4648.

John P. Waleh
Director of Land Utilization

MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FROM: JOHN P. WALEH, DIRECTOR

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISP)
PROPOSED WEST LOCH ESTATES SUBDIVISION DEVELOPMENT PROJECT
EWA, OAHU; NHA MAP KEYS: 8-1-171; VARIOUS; 9-0-480; 70;
9-0-201; VARIOUS; 9-0-211; VARIOUS

Thank you for the opportunity to review your preparation notice for the above referenced project. Based upon our review, we offer the following comments:

1. As mentioned in the EISP, plans for the project could affect coastal wetlands and the Pearl Harbor National Wildlife Refuge Honolulu Unit. Depending upon the nature of the proposed park design, there may be possible construction related impacts to the Refuge such as drainage diversion, water table modification and disturbance to wildlife due to noise and lights. These potential impacts should be addressed in the Draft Environmental Impact Statement (DEIS).

2. The DEIS should include a study of the project impact on coastal views.

We hope these comments will be a help to you in the preparation of the DEIS. If you have any questions, please contact Art Challicome of our staff at 523-4648.

John P. Waleh
Director of Land Utilization
September 16, 1987

MEMORANDUM

TO: JOHN P. WHALEN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: MICHAEL M.R. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR: WEST LOCH ESTATES DEVELOPMENT, EMA, OAHU

Thank you for your comments of June 8 and July 14, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and can appreciate your concerns relating to the project impacts on the coastal wetlands, the Honolulu Wildlife Refuge, and coastal view plane impacts.

Our intent is not to affect any of the ponds located along the coastline except for the clearing of shrubs and grasses which are currently there. We are proposing that these ponds be incorporated into the master plan as part of a shoreline park. We will be complying with the provisions of Ordinance 84-4 relating to Special Management Area for Oahu.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 19, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.

Mr. John P. Whalen
September 16, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-9201. Thank you again.

Robert Ng
for Mike Moon
Director

SEP 14 1987
TO: NIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: HIRAN K. KAMADA, DIRECTOR

SUBJECT: WEST LOCH ESTATES HOUSING PROJECT - EMA
TAX MAP KEY 9-1-17 AND 9-4-40

We have reviewed the proposed West Loch Estates Housing project and make the following comments:

The recreational needs of the proposed West Loch Estates Housing Project have been addressed. Park sites have been included in the project's plan to serve the project and comply with the Park Dedication Ordinance requirements.

Thank you for the opportunity to review the project.

HIRAN K. KAMADA, Director

HEX: #1
Attach.
September 16, 1987

MEMORANDUM

TO: HIRAN K. KAMAKA, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: MICHAEL H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR: WEST LOCH ESTATES DEVELOPMENT, OAHU

Thank you for your comments of June 29, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. As more detailed information is developed on the project we will be consulting with your department as to the specific details for recreational services and facilities. We look forward to your review of this document.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and comments specifically concerning the golf course and park, are being directed to the Department of Parks and Recreation for review and response.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5321. Thank you again.

[Signature]
Mike Moon
Director
MEMORANDUM

TO: MIKE NOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR WEST LOCH HOUSING PROJECT
(TAX MAP KEY: 9-1-17:6, 9-11, 13, 14, 10-12, 14,
41, 3-1-48: 76)

June 5, 1987

In response to your memorandum dated May 22, 1987, regarding the proposed subject project, our comments are as follows:

1. A drainage report should be prepared and submitted to the Drainage Section, Division of Engineering for review and approval.

2. Phase I of the project, consisting of approximately 420 residential units on 65.8 acres may be connected to the existing Waipahu sewer system. However, approximately 1,300 feet of the affected sewer line will have to be relieved.

3. Phase II of the project, consisting of approximately 1,080 residential units on 165.8 acres would require the construction of a wastewater pump station and force main that will be connected to the existing Ewa sewers at Henton Road and Fort Weaver Road. The assessment should discuss the relative location of the pump station in respect to the master plan of the Honolulu Rail Plan located in the vicinity of the golf course, and how the station will be operated and maintained.

4. In this regard, the assessment should discuss how the auxiliary units of the golf course will be connected to the sewer unit.

Alfred J. Thiede
Director and Chief Engineer

July 7, 1987

MEMORANDUM

TO: MIKE NOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: RISHER PREPARATION NOTICE FOR WEST LOCH HOUSING PROJECT
(TAX MAP KEY: 9-1-17:6, 9-11, 13, 14, 10-12, 14,
41, 3-1-48: 76)

We have reviewed the subject RISHER and have no additional comments to offer at this time.

Alfred J. Thiede
Director and Chief Engineer
MEMORANDUM

TO:        ALFRED J. THIEDE
            DIRECTOR AND CHIEF ENGINEER
            DEPARTMENT OF PUBLIC WORKS

FROM:      MICHAEL M.R. MOON, DIRECTOR
            DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT:   ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
            FOR: WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

September 16, 1987

Thank you for your comments of June 5 and July 7, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. As more detailed information is developed on the project, we will be consulting with your department as to the specific details for the drainage and wastewater improvements. This data will be provided for your review in the Draft Environmental Impact Statement currently under preparation. We look forward to your review of this document.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPN) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPN has been prepared and submitted to The Office of Environmental Quality Control by that Department.

Mr. Alfred J. Thiede
September 16, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5321. Thank you again.

Robert Nagamatsu
Director
MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: JOSEPH M. MAGALDI, JR., ACTING DIRECTOR

SUBJECT: WEST LOCH ESTATES HOUSING PROJECT

June 15, 1987

Pursuant to your May 22, 1987 request for comments on the West Loch Estates Housing Project, we respond with the following:

1. The requirement for public transit to service the project needs to be discussed. Identification of existing bus service to the area and the anticipated need for future public transit will be of significance. Any consideration for a park-and-ride facility should be addressed.

2. Longer term rapid transit impacts on the project: Although the proposed West Loch Estates Housing Project is beyond the planned terminus at the Waiau Interchange, possible construction of a rapid transit rail system would help mitigate some traffic impacts and serve residents of this project. Frequent feeder bus service can be provided residents in the area to the Waiau Station. From there, riders would be able to commute to downtown Honolulu in about 25 minutes or be in Waikiki in about 35 minutes. If population growth warrants future expansion of the rail system toward Waikiki, service to residents of this development would be improved.

3. Traffic engineering requirements: Due to the magnitude of the project, a traffic study is required. The study should address the following concerns:

a. The amount of traffic that will be generated by the project and its impact on the surrounding streets. A capacity analysis for the critical intersections that will be impacted is required for the A.M. and P.M. peak hours.

b. The traffic impact of the project on the arterial system that will be affected.

c. The need for street improvements, including traffic signalization of critical intersections to accommodate the proposed project.

Should you have further questions, please contact Garrett Goo of my staff at Local 6301.

[Signature]

JOSEPH M. MAGALDI, JR.
MEMORANDUM

TO:      JOHN E. BIRKEN, DIRECTOR  
DEPARTMENT OF TRANSPORTATION SERVICES  
CITY AND COUNTY OF HONOLULU

FROM:    MICHAEL N. MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT  
CITY AND COUNTY OF HONOLULU

ATTN:    JOHN E. BIRKEN, DIRECTOR

SUBJECT: CHAPTER 363, HAWAII REVISED STATUTES
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
PROPOSED WEST LOCH ESTATES SUBDIVISION DEVELOPMENT
PROJECT LOCATED IN EWA, OAHU

This is in response to your letter dated July 6, 1987 memorandum.

Thank you for your comments of June 15, 1987 and your request to be a
consulted party during the preparation of the Environmental Impact Statement.

We would like to have the opportunity to comment and be
consulted during the preparation of this Environmental Impact Statement.

Thank you for allowing us this opportunity to respond.

September 16, 1987

MEMORANDUM

TO:      JOHN E. BIRKEN, DIRECTOR  
DEPARTMENT OF TRANSPORTATION SERVICES  
CITY AND COUNTY OF HONOLULU

FROM:    MICHAEL N. MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT  
CITY AND COUNTY OF HONOLULU

ATTN:    JOHN E. BIRKEN, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

Thank you for your comments of June 15, 1987 and your request to be a
consulted party during the preparation of the Environmental Impact Statement.

As you know, the retained consultants have been requested to develop a
Traffic Impact study that will address the specific traffic concerns you have
voiced in your memorandum. The comments from your office have been
provided to the consultant for their use and we look forward to your staff
review of the Traffic study as it is provided in the Draft Environmental Impact
Statement.

The proposed golf course and beach park have been separated from the
original Environmental Impact Statement Preparation Notice (EISP) that was
submitted on June 29, 1987. It was determined that it would be inappropriate
to combine both projects under a single Notice as the projects are not related
to one another, will be administered by different departments and involve
separate funding.

Please provide all comments relative to the Housing projects to this office and
if you have comments specifically concerning the golf course and park, they
should be directed to the Department of Parks and Recreation. A separate
EISP has been prepared and submitted to the Office of Environmental Quality
Control by the Parks Department.
Mr. John E. Hetten
September 14, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Nural, Project Manager at 327-5321. Thank you again.

[Signature]
John Hetten
Director

SEP 14 1987
MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: MARIA VICTORIA A. BURKE, DIRECTOR
OFFICE OF HUMAN RESOURCES

SUBJECT: WEST LOCK ESTATES HOUSING PROJECT ENVIRONMENTAL ASSESSMENT

The Office of Human Resources has reviewed the following documents in response to your request:
- Chapter 343, HRS;
- 24 CFR, Part 58;
- 24 CFR, Part 570.205,
- 40 CFR, Parts 1500-1509; and
- Environmental Assessment Form.

As a result, we recommend the following:
1. that 44,000 square feet of land be set aside adjacent to the Park-and-Ride facility for a Child Care Center serving 250 children;
2. that an additional thirty (30) rental units be set aside for single parent families with young children;
3. that at least ten (10) of the 150 elderly rental units be designated as group homes; and
4. that an Environmental Impact Statement be prepared for the project.

Thank you for the opportunity to comment.

MARY A. BURKE
DIRECTOR

MEMORANDUM

TO: MIKE MOON, DIRECTOR
HOUSING AND COMMUNITY DEVELOPMENT

FROM: MARIA VICTORIA A. BURKE, DIRECTOR
OFFICE OF HUMAN RESOURCES

SUBJECT: WEST LOCK ESTATES SUBDIVISION DEVELOPMENT PROJECT ENVIRONMENTAL IMPACT STATEMENT

The Office of Human Resources has reviewed all pertinent documents pursuant to Environmental Impact Statements. We recommend the following:
1. that 44,000 square feet of land be set aside adjacent to the planned Park-and-Ride facility for a Child Care Center to serve 250 children;
2. that an additional thirty (30) rental units be set aside for single parent families with young children;
3. that at least ten (10) of the 150 elderly rental units be designated as group homes; and
4. that this office have access to, and consultation with, your E.I.S. consultant during the preparation of the document.

Thank you for the opportunity to comment.
MEMORANDUM

TO: MARIA VICTORIA R. BUNYE, DIRECTOR
OFFICE OF HUMAN RESOURCES

FROM: MICHAEL W. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR: WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

September 14, 1987

Ms. Maria Victoria R. Bunye
September 16, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Murak, Project Manager at 527-5321. Thank you again.

Robert Moon
Director

Thank you for your comments of June 10 and July 22, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. As more detailed information is developed on the project, we will be consulting with your office as to the specific details for the child care facilities and the development of rental facilities for single parent families and group homes.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPUN) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPUN has been prepared and submitted to The Office of Environmental Quality Control by that Department.
MEMORANDUM

TO:     MICHAEL H.H. MOON, DIRECTOR
FROM:   FRANK K. KAHNOKAHANO, FIRE CHIEF
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your comments. If you have any questions, please contact Battalion Chief Kenneth A. Ward at 947-2602.

Thank you for your comments of June 15, 1987 relating to the proposed West Loch development.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.
Chief Frank K. Xahoolohanohano  
September 16, 1987  
Page 2  

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5321. Thank you again.

[Signature]

For Mike Moon  
Director  
SEP 16 87
TO: MIKE MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: DOUGLAS G. GIEB, CHIEF  
HONOLULU POLICE DEPARTMENT

SUBJECT: WEST LOCH ESTATES HOUSING, HONOLULU, OAHU

June 2, 1987

We have reviewed the project description and location map for the proposed project and offer the following comments.

The above proposed project covers approximately 468.05 acres. Approximately two-thirds of this acreage would be utilized to develop residential single family homes and rental units for the elderly. We expect the need for police services to rise with the increase in population.

Our Pearl City District station, which presently serves the Ewa community, is already operating at near maximum capability. With this project, and other proposals that are being submitted for approval in West Oahu, we expect an even greater demand for police services.

Our ability to provide adequate services for the community will depend primarily on the availability of funding for sufficient personnel, equipment and communications. We can maintain adequate police services for the West Loch area as long as these resources keep pace with the growth.

Thank you for the opportunity to provide comment.

DOUGLAS G. GIEB  
Chief of Police

July 10, 1987

TO: MIKE MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

ATTENTION: HOWARD MURAI, PROJECT OFFICER  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: DOUGLAS G. GIEB, CHIEF OF POLICE  
HONOLULU POLICE DEPARTMENT

SUBJECT: CHAPTER 243, HAWAII REVISED STATUTES  
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE  
PROPOSED WEST LOCH ESTATES SUBDIVISION DEVELOPMENT  
PROJECT SITED EWA, OAHU

July 10, 1987

We have reviewed the EIS Preparation Notice for the Proposed Development at West Loch Estates, Ewa, Oahu, and request to be consulted during the preparation of this EIS.

We are concerned that a development of this size will affect the traffic flow in the area, the calls for police service, and the Department's ability to answer these calls. Additional manpower and equipment will also have to be allocated to the area.

We would appreciate being involved in the planning for the development as early as possible.

DOUGLAS G. GIEB  
Chief of Police
MEMORANDUM

TO: DOUGLAS G. GIBB, CHIEF OF POLICE  
HONOLULU POLICE DEPARTMENT

FROM: MICHAEL M. MOON, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE  
FOR: WEST LOCH ESTATES DEVELOPMENT, EWA, OAHU

September 16, 1987

Thank you for your comments of June 2 and July 16, 1987 relating to the proposed West Loch development.

We are in the process of developing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and can appreciate your concerns relating to the project impacts on traffic flow and the need for additional Police service that will be created by this project. We will be providing the detailed planning information in the Draft EIS currently under preparation.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPN) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPN has been prepared and submitted to The Office of Environmental Quality Control by that Department.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Hural, Project Manager at 527-5321. Thank you again.

Sincerely,

[Signature]

Mike Moon  
Director
Mike Moon, Director
Department of Housing and
Community Development
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Thank you for the opportunity to review and comment
on the West Loch Estates Housing Project. The following
comments are offered:

a. Shoreline areas of Pearl Harbor are typically
Salt/mangrove wetland areas. Any fill within these
coastal wetlands for the proposed development should be
coordinated with Operations Branch for permit
requirements.

b. We provided comments previously on this project
in our letter on April 7, 1987. The flood hazard zones
are X, D and A.

Sincerely,

Kiyu Chuang
Chief, Engineering Division

Mr. Howard Mural
Department of Housing and
Community Development
650 South King Street, Fifth Floor
Honolulu, Hawaii 96813

Dear Mr. Mural:

Thank you for the opportunity to review and comment
on the EIS Preparation Notice for the Proposed West Loch
Estates Subdivision Development Project Situated in Ewa,
Oahu. The following comments are offered:

a. We are aware that your department consulted with
our Operations Branch on June 26, 1987, concerning the
Department of the Army permit requirements regarding fill
in wetlands. We understand that EIS studies will include
a botanical survey to delineate wetland areas for U.S.
Army Corps of Engineers' jurisdictional determinations.

b. The parcel under review are shown on the
enveloped tax map for the Honolulu, Oahu area. According
to the Flood Insurance Study for the City and County of
Honolulu (September 1988) and the enclosed Flood Insurance
Rate Map (Panel 119), the parcels are in the following
designated zones:

(1) Zone A. Special flood hazard areas
inundated by the 100-year flood. No base flood elevations
or flood hazard factors determined.

(2) Zone C. Area of minimal flooding.

(3) Zone D. Area of undetermined, but possible
flood hazard.
Please contact our Operations Branch for further consultation during preparation of the EIS for this project.

Sincerely,

[Signature]

Kiaulani Chung
Chief, Engineering Division

Enclosure
Mr. Klaus Cheung
September 16, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Wurzel, Project Manager at 527-3383. Thank you again.

Sincerely Yours,

Robert Nishimoto
Director

Mr. Klaus Cheung
Chief
Engineering Division
Department of the Army
U.S. Army Engineering District, Honolulu
Building 230
Fort Shafter, Hawaii 96850-5440

Dear Mr. Cheung:

Subjects: Environmental Impact Statement Preparation Notice For:
West Loch Estates Development, Ewa, Oahu

Thank you for your comments of June 22 and July 17, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and an Environmental Impact Statement (EIS) for the proposed development. We are cognizant of the need to protect our coastal ecosystem and will comply with applicable federal, state and county regulations as they relate to the coastal environment, historic resources and flood hazards.

The Flood Insurance Study designations will be included in the Draft EIS currently under preparation.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 22, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP was prepared and submitted to the Office of Environmental Quality Control by that Department.
DEPARTMENT OF THE NAVY
COMMANDER
NAVAL RESERVE FLEET}

September 16, 1987

Capt. R.H. Gallen
Captain, O.C. S. Navy
Department of the Navy
Box 319
Pearl Harbor, Hawaii 96856-5020

Dear Capt. Gallen:

Subject: Environmental Impact Statement Preparation Notice For: West Loch Estates Development, Ewa, Oahu

We acknowledge by this advice your request to be a consulted party during the preparation and processing of the Environmental Impact Statement (EIS) for the West Loch Estates Residential Subdivision, Ewa, Oahu.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as they are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Kurial, Project Manager at 527-5321. Thank you again.

Sincerely Yours,

[Signature]

Mr. Mike Moon
Director

Copy to:
OEC

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

Mr. Mike Moon, Director
Department of Housing and Community Development
600 South King Street, 5th Floor
Honolulu, HI 96813

Dear Mr. Moon:

WEST LOCH ESTATES SUBDIVISION, EWA, OAHU

In response to the Office of Environmental Quality Control (OEC) Bulletin (Volume IV, Number 13) of July 8, 1987, we would like to be consulted in the preparation of the Environmental Impact Statement for the West Loch Estates Subdivision.

Sincerely,

[Signature]

R.H. GALLEN
Captain, O.C. S. Navy
Base Civil Engineer

Copy to:
OEC
June 30, 1987

Mr. Michael M. H. Moon, Director
Dept. of Housing and Community Dev.
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Mr. Moon:

SUBJECT: West Loch Estates Housing Project

We have reviewed your letter that requests environmental review comments on the subject project to determine the need for an Environmental Impact Statement. We understand that the proposed 448 acre project will provide for 1350 family units, 150 elderly rental units, 95 acres in parks and a 150 acre golf course.

Our comments on the proposed development follow:

1. In order to determine the need for a full Environmental Impact Statement in accordance with NEPA criteria, you should refer to 24 CFR Part 58.27 cases when Environmental Impact Statements are required.

2. Noise. There are two major sources of noise that may cause adverse impacts on the proposed project: aircraft operations and vehicular traffic.

The 60 and 65 Ldn contours for Barbers Point NAS and Honolulu International Airport should be plotted on a location map to show their relationship to the project.

Vehicular traffic on Fort Weaver Road should also be evaluated to determine if mitigative measures would be required. Both automobile and truck/bus traffic volumes should be considered at the time of project completion and projected to the year 2005.

If you have any questions, please feel free to contact Frank Johnson at 541-1326.

Yours sincerely,

[Signature]

William W. Calhoun
Director
Community Planning and Development Division, 9.2C
July 30, 1987

Mr. Howard Nural
Department of Housing and Community Development
City and County of Honolulu
650 South Street
Honolulu, HI 96813

Dear Mr. Nural:

SUBJECT: Environmental Impact Statement Preparation Notice
Proposed West Loch Estates Subdivision Development

This responds to your request for comments on the subject project that will provide for 1500 housing units, a golf course and a park on approximately 466 acres.

We find that we do not have any additional concerns that should be considered in the Draft EIS than those that were identified in our letter to Mike Noon dated June 30, 1987.

We appreciate the opportunity to review the Preparation Notice and look forward to receiving a copy of the Draft EIS.

Sincerely yours,

Calvin Lew
Director
Community Planning and Development Division

September 16, 1987

Mr. Calvin Lew, Director
Community Planning and Development Division
U.S. Department of Housing and Urban Development
Honolulu Office, Region 1X
305 Ala Moana Boulevard
Room 3310, Box 50077
Honolulu, Hawaii 96850-4991

Dear Mr. Lew:

Subject: Environmental Impact Statement Preparation Notice
For West Loch Estates Development, Ewa, Oahu

Thank you for your comments of July 30, 1987 acknowledging your office's review of our Environmental Impact Statement Preparation Notice (EISP) for the West Loch Estates project. We will keep your agency apprised of the project through the Draft Environmental Impact Statement (DEIS) currently under preparation. We look forward to your review of this document.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to The Office of Environmental Quality Control by that Department.
Mr. Calvin Low  
September 16, 1987  
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Mural, Project Manager at 527-5221. Thank you again.

Sincerely Yours,

Mike Moon  
Director
SEP 16 1987
Mr. Michael Moon, Director
Department of Housing and Community Development
City and County of Honolulu
660 South King Street
Honolulu, Hawaii 96813

Re: West Loch Estates Housing Project, Honolulu, Ewa

Dear Mr. Moon:

We have reviewed the preliminary information on the proposed West Loch Estates Housing project and offer the following comments for your consideration.

The Pearl Harbor National Wildlife Refuge, Honolulu Unit, was established in 1951. The 26.5-acre refuge is on lands owned by the U.S. Navy and is managed for endangered Hawaiian waterbirds by the Service under an interagency cooperative agreement. The Honolulu refuge provides feeding, nesting, and breeding habitat for the endangered Hawaiian Stilt (Himantopus sandvicensis), Hawaiian Coot (Fulica americana), Hawaiian Common Moorhen (Gallinula chloropus sandvicensis), and Hawaiian Paua (Gallinula chloropus). In addition, the refuge provides habitat for migratory shorebirds and waterbirds such as the Greater Yellowlegs (Tringa melanoleuca), Northern Shoveler (Anas clypeata), Lesser Golden Plover (Pluvialis dominica), Wandering Tattler (Heteroscelus incanus), Red Knot (Calidris canutus), and Surfbird (Aphriza virgata).

The Environmental Assessment (EA) should discuss the following points:

a. The Service is concerned that the proposed housing development, particularly the 1,080 units planned for Phase II, may increase local populations of feral and domestic cats, dogs, and mongooses in the project area. Larger populations of these predators may increase predation levels on ground-nesting, endangered waterbirds that use the Pearl Harbor National Wildlife Refuge at Honolulu. This refuge is separated from Phase II by a 13.5-acre park.

At the May 8, 1987 joint agency site visit to the Honolulu refuge, several methods to control domestic and feral pets from entering the refuge were discussed. These alternatives included:

(1) Implementing subdivision covenants that banned the ownership of dogs and cats in the housing development;

(2) Constructing additional fences and walls around the refuge;

(3) Enforcing existing leash laws; and,

(4) Trapping feral animals that wander into the refuge.

From the refuge management aspect, the banning of pets as a subdivision covenant appears the most effective. It was our understanding at the May 8, 1987 site visit that Mr. Jeremy Harris would investigate the legal aspects of a subdivision covenant restricting the ownership of pets. Fences and walls are moderately effective barriers; however, these structures will not keep a determined dog from digging under the fence or swimming across the moat. The effectiveness of leash laws depends on citizen compliance with the law and active enforcement by police. Trapping animals that wander into the refuge generates additional work for the refuge manager since the captured animals are taken to an animal shelter. In addition, the housing development on the refuge may generate community ill-will towards the refuge.

Methods to control feral and domestic pets within the project area should be discussed in the EA.

b. The Phase II residential development, if not properly buffered from the refuge, may reduce the biologic productivity of the refuge by increasing levels of human disturbances, noise, and lighting. Methods to buffer the refuge from the housing development include visual barriers of shrubbery and trees, fencing, and reducing line-of-sight vision between the housing development and refuge. If properly designed, the shoreline park will partially buffer the Phase II development from the refuge.

c. In our April 22, 1987 letter to Mr. Donald Clegg, we recommended that the proposed shoreline park incorporate the fishponds within the site as habitat for endangered waterbirds. This proposal would include buffer areas around the ponds, interpretive displays and viewing areas, and would enhance the educational value of the park for residents and visitors. We continue to offer our assistance in designing appropriate waterbird habitats and interpretive displays for the park.

d. Endangered Hawaiian coots are known to use golf course greens and water traps at the Princeville golf course on Kauai. It is likely that Hawaiian coots and migratory shorebirds may be attracted to the proposed golf course greens and water areas at times.
There have been several cases of accidental pesticide poisoning of waterbirds on golf courses in the continental U.S. The Service is concerned that endangered Hawaiian waterbirds and migratory shorebirds may be accidentally poisoned while feeding or nesting on the proposed golf course and water areas. However, this potential adverse impact may be reduced by controlled and judicious use of pesticides and the selection of pesticides with low acute and chronic toxicities to waterbirds and aquatic organisms. The Service is willing to review the pesticides that may be used on the golf course and provide recommendations on their suitability.

e. The EA should discuss the drainage plan for the housing development. We recommend that runoff be contained on-site by using golf courses, parks, and open areas as sediment basins.

We appreciate this opportunity to comment. Please feel free to contact our office for further information.

Sincerely,

Ernest Kosaka
Project Leader, Environmental Services
Pacific Islands Office

cc: MW
DLNR

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Re: Development Plan Public Facility Amendment for Central Oahu, West Loch Regional Park -- 87/K-1012 (IC), Oahu

Dear Mr. Clegg:

We have reviewed the Development Plan Public Facility Amendment for the proposed park along West Loch and offer the following comments for your consideration.

The proposed shoreline park and West Loch Estates housing development were discussed with representatives from the City and County of Honolulu and the Service on April 7, 1987. At this meeting, we discussed Service concerns regarding potential impacts from the proposed housing development to the Pearl Harbor National Wildlife Refuge, Honolulu Unit. In addition, we discussed mitigation measures (buffers, fencing, moats, trapping, etc.) that would reduce potential adverse impacts to endangered Hawaiian waterbirds that depend on this refuge. Many of the concerns regarding the housing development also apply to the proposed shoreline park.

The proposed shoreline park encompasses several fishponds that provide loafing and feeding habitat for endangered Hawaiian waterbirds. The educational value of the park would be enhanced if these fishponds were managed as endangered waterbird habitat and interpretive displays and viewing areas of these ponds were provided. This would provide residents and park visitors with an easily accessible site to observe and learn about endangered Hawaiian waterbirds. We would be happy to work with the City and County of Honolulu to develop an educational and management program for these fishponds.

We would like to invite interested staff members to a guided tour of this refuge. This visit will give us a first-hand opportunity...
to discuss the concerns regarding the proposed housing development and shoreline park. For further coordination, please contact Andy Yuen (541-2761) of my staff.

We appreciate the opportunity to comment.

Sincerely,

[Signature]

Ernest Kosaka
Project Leader
Office of Environmental Services

cc: RW
DLNR

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ES 6207
AUG 7 1997

Mr. Howard Hohadi
Department of Housing and Community Development
City and County of Honolulu
600 South King Street, Fifth Floor
Honolulu, HI 96813

Re: Environmental Impact Statement Preparation Notice, Proposed West Loch Estates Housing Project, Ewa, Oahu

Dear Mr. Hohadi:

We appreciate the opportunity to work closely with the City and County of Honolulu to eliminate potential adverse impacts from the proposed housing project to the Pearl Harbor National Wildlife Refuge, Waimanalo Unit. We believe early coordination with the affected agencies will substantially reduce potential conflicts and impacts associated with the proposed project.

For a discussion of our concerns, please refer to the April 22, 1987 letter to Mr. Ronald Clegg (enclosure 1) and the June 22, 1987 letter to Mr. Michael Moore (enclosure 2). We would appreciate being consulted during the preparation of the Draft Environmental Impact Statement.

We appreciate the opportunity to comment.

Sincerely,

[Signature]

Ernest Kosaka
Project Leader, Environmental Services
Pacific Islander Office

Enclosures

cc: RW
DLNR

Save Energy and You Serve America!
September 16, 1987

Mr. Ernest Kosaka
Project Leader, Environmental Services
Pacific Islands Office
United States Department of the Interior
Fish and Wildlife Service
300 Ali Moana Boulevard
P.O. Box 50147
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Subject: Environmental Impact Statement Preparation Notice
For: West Loch Estates Development, Ewa, Oahu

Thank you for your comments dated June 22 and August 7, 1987 on the Environmental Impact Statement Preparation Notice (EISP) prepared for the proposed West Loch Estates Residential Subdivision, Ewa, Oahu. We also would like to express our appreciation for your time and effort in our preliminary meetings and early coordination regarding the potential impacts on the Honolulu National Wildlife Refuge from the proposed West Loch Estates project.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. Prior comments relative to the Wildlife Refuge have been provided to the Parks Department. A separate EISP has been prepared and submitted to the Office of Environmental Quality Control by that Department.

Sincerely Yours,

Robert M. Hays
Director

Mr. Ernest Kosaka
September 16, 1987
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comment and suggestions, please direct them to Mr. Howard Horal, Project Manager at 587-3521. Thank you again.
June 18, 1987

Mr. Michael Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Moon:

Subject: Environmental Assessment for West Loch Estates Housing Project

At its regular meeting on June 16, 1987, the Ewa Neighborhood Board No. 23 discussed the above project. The following are the concerns we would like to see addressed in the Environmental Assessment:

1. The feasibility of the City versus private business developing this type of housing in this area.
2. What will be the relative cost of the development if it is done by the City versus private business?
3. The overall financing of the project.
4. What will be the sequencing of the development of the housing and golf courses for this project?
5. The adequacy of the infrastructure to support this project.
6. The adequacy, and plans for meeting the increased need for police and fire protection that this development will bring to the community.
7. The ability of the schools to meet the needs that this development will bring to the community.
8. The traffic impacts that this development will have on Pt. Weaver Road, and if there are plans for any other access to the development.
9. Impacts that this development will have on the Second City development.
10. The adequacy of the water supply for this development.
11. Assurances that the City, if it is the developer of this project, will follow all guidelines and requirements that would be required of a private developer.
12. Providing of adequate parks and other recreational facilities to meet the needs of the community.
13. Ability of the area to be evacuated in the event of a tsunami.

The Board would like to note that as we did not have sufficient time to fully discuss this issue in order to meet your response deadline, we would like to reserve the right to provide additional comments at a future date.

Thank you for giving us the opportunity to provide comments on this subject.

Sincerely,

Eugene Martin
Chairman

cc: Jeremy Harris, Managing Director
Representative Paul Oshiro
Representative Mike Crouser
Wahiawa Neighborhood Board No. 22
Dick Reamer, Ewa Beach Community Association
Neighborhood Commission
September 16, 1987

Mrs. Eugene Martin
Chairman
Ewa Neighborhood Board No. 23
P.O. Box 2392
Ewa Beach, Hawaii 96706

Dear Mrs. Martin:

Subject: Environmental Impact Statement Preparation Notice For:
West Loch Estates Development, Ewa, Oahu

Thank you for your Board's comments dated June 18, 1987 on the proposed
West Loch Estates Residential Subdivision Environmental Impact Statement
Preparation Notice (EISPNI). These comments have been provided to the
consultants responsible for the preparation of the Project Master Plan and
Environmental Impact Statement (EIS). You will be pleased to know that there
are weekly meetings with the consultants as well as the specific City
departments who will be responsible for the proper planning and review of
the Master Plan and Draft Environmental Impact Statement (DEIS).

The thirteen (13) items that your Board has noted as their areas of specific
concern will be included in the DEIS currently under preparation. We are
acknowledging your request to be a consulted party during the preparation
of the EIS and look forward to your comments.

The proposed golf course and beach park have been separated from the original
Environmental Impact Statement Preparation Notice (EISPNI) that was submitted
on June 30, 1987. It was determined that it would be inappropriate to combine
both projects under a single Notice as the projects are not related to one
another, will be administered by different departments and involve separate
funding.

Please provide all comments relative to the housing projects to this office and
if you have comments specifically concerning the golf course and park, they
should be directed to the Department of Parks and Recreation. A separate
EISPNI has been prepared and submitted to The Office of Environmental Quality
Control by that Department.

Sincerely,

Mike Moon
Director

Page 2
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

Ms. Muriel B. Seto
Executive Director
Hawaii's Thousand Friends
941 River Street, Suite 202
Honolulu, Hawaii 96817

September 16, 1987

Dear Ms. Seto:

Subject: Environmental Impact Statement Preparation Notice For: West Loch Estates Development, Ewa, Oahu

Thank you for your comments of July 16, 1987 relating to the proposed West Loch development.

We are in the process of preparing a Master Plan and Environmental Impact Statement (EIS) for the proposed development and appreciate your organization's interest in the project.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISPP) that was submitted on June 16, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISPP has been prepared and submitted to the Office of Environmental Quality Control by that Department.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Howard Moriai, Project Manager at 527-5221. Thank you again.

Sincerely,

Robert O. Nagata
Director
September 16, 1987

Mr. William Balfour
President and General Manager
Oahu Sugar Company
P.O. Box 40
Waipahu, Hawaii 96792

Attention: Mr. William R. Delfent

Dear Mr. Balfour:

Subject: West Loch Estates
Environmental Impact Statement (EIS)

Although you have not submitted any comments in response to the Environmental Impact Statement Preparation Notice on the above subject project that is being proposed for development in Honolulu, Ewa, Oahu, nor asked to be a consulted party, we will be forwarding copies of the Draft EIS to you for review and possible comment. Inasmuch as you have major holdings in the area, we believe the opportunity for review and comment can be mutually beneficial in avoiding conflicts with your operating requirements in the area.

The proposed golf course and beach park have been separated from the original Environmental Impact Statement Preparation Notice (EISP) that was submitted on June 30, 1987. It was determined that it would be inappropriate to combine both projects under a single Notice as the projects are not related to one another, will be administered by different departments and involve separate funding.

Please provide all comments relative to the Housing projects to this office and if you have comments specifically concerning the golf course and park, they should be directed to the Department of Parks and Recreation. A separate EISP has been prepared and submitted to the Office of Environmental Quality Control by that Department.
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

September 16, 1987

Mr. Oswald Stender, Chief Executive Officer
The Estate of James Campbell
228 Fort Street Mall, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Stender:

Subject: West Loch Estates
Environmental Impact Statement (EIS)

Although you have not submitted any comments in response to the
Environmental Impact Statement Preparation Notice on the above subject project
that is being proposed for development in Honolulu, Oahu, nor asked
to be a consulted party, we will be forwarding copies of the Draft EIS to you
for review and possible comment. Inasmuch as you have major holdings in the
area, we believe the opportunity for review and comment can be mutually
beneficial in avoiding conflicts with your operating requirements in the area.

The proposed golf course and beach park have been separated from the
original Environmental Impact Statement Preparation Notice (EISP) that was
submitted on June 30, 1987. It was determined that it would be inappropriate
to combine both projects under a single Notice as the projects are not related
to one another, will be administered by different departments and involve
separate funding.

Please provide all comments relative to the housing projects to this office
and if you have comments specifically concerning the golf course and park,
they should be directed to the Department of Parks and Recreation. A separate
EISP has been prepared and submitted to the Office of Environmental Quality
Control by that Department.

If you should have any questions or desire additional information, please
call Mr. Howard Hurai of this Department at 527-5321.

Thank you very much.

Sincerely,

[Signature]

Mike Moon, Director

[Date: 9/16/87]
### XII. LIST OF ORGANIZATIONS AND AGENCIES CONSULTED DURING DEIS REVIEW

#### 12.1 ORGANIZATIONS AND AGENCIES

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MEMORANDUM

To: Mr. John P. Whalen, Director
Department of Land Utilization
City and County of Honolulu

Subject: Draft Environmental Impact Statement (DEIS) for
West Loch Estates Subdivision
Department of Housing and Community Development (DHCD)
TMK: 9-1-17: various
9-4-20: 76
West Loch, Ewa, Oahu
Acres: 465

The Department of Agriculture has reviewed the Draft EIS and has the following comments to offer.

The DHCD proposes to develop an "affordable residential community" for the "gap group housing market" on the subject property.

In our review of the EIS Preparation Notice for the subject project, we listed several concerns for the applicant to address (DEIS, section 21). The response to our concerns as found in the DEIS show a good faith effort to address each of our concerns. We would like specific information that the soils information contained in the DEIS be mapped to show the Land Study Bureau and Agricultural Lands of Importance to the State of Hawaii (AULSI) classifications within the subject property. We would also like to comment further on the following two points made in the DEIS:

1. "...the West Loch Estates - individually or in combination with other major projects planned and proposed for Ewa and Central Oahu -- will not adversely affect the economic viability of OSHO, nor will it involve layoffs of sugar workers. This assumes the continuation of historic development rates for housing projects - rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage under sugarcane cultivation, especially if high-yield lands are removed from production. Increased sugar yields can generally occur with additional production costs for capital, labor, management, energy, and research. A recent statement from Oahu Sugar Company concerning another project indicates that if the proposed projects on the island of Oahu (e.g., the proposed "high-yield" lands) concludes collectively and out of a desirable sequence, they will adversely affect the economic viability of OSHO. (emphasis added)

2. "...it is extremely doubtful that this [the loss of agricultural use of the subject area] will adversely affect the growth of diversified agriculture in Hawaii. This assessment is based on: (1) an extensive amount of prime agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some - if not most or even all - of the sugar operations will make their lands available for profitable replacement crops to the extent that such crops are available; and, (4) compared to the available supply, a very small amount of land and water is required to grow and maintain crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports." (DEIS, paragraphs 25-21 to 1, and Appendix J, pages 22 and 25.

The third point is highly problematic. While there may be a reduction in sugarcane acreage, the followed lands do not necessarily become available for other agricultural use if landowners wish to pursue other activities that generate higher returns, or to hold their lands off the market. Our records show more than 200 individuals searching for suitable farm land to begin, expand or relocate their diversified farming activities. It would be useful if these "farms" lands could be identified in terms of location, specific availability to farmers for sale or lease, and at what prices and terms.
The Department of Agriculture is compelled by the State Constitution to "...conserve and preserve agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands". On Oahu, it happens that the lands most suitable for agricultural use are situated in the areas (Haiku and Central Oahu) that are under the greatest pressure for housing expansion. We take the perspective that agriculturally suitable land is a resource in its own right, rather than simply an economic commodity that should be used for the highest private return. Agriculturally suitable lands once developed for higher uses will remain unavailable for agricultural use. Thus, while there may be more important agricultural lands in total on Oahu than can be fully utilized over the next decade, we feel it should be the policy of the State and the City and County to allocate the best agricultural lands to agricultural use to the fullest extent possible. Alternative uses (such as the subject project) should be directed to lands of lesser value for agriculture whenever possible. That is why it will be helpful to see maps of the Land Study Bureau and ALISH classifications of the property in the Final EIS.

The Department of Agriculture is well aware and supportive of the need to develop affordable housing for Hawaii's residents. As noted in the DEIS, the State Agriculture Functional Plan contains implementing Action 8(3)(c) which states: "Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustices or inequity will result or overruling public interest exists to provide such lands for other objectives of the Island-State Plan." (emphasis added)

If it is determined that the proposed project falls within the definition of "overriding public interest", that interest (in the location and magnitude of affordable housing development in Haiku and Central Oahu) should be articulated in a coherent regional land use plan.

To summarize, we request that the following be included in the Final EIS:

1. Maps showing the Land Study Bureau and ALISH classifications for the subject property.

2. Specific identification of the "extensive amount of prime agricultural land and water (that) has been freed from sugar and pineapple production" and is "available for profitable replacement crops".

Thank you for the opportunity to comment. We hereby request a copy of the Final EIS as soon as it is available.

Suzanne D. Peterson
Chairperson, Board of Agriculture

Cc: Mr. Mike Noon, DECD
Mr. William Balfour, OSCo
GSP
OSQC
DOP
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

December 11, 1987

Ms. Suzanne D. Peterson, Chairperson
Department of Agriculture
P.O. Box 2159
Honolulu, Hawaii 96822-0159

Dear Ms. Peterson:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Ewa, Oahu

Dear Ms. Peterson:

Thank you for the comments contained in your letter of November 23, 1987 on the Draft Environmental Impact Statement (DEIS) prepared for the West Loch Estates Subdivision. The staff and consultants have reviewed your comments and respond as follows:

1. The specific request to provide the appropriate soils data contained in the Land Study Bureau and Agricultural Landuse of Importance to the State of Hawaii (ALIS) map will be complied with in the final EIS.

2. The Department of Agriculture's (DDA) concern as to whether the Oahu Sugar Company (OSCo) could continue to function as a viable sugar operation in view of the reduction in acreage, was reviewed by Decision Analysts Hawaii, Inc. who provided this response: "The following statements of OSCo were drafted after discussions with OSCo and were reviewed by them. After release of the DEIS, OSCo expressed concerns about West Loch Estates - they had not over two proposed projects other than West Loch Estates - it is known that at least one of these other projects is being coordinated with OSCo so as to result in a design and development sequence which would result in the least disruption to OSCo's operations, thereby assuring that it does not adversely affect the long-term economic viability of OSCo. Furthermore, it is very doubtful that all of the planned and proposed projects will in fact be approved and developed within a time period that would affect OSCo."

3. Decision Analysts Hawaii, Inc. also examined the comment that followed

"Ms. Suzanne D. Peterson
December 11, 1987
Page 2

lands are not necessarily being made available to individuals searching for suitable farm land to begin, expand, or relocate activities in diversifying agriculture. They responded: "Two compelling arguments support the position that ... (this) point is not problematic; first, common sense argues that landowners would convert their lands to a more profitable use; and second, as was testified on the Ululake project before the State Land Use Commission, one of the components of the OSGo's "Survival Plan" is to find profitable replacement crops before OSCo is forced by outside economic factors to cease operations."

With regard to the point about making land available to small farmers, the full text of the Decision Analysts Hawaii, Inc. (Appendix 1) contained in the DEIS discusses this matter and explains why land are not always available to small farmers (pages 16 and 17) which, in summary form, notes that due largely to regulatory requirements, such activities cannot be profitably undertaken. With regard to identifying the "farm" lands, we agree that it would be useful to the DDA to have these "farm" lands identified and the terms of obtaining use, and believe that this would be of great statewide benefit. However, this is a large project which is more appropriately within the purview of the State as an ongoing effort. Most of the "farm" lands would include aquaculture and not be limited to those released by the closing of four sugar operations since 1970 (Kilauea on Kauai, Kahuku on Oahu, and Puna on Hawaii), and pineapple operations on Molokai and Kauai.

4. The conflicting policies of agricultural land preservation versus the need for affordable housing are recognized. Decision Analysts Hawaii, Inc. notes that the State and City & County embrace conflicting policies on agriculture vs. housing as prime agricultural lands provide affordable housing (which, on Oahu, requires development of agriculture to meet the agricultural land requirements); and a City & County Policy of developing a secondary urban center in Ewa, most of which is planned in sugar. The issue of urban center in Ewa, most of which is planned in sugar, is one of the most important issues. It is argued in the DEIS that the proposed West Loch Estates is in the best interest of the DDA that the proposed West Loch Estates is in the best interest of the DDA, and the proposed West Loch Estates is in the best interest of the DDA, and the proposed West Loch Estates is in the best interest of the DDA, and the proposed West Loch Estates is in the best interest of the DDA, and the proposed West Loch Estates is in the best interest of the DDA.

5. Finally, Decision Analysts Hawaii, Inc. examined the comment from DDA regarding the need to articulate a coherent land use plan whether this project (or any other similar project) falls within the definition of "overriding public interest," and responded:

"The General Plan for the City & County of Honolulu and the Ewa Development Plan, which are updated periodically, already exist and..."
provide a coherent regional land use plan which calls for directing
growth to Ewa. These plans indicate an overriding public interest to
urbanize some agricultural lands in order to provide housing.*

Thank you for your comments and continuing interest.

Robert G. Raymo
Director
Mr. John P. Whalen, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Re: Draft Environmental Impact Statement (DEIS) for West Loch Estates

We have reviewed the subject DEIS and offer the following comments:

We support the provision of affordable housing opportunities available to gap group and elderly households. However, in light of the 34,506 low and moderate income households on Oahu who pay an excessive amount for rent (Housing Assistance Plan), we believe the project should also include a cluster of housing units affordable to this target group. This action would assist in achieving an overall objective of dispersing lower income housing units, in relatively compact and manageable pockets, to all communities. Thank you for the opportunity to comment.

Sincerely,

[Signature]

RUSSELL N. FUJIMOTO
Acting Executive Director

cc: Mr. Mike Noon, Director

December 11, 1987

Mr. Russell N. Fujimoto
Acting Executive Director
Department of Business and Economic Development
Housing Finance and Development Corporation
P.O. Box 17707
Honolulu, Hawaii 96817

Dear Mr. Fujimoto:

Subject: Draft Environmental Impact Statement (DEIS) for West Loch Estates, Ewa, Oahu, Hawaii

This is to acknowledge receipt of your letter dated November 6, 1987, commenting on the subject DEIS.

In response to your suggestion that affordable rental units be included in the West Loch Estates Project, please be advised that the 150 unit elderly housing project is designed to provide such low cost rentals. The development of the elderly housing project is strongly supported by the Wai' Alae community.

Thank you for your comments.

[Signature]

for Mike Noon
Director
The Honorable John P. Whalen  
Department of Business and Economic Development  
Oahu  
November 17, 1987

The Honorable John P. Whalen  
Director  
Department of Land Utilization  
Hawaii State Capitol  
November 17, 1987

Dear Mr. Whalen:

Subject: Draft Environmental Impact Statement for the West Loch Estates Housing Project by the Department of Housing and Community Development, City and County of Honolulu

We have reviewed the subject DEIS and have the following comments.

1. The Mauk Island Land Management (MILM) law calls for controlling development in areas subject to flood hazard. There is a need for consistent development, even during the development of the Federal Flood Insurance Program. We note in our comments on the EIS that portions of the project site are within a flood hazard area and that mitigation measures should be adopted. This information was not included in the DEIS. Furthermore, we note that the Federal Flood Insurance Rate Map (FIRM) data presented on Page 4-2 is not entirely accurate on the basis of the latest slash dated 1-1-1987. Portions of the project site appear to be in zone A and zone X-shaded, not zone A and zone X-unshaded as reported in the DEIS. This is also inappropriate and included under the soils section.

2. The applicant has inaccurately stated that the MILM permits will be applicable on the basis of flood hazard considerations. This project will also be subject to MILM consistency certification if any Federal funds, such as CDBG or RBD housing program funds, are involved or if any Federal permits are required. Although an audit general consistency to HED’s Honolulu Office for its CDBG and housing program in Hawaii, this project does not qualify because it meets several of the exception criteria.

3. The final EIS should indicate the source of the potable water necessary for the project. We note that the projected water demand for the development is 10,000 gallons per day and will be withdrawn from the Koolau Reservoir. This well source is located within the Koolau Reservoir of the MNRMA, which has only 20,000 gpd available for further allocation as indicated on page 17.

4. The final EIS should address the special transportation needs of elderly individuals to be served by the community. If the park and ride facility is included, a transportation program should also be considered to facilitate ride-sharing or other transportation alternatives.

5. The final EIS should also address projected regional impacts on the I-1 and Farrington Highway traffic corridors.

6. The final EIS should provide a more detailed site plan which indicates the location of structures relative to the flood plains and public access to West Loch.

7. Project phasing should be discussed relative to the timing of other tax projects.

8. If the golf course site is comprised of lands related to "A" or "B" by the Land Use System of land classification, consideration should be given to inclusion of the golf course area within the proposed urban district. Golf courses within the State Agriculture district are permitted use only if the proposed site does not contain lands rated "A" or "B."

Thank you for the opportunity to review this DEIS and provide our comments. Please feel free to contact our GDM office at 548-1973 if there are any questions.

Sincerely,

[Signature]

Roger A. Ultsch

cc: Mr. Mike Moon, Director  
Department of Housing and Community Development  
City and County of Honolulu
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

December 11, 1987

Mr. Murray E. Towill
Deputy Director
Department of Business and Economic Development
P.O. Box 2399
Honolulu, Hawaii 96813

Dear Mr. Towill:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Ewa, Oahu

Thank you for your comments contained in your letter of November 17, 1987 regarding the Draft Environmental Impact Statement (DEIS) for the West Loch Estates project. The staff and consultants have reviewed your comments and we respond as follows:

1. The listed flood hazard designations for the project site as specified on pp. IV-2 have been updated to conform with the recently issued Federal Flood Insurance Rate Map. Page IV-2 will now show the newly designated Zones.

   Page V-2: Paragraph 2 (referring to the soil types located in the flood plain to be used for the golf course) will be deleted in entirety. This matter will be fully discussed in the EIS for the golf course and shoreline park now being separately prepared.

2. We regret having omitted reference to the applicability of C2NF consistency certification for the planned use of HUD/ FHA housing programs in our letter of September 16, 1987, and will make the necessary corrections to the Final EIS.

3. Potable water requirements for the West Loch Estates will not be met by the Waipio Heights III Well. The reference on page IV-1 to an unallocated 90,000 gpd in the Koolau sub-area is that remaining after allocation of the 850,000 gpd required for this project.

4. Including a transportation coordinator as a part of developing the Park and Ride facility is under consideration and consultation with the City Department of Transportation Services is on-going.

5. At completion, the West Loch Estates project will not itself have a significant impact on Farrington Highway and the H-1 Freeway. The long-term cumulative impact of the project on these regional transportation facilities cannot, however, be realistically assessed since adequate information regarding the schedule for development of other planned and proposed projects in the Leeward and Ewa areas is not available.

6. A detailed site plan is not available at this early stage of the planning process. Applicable restrictions on the construction of structures in the flood plain will be fully observed. Public access to the shoreline will be provided both through the residential subdivision and through hiking and bike paths extending beyond the project area.

7. The phasing of the project in relation to other developments in Ewa is difficult to discuss at this time, particularly in view of recent public announcements which seem to question the policy of directing growth to this area of Oahu. We have established a development schedule for the project that is described on pages III-6 and 7 and are confident that it can be achieved.

8. The area planned for development as a golf course is comprised of isolated pockets of prime agricultural land which will be processed under Special Use Permit procedures and the authority of the counties to amend the district boundary in other than conservation districts, when the land area involved is less than 15 acres.

Thank you for your comments and continuing interest.

[Signature]
Ralph H. Manwaring
Director
October 25, 1989

Engineering Office

To: John S. Koles, Director
Department of Land Utilization
1185 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Koles:

I'm enclosing our proposal for the above project. Thank you for the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

[Signature]

Jerry K. Matsuda
Deputy, Hawaii Air National Guard
CFO & Engr Officer

cc: We Kauai, Director, Dept. of Housing & Community Development

NO RESPONSE NEEDED
Mr. Mike Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

SUBJECT: West Loch Estates Housing Project

Our review of your proposed housing project indicates that it may generate the following additional enrollment in our area schools:

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>GRADES</th>
<th>APPROXIMATE ENROLLMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva Elementary</td>
<td>6-8</td>
<td>240 - 480</td>
</tr>
<tr>
<td>Ilima Intermediate</td>
<td>7-8</td>
<td>90 - 170</td>
</tr>
<tr>
<td>Campbell High</td>
<td>9-12</td>
<td>160 - 240</td>
</tr>
</tbody>
</table>

Schools at all levels in this service area are operating at capacity. Budgeting for additional classrooms will be necessary to accommodate the anticipated enrollment growth at Ilima Intermediate and Campbell High School.

A site for a new elementary school should be identified within the project. Additional classrooms at Eva Elementary or housing to nearby elementary schools will be necessary during the initial phase of the project.

Please keep us informed of any changes to your development plans so that we may be able to adjust to changing needs.

Sincerely,

Charles T. Tooguchi
Superintendent

CC: E. Imai, OHS
M. Moon, Dept. of Housing & Comm. Devel.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER
December 11, 1987

Mr. Charles T. Toguchi
Superintendent
Department of Education
P.O. Box 2368
Honolulu, Hawaii 96804

Dear Mr. Toguchi:

Subject: Draft Environmental Impact Statement (DEIS) for West Loch Estates, Ewa, Oahu, Hawaii

This is in response to your letter dated October 21, 1987 commenting on the subject DEIS.

The issues you have raised regarding the need for additional facilities are addressed in Sections 3.1.1 and 4.2.8. Schools of the DEIS which specifically recognized the need to establish an elementary school in the area. We will keep your facilities planning personnel advised as the project progresses through the land use approval process.

Thank you for your comments and continuing interest.

[Signature]
Mike Moon
Director
MEMORANDUM

To: Mr. John P. Whalen, Director
   Department of Land Utilization, City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Draft Environmental Impact Statement for West Loch Estates, Ewa, Oahu

November 19, 1987
Page 2

Thank you for allowing us to review and comment on the subject DEIS. We provide the following comments:

Air Pollution

The study for the DEIS indicated that the state standards for carbon monoxide may be exceeded at the intersections of Fort Weaver Road with Project Access Road "A," Project Access Road "B," and Hinton Road. The DEIS should present those mitigating measures which shall be implemented to prevent the exceedances from occurring.

Noise

1. Concerns toward this proposed development were addressed in previous comments to the environmental assessment (June 12, 1987) and EIS Preparation Notice (July 14, 1987).

2. The applicant has included a detailed study of vehicular traffic noise impact along with proposed mitigative measures.

3. Potential impacts from aircraft noise were addressed; study showing that the proposed development is situated outside Ldn 50 noise contour. However, it should be noted that when the calculated Ldn value is influenced by a series of isolated events such as aircraft flyover noise, this source of noise intrusion tend to be more pronounced to the impacted community.

4. The applicant has indicated that the average Ldn values of cane haul trucks during the harvesting season are in the "Moderate Exposure Acceptable" category. However, it should be noted that noise from individual or series of trucks may impact residents while travelling along the cane haul route, particularly during nighttime hours. Since complaints regarding such activities have been received by the Department of Health, mitigative measures must be incorporated to minimize such disturbances.

5. The following concerns and regulatory requirements addressed on earlier comments were not included in the DEIS:
   a. Noise from activities associated with recreational areas, particularly from the proposed golf course.
   b. Noise associated with the construction plans of the proposed project.

6. There are additional concerns that should be addressed in the final EIS. Mitigative measures to minimize potential noise impacts from these identified concerns must be included.
   a. Noise from activities associated with industrial-type facilities located within the Waipahu Industrial Park area, north of the proposed development.
   b. Noise from activities associated with the proposed commercial center within the development, including stationary equipment (air conditioning/ventilation units, exhaust units, refrigeration compressors) and vehicles utilized for deliveries and services.
   c. Noise from agricultural field operations in areas surrounding the proposed development.
   d. Noise associated with school activities, particularly recreational type.
   e. Vehicular noise associated with the park and ride facility.

BRUCE S. ANDERSON, PH.D.

Mr. Mike Moon

NOV 23 1987
Dr. Bruce S. Anderson  
December 11, 1987  
Page 2

b. The noise impacts of activities associated with the adjoining recreational areas are not considered a serious enough problem to require mitigation since the Community Noise Regulations require reduction in noise levels after 10:00 p.m. By this time of the evening, play on the golf course will have stopped.

c. Control of construction related noise will be the responsibility of the general contractor engaged to work on the site. Compliance with the applicable noise code regulations will be a specific requirement of the construction contract awarded for the project. If it is necessary to exceed the noise levels permitted during normal construction periods, a permit from the Department of Health must be obtained by the contractor.

d. Similarly, the noise levels from the various other types of activities commonly associated with or adjacent to residential areas are all subject to Department of Health regulations. The responsibility for compliance rests with the operator or owner of the noise source. At the same time, however, the importance of careful design planning to isolate higher noise activity areas such as the commercial center and the Park and Ride facility, are recognized.

Thank you for your continuing interest and comments.

Robert Margareto  
for Mike Hahn  
Director
Honorable John P. Whalen

Historic Sites Concerns

The archaeological reconnaissance completed on the increments I and II (residential) areas covers 2.2 acres, approximately 1/5 of the acreage involved in the entire project. The reconnaissance survey report by PBRI is attached to the Draft EIS as Appendix E.

We agree with the significance assessments for the four historic sites that were located in the survey. Only one (T-1), an early 20th century cemetery, is significant.

Two concerns exist for mitigation of historic sites. One, the cemetery needs to be appropriately mitigated. As the preferred option, the cemetery should be preserved in place. The second option is disinterment, scientific recouping and analysis, and appropriate burial in accordance with State Health Department regulations.

The second mitigation concern is for archaeological monitoring in selected areas to cover the slight possibility that unknown significant historic remains might be uncovered. The applicant's consulting archaeologist recommended selective archaeological monitoring of initial grubbing activity and/ or vegetation clearing. However, a definition of "selective" was not included, nor were areas specified or a rationale for monitoring offered. The Draft EIS does not include the background information on land use in this area that PBRI obtained from historic maps of the area. Our office and County officials were briefed on these findings several months ago. The maps, dating back to 1825, indicate that native Hawaiian historic era housing along the coastal portion of project area was fairly dense. We suspect that in pre-Western contact times this was also true of the area. Because of this history of occupation, even given the fact that much of the area has been in sugar cane production, we would strongly recommend that initially, continuous archaeological monitoring be carried out in these areas, as we are not convinced that the possibility of subsurface remains is remote.

Thank you for your consideration of our concerns.

Very truly yours,

[Signature]

Chairperson
Board of Land and Natural Resources

cc: Honorable Mike Moon, Director, CAC DLNR
December 11, 1987

Mr. William W. Paty, Chairperson
Department of Land and Natural Resources
P.O. Box 441
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Kwa, Oahu

We are in receipt of the comments contained in your letter of November 30, 1987 on the Draft Environmental Impact Statement (DEIS) prepared for the West Loch Estates residential subdivision. The comments were received on December 2, 1987, after the 45-day deadline of November 23, 1987. However, the concerns expressed in your letter are similar to those of the U.S. Fish & Wildlife Service, State Department of Business and Economic Development, and City & County Department of Land Utilization. We believe our responses to these agencies address your concerns.

Thank you for your comments and continuing interest.

Robert Magnerato
Mike Noon
Director
November 24, 1987

Mr. Mike Moon, Director
Dept. of Housing & Community Development
City & County of Honolulu
650 S. King St.
Honolulu, Hawaii 96813

Dear Mr. Moon:

Re: West Loch Estates, Ewa Gahu
Draft EIS Comments

The traffic problems we were concerned about appear to be solved with the construction of access roads to this community. Also, the cul-de-sacs within the housing area will minimize speeding and ensure the safety of the children.

As for our other concern, the Board of Water Supply feels that the wells servicing the Pearl Harbor area will be adequate to meet the project demand of 0.8 MGD and it may not be necessary to tap Waipio Heights Well III, which is located almost five miles away.

Thank you for this opportunity to comment and for giving our concerns serious consideration.

Sincerely,

Marvin T. Iiura, Ph.D.
Interim Director

George S. Broshy
Planner

December 11, 1987

Dr. Marvin T. Iiura
Interim Director
Office of Environmental Quality Control
455 South King Street, Room 101
Honolulu, Hawaii 96813

Dear Dr. Iiura:

Subject: Draft Environmental Impact Statement (EIS) for the West Loch Estates Subdivision, Ewa, Oahu

Thank you for the comments contained in your letter of November 24, 1987 on the Draft Environmental Impact Statement (EIS) on the proposed West Loch Estates. We have reviewed your comments and respond as follows:

1. Your comments that traffic concerns have been satisfactorily addressed, are appreciated.

2. The Waipio Heights III Well has an allocation of 0.8 MGD that will increase the capacity of the Board of Water Supply system to permit servicing of the West Loch Estates project. When viewed as a water supply "system," the specific location of the new well source is not a significant issue.

The project will simply "tap" into the existing system at an adjacent section of Waipahu and thereby utilize the additional capacity provided by the Waipio Heights III Well.

Thank you for your comments.

Robert Maggiulli
Director
University of Hawaii at Manoa
Environmental Center
Crawford 217, 250 Campus Road
Honolulu, Hawaii 96822
Telephone 808-956-3081

November 24, 1987

Mr. John P. Whalen, Director
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Draft Environmental Impact Statement
West Loch Estates
Ewa, Oahu

The above mentioned document proposes the construction of 1,000 residential units on 255 acres. Along with the residential development, there will be various recreational amenities, a commercial center, a daycare facility and a park and ride facility. This development is sponsored by the Department of Housing and Community Development which will market 20 percent of the homes to low income buyers and 40 percent will be sold at a fair market price. This review was prepared with the assistance of Jon Hsu and Steven Arzann, Environmental Center.

The Draft Environmental Impact Statement (EIS) is inadequate in its discussion of the displacement and relocation of present residents. Many of the potentially affected residents of Koahe Point live a subsistence lifestyle which is not possible in a residential urbanized community. Rent subsidies will allow them a place to live, however, their source of subsistence will be limited. The displacement policy discussed in the Draft EIS does not mention any assistance which will be offered, other than rent subsidies. The final document should discuss this topic thoroughly.

Various studies have indicated that the Ewa area has one of the highest levels of solar radiation on Oahu. This makes the area a prime location for the installation of solar water heaters. The installation of solar water heaters during the construction phase should result in substantial long-term savings to the property owner and significant fuel savings to the utility company. Further, considering that the unit could be mass produced, it is quite possible that the homeowner's return on investment will be shortened hence the savings increased. We suggest that the long-term cost and benefits of the installation of solar water heaters, during the construction phase, be studied.

Mr. John P. Whalen, Director
November 23, 1987

Thank you for the opportunity to comment on this Draft EIS. We hope our comments will help in the preparation of the final document.

Yours truly,

Jacqueline N. Miller
Associate Environmental Coordinator

cc:
M. Moore, DHCO
L. Stephen Lau
Jon Hsu
Steven Arzann
December 11, 1987

Ms. Jacqueline H. Miller
Associate Environmental Coordinator
University of Hawaii at Manoa
Environmental Center
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Ms. Miller:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Ewa, Oahu

Thank you for the comments contained in your letter of November 23, 1987 on the Draft Environmental Impact Statement (DEIS) on the West Loch Estates project. Your comments have been reviewed by our staff and consultants and we respond as follows:

1. The legal requirements and policies relating to displacement and relocation of households caused by governmental action are discussed in Section 2.9.5 (pp. V-16 and V-17). A description of the type and nature of the assistance that will be made available is provided in the same section.

   The possibility of providing additional assistance such as replacement housing is a matter that is still being discussed with the residents of the Ho'omaluhia Point at this time.

2. The use of solar powered energy conservation devices is desirable; however, in view of the fact that such devices do result in additional costs, it is believed that the prospective home purchaser should have the option to decide if it can be accommodated within the household budget.

Thank you very much.

[Signature]

Robert Whaley
Director
MEMORANDUM

TO: KAZU HAYASHIDA, MANAGER & CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: MICHAEL M. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: DRAFT EIS FOR WEST LOCH ESTATES TAP: 9-1-17

This is in response to your memorandum dated October 28, 1987 commenting on the subject DEIS.

1. The Water Master Plan will be provided to your office for review and approval as the planning process continues. The engineering consultants will work with your agency to ensure compliance with prevailing requirements and design standards.

2. Section 5.10.1, Potable Water on pg. V-18 has been modified at the end of the subject paragraph to clarify that an allocation of non-potable water for irrigation purposes is being sought from the State Department of Land and Natural Resources: "An approved allocation for the use of non-potable water is required from the State Department of Land and Natural Resources and an application will be submitted to that agency."

3. The requested map from GeoLabs-Hawaii identifying the locations of the various borings conducted for their preliminary soil study will be provided to your agency. Inasmuch as the map is very large, a copy will be made available for inspection by the general public at this Department during regular business hours, upon request.

Salt tolerant vegetation will be utilized for landscaping purposes where appropriate to deal with potential problems of tidal interaction with...
Mr. Ken Hayashi
December 11, 1987
Page 2

groundwater levels and capillary action which can result in salt intrusion.
The golf course architects and landscaping consultants are aware of this
as a potential problem and are taking steps to ensure proper mitigation.

Thank you for your comments.

Robert Aliprandi
Acting Director

Enclosure
MEMO TO:  MR. JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION  

FROM:    HERBERT K. MURAKA  
DIRECTOR AND BUILDING SUPERINTENDENT  

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR  
WEST LOCH ESTATES  

We have reviewed the subject draft EIS and have no comments.  
Thank you for the opportunity to review the document.  

/Herbert Murakata  
HERBERT K. MURAKA  
Director and Building Superintendent  

CC: J. Harada  
Dept. of Housing &  
Comm. Development  

NO RESPONSE NEEDED
MEMORANDUM

TO: JOHN P. WHALEN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

SUBJECT: CHAPTER 143, HAWAI'I REVISED STATUTES
DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED
WEST LOCH ESTATES PROJECT SITUATED IN EWA, OAHU

We have reviewed the subject Draft Environmental Impact Statement (DEIS) and have found that the concerns we presented on the EIS Preparation Notice have been addressed.

Thank you for giving us an opportunity to comment on this matter.

Donald A. Clegg
Chief Planning Officer

cc: Department of Housing and Community Development
R.M. Towill Corporation

December 11, 1987

MEMORANDUM

TO: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: MICHAEL H.H. MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

SUBJECT: CHAPTER 143, HAWAI'I REVISED STATUTES DRAFT
ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED
WEST LOCH ESTATES PROJECT SITUATED IN EWA, OAHU

This is to acknowledge receipt of your memorandum dated November 12, 1987 regarding the subject Draft Environmental Impact Statement (DEIS). Thank you for your timely response.

Robert Nogasato
Director
MEMO TO MICHAEL MOON, DIRECTOR

Page 2

The final EIS should also incorporate point-by-point responses to all concerns raised by various agencies and groups during the EIS review process. This will expedite acceptance of the final EIS.

I hope these comments will be helpful to you in preparation of the final EIS. If you have any questions, please feel free to contact Art Challacombe at extension 4648.

[Signature]
JOHN P. WALEN
Director of Land Utilization
MEMORANDUM

TO: JOHN P. WHALEN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: MICHAEL H. KIM, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR WEST LOCH ESTATES SUBDIVISION DEVELOPMENT, EWA, OAHU

December 11, 1987

This is in response to your memorandum dated November 3, 1987 commenting on the subject DEIS. Your comments were reviewed by our staff and consultants who prepared the following responses:

1. Subsection 4.1.4: Midden: A review of the final report prepared by our wildlife consultant, Mr. Andrew J. Berger indicates that noise and light as negative impacts on the birds that reside in the National Wildlife Refuge are not significant. Berger cites his own findings as well as those of U.S. Environmental Protection Agency (1971, 1980); E. Krider (in Dorn, 1980) and Ronald L. Helzer, State Fish & Wildlife (1976) who found that birds are tolerant of noise, human activity, traffic, aircraft, boats, and construction noise.

The possibility of prohibiting pet ownership (dogs and cats) within the West Loch Estates Subdivision, as was discussed with Managing Director Jeremy Harris, during a meeting with U.S. Fish and Wildlife Service on May 9, 1987, has been fully researched and found to be unfeasible. Enforcement is likely to be both difficult and expensive for the homeowners' association who would have to seek remedy through litigation. Such restrictions are also likely to be viewed as being unreasonable by homeowners having pets and/or those wishing to acquire a dog for security purposes. This group could very well initiate their own litigation against the homeowner's association and prevail.

A variety of alternatives have also been examined and discarded on the basis of infeasibility. For example, installation of fencing or construction...
MEMORANDUM

TO: HIROMA K. KANAKA, DIRECTOR  
DEPARTMENT OF PARKS AND RECREATION

FROM: MICHAEL K. HINO, DIRECTOR  
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE WEST LOCH ESTATES SUBDIVISION, OAHU

The comments contained in your memorandum dated October 25, 1987 to the Department of Land Utilization have been received and are acknowledged. We appreciate your timely response.

Robert M. May

cc: Mike Hino, Dept. of Housing & Community Development
MEMORANDUM

TO:  JOHN F. WULLEN, DIRECTOR
      DEPARTMENT OF LAND UTILIZATION

FROM:  ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT:  DRAFT EIS FOR WEST LOCH ESTATES, EWA, OAHU, HAWAII

THEME:  7-1-1715, 4-11, 16, 40, 50-122(12)-11

The subject Draft EIS was reviewed and we have the following comments:

1. The drainage master plan should be submitted to the Drainage Section, Division of Engineering, for review and approval.

2. The status of the proposed wastewater pump station that will be constructed at or near Increment II should be clarified. The Division of Wastewater Management will operate and maintain the station only if it is built according to City and County standards.


E. ALFRED J. THIEDE
Director and Chief Engineer

cc: OHUCD

MEMORANDUM

TO:  ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER
      DEPARTMENT OF PUBLIC WORKS

FROM:  MICHAEL H.H. HOON, DIRECTOR
      DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

SUBJECT:  DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR WEST LOCH ESTATES, EWA, OAHU, HAWAII

This is in response to your memorandum dated October 19, 1987 commenting on the subject DEIS.

1. The Drainage Master Plan will be submitted to the Drainage Section, Division of Engineering, for review and approval as the project planning process continues. The engineering consultants will work with your department to ensure compliance with prevailing requirements and design standards.

2. Section 5.10.2, Sanitary Sewer System on pp. V-18 and V-19 has been clarified to reflect plans for utilization of a sewage pump station that complies with City requirements. The additional language to be included in the Final EIS will explicitly state that "All proposed improvements will be designed, built, and/or installed to meet City standards for capacity, operating efficiency, maintenance and economy."

Thank you for your calling these to our attention.

Rafael Magana
Director
TO:      JOHN P. JAYLO, DIRECTOR
         DEPARTMENT OF LAND UTILIZATION

FROM:    FRANK K. KAMIBAHANAI, FIRE CHIEF

SUBJECT: WEST LUCU ESTATES
         ENVIRONMENTAL IMPACT STATEMENT (EIS)

We have reviewed the West Loch Estates EIS and have no additional comments at
this time.

Should you have any questions, please contact Battalion Chief Kenneth Ito at
943-8298.

We are returning the EIS to the Office of Environmental Quality Control.

FRANK K. KAMIBAHANAI
Fire Chief

FREED/KB

cc:  Mike Ito, Director
     Dept. of Housing & Community Development

NO RESPONSE NEEDED
TO:  JOHN P. MOALE, DIRECTOR
      DEPARTMENT OF LAND UTILIZATION

FROM:  DOUGLAS G. CIBB, CHIEF OF POLICE
        HONOLULU POLICE DEPARTMENT

SUBJECT:  ENVIRONMENTAL IMPACT STATEMENT FOR WEST LOCH ESTATES,
           WEST LOCH, EWA, OAHU

We have reviewed the environmental impact statement for the West Loch Estates and have no additional comments to make regarding the housing development. Our concerns were stated in previous responses of June 2 and July 10, 1987, copies of which are contained in Section X of this EIS.

Thank you for the opportunity to be involved in the planning of this development.

DOUGLAS G. CIBB
Chief of Police

By Warren Fernima
Deputy Chief of Police

cc: Housing and Community Development

December 31, 1987

MEMORANDUM

TO:  DOUGLAS G. CIBB, CHIEF OF POLICE
     HONOLULU POLICE DEPARTMENT

FROM:  MICHAEL H. MOON, DIRECTOR
        DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

SUBJECT:  DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR
           THE WEST LOCH ESTATES SUBDIVISION, OAHU

The comments contained in your memorandum dated October 16, 1987 to the Department of Land Utilization have been received and are acknowledged. We appreciate your timely response.

Robert Mogram
Director
Mr. John P. Whalen, Director
Department of Land Utilization
655 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Thank you for the opportunity to review the Draft Environmental Impact Statement (DEIS) for West Loch Estates. The following comments are offered:

a. Based on review of the DEIS and meetings between Operations Branch and the City and County of Honolulu, the proposed housing development does not involve work in waters of the U.S. or adjacent wetlands, and no Department of the Army (DA) permit is needed.

b. The proposed shoreline park and golf course involve work in wetlands and/or shorewaters and may require a DA permit. This proposal is being handled as a separate project (Department of Housing and Community Development announcement letter dated September 16, 1987; Corps' response dated October 7, 1987). Operations Branch is continuing to meet with the City and County of Honolulu to establish jurisdiction.

c. Prior comments regarding flood hazard zones for this project (letter dated June 12, 1987), are no longer valid. The flood hazard zones have changed (flood insurance Rate Map dated September 4, 1987; copy of relevant portion enclosed). The project parcels are in the following zones:

1) Zone D. Represents unstudied areas under the Federal Flood Insurance Program and is an area of undetermined but possible flood hazards.

2) Zone AE. Special flood hazard area inundated by the 100-year flood, with base elevations ranging from 1 foot to 11 feet.

3) Zone X (shaded portion). Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot. Because each county administers its own flood hazard prevention ordinances, applicant is advised to coordinate with the appropriate county office regarding this particular area.

4) Zone X (unshaded portion). Areas outside of the 500-year flood plain.

Sincerely,

Kinuk Shimizu
Chief, Engineering Division

Enclosure
December 11, 1987

Mr. Klaau Chueng
Chief, Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 218
Ft. Shafter, Hawaii 96856-5440

Dear Mr. Chueng:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Ewa, Oahu

Thank you for the comments contained in your letter of November 17, 1987 on the Draft Environmental Impact Statement (DEIS) on the proposed West Loch Estates project. We appreciate the updating of the wetlands criteria affecting the project and also, the acknowledgement that the residential portions of the total project do not involve work in waters of the United States or adjacent wetlands.

Your specific references to the recent changes in the Flood Insurance Rate Maps will be incorporated in the Final EIS at page IV-2.

Our special thanks for your comments and continuing interest.

Robert Maystadt
Director
DEPARTMENT OF THE NAVY
NAVY, PEARL HARBOR
HAWAII

Mr. John P. Whalen, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

December 11, 1987

Captain G.H. Gallan
Department of the Navy
Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96840-5020

Dear Mr. Whalen:

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
WEST LOCH ESTATES, CITY AND COUNTY OF HONOLULU
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
(October 1987)

The subject draft EIS has been provided to Navy by transmittal letter dated October 7, 1987, from the State Office of Environmental Quality Control. Because the question of the proposed West Loch Golf Course and Shoreline Park is being addressed in a separate EIS, Navy comments on that subject are being provided to Mr. Hiram K. Kamaka, Director, Department of Parks and Recreation, in response to the EIS Preparation Notice.

The Navy has reviewed the subject draft EIS and has no special comments to make. It is understood that Mr. Howard Hurst, of the Department of Housing and Community Development, may be meeting with Navy representatives at a later date to discuss the subject after the West Loch Golf Course and Shoreline Park EIS Preparation Notice is complete. However, the Navy wishes to receive two copies of the Final EIS upon completion.

Thank you for the opportunity to comment on this Draft EIS. The Navy point of contact is Mr. B.L. Liu, phone 471-3731 (changed to 471-3324 after October 22).

Sincerely,

Robert M. Higass
Director

Copy To:
Mr. Mike Moon, Director
Department of Housing and Community Development
650 South King Street, 5th Floor
Honolulu, HI 96813
United States Department of the Interior

FISH AND WILDLIFE SERVICE

Mr. John P. Whelan, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Mr. John P. Whelan:

We have reviewed the referenced Draft Environmental Impact Statement (EIS) and offer the following comments for your consideration:

General Comments

The Service has already expressed its concern that the proposed housing project poses environmental risks to the Pearl Harbor National Wildlife Refuge at Oahu. We provided letters discussing environmental issues to the County on March 12, 1987; April 9, 1987; April 22, 1987; June 22, 1987; and August 7, 1987, and met with representatives of the County on July 29, 1987, to discuss environmental concerns. We have reviewed the Draft EIS and offer the following comments for your consideration:

Specific Comments

A. The Service believes that the proposed development will lead to an increased number of stray cats, dogs, and wild animals on the refuge. We noted our concern that larger populations of these predators may increase the level of predation on the endangered waterbirds that use the refuge. We provided a draft Environmental Impact Statement (EIS) in letters to County officials on March 12, 1987; April 9, 1987; and June 22, 1987, and in meetings on April 7, 1987, and May 8, 1987. We discussed the impact of these predators on the refuge and the need to increase the level of predation on the endangered waterbirds that use the refuge. We are concerned that the proposed development will lead to an increased number of stray cats, dogs, and wild animals on the refuge. We noted our concern that larger populations of these predators may increase the level of predation on the endangered waterbirds that use the refuge. We provided a draft Environmental Impact Statement (EIS) in letters to County officials on March 12, 1987; April 9, 1987; and June 22, 1987, and in meetings on April 7, 1987, and May 8, 1987. We discussed the impact of these predators on the refuge and the need to control them. We recommended the following measures to control dog and cat populations:

1. Implement subdivision covenants that ban the ownership of dogs and cats in the housing development.

2. Construct additional fences and gates around the refuge.

3. Enforce existing leash laws.

4. Trap dogs and cats that wander into the refuge.

Each of these measures has various drawbacks that limit their effectiveness (see our June 22, 1987 letter for a discussion). The EIS should discuss this problem and explore alternate ways of avoiding the risks posed by dogs and cats to wildlife resources on the refuge.

b. The importance of buffering the refuge from disturbances associated with the proposed development was discussed in our letters of March 12, 1987; April 9, 1987; and June 22, 1987, and at meetings held on April 7, 1987; May 8, 1987; and July 29, 1987. We are concerned that increased levels of certain human activities, noise, and lighting may reduce the biological productivity of the refuge. In our June 22, 1987 letter and at the meeting held on July 29, 1987, we discussed the need to reduce the impact of these activities on the refuge.

c. Page 11-3. Impacts and Mitigating Measures. We disagree with the statement, "The proposed project is not expected to have any significant adverse environmental impact, nor will it be environmentally controversial." This section could be enhanced by presentation of the Service's concerns.

d. Pages 111-1 and 111-5. We are pleased that the golf course and shoreline park will be used to retain and settle surface runoff from the residential community and the upland drainage areas.

e. Page 114-9. Wildlife. This section should discuss the use of bodies of fish ponds and other wetlands in the project area by endangered Hawaiian waterbird and migratory waterfowl.
f. A map showing the distribution of wetlands within the project site and their location relative to the housing developments, golf course, and shoreline park would be valuable in determining potential impacts to these habitats.

g. Appendix B. At least four nests of the endangered Hawaiian Duck (Anas wyvilliana), 16 Ruddy Ducks, 16 pairs of the endangered Hawaiian Murrelet (Calliornia veridissima), at least 25 Hawaiian Coots (Fulica americana), and at least 10 Hawaiian Stilt (Himantopus mexicanus knudseni) were observed by refuge staff at the Kalihiwai Refuge in 1987. In addition, sightings of endangered waterbirds have also been made in the Fishpond and wetlands near the Refuge. Wetlands in the Pearl Harbor area do provide habitat for these endangered Hawaiian waterbirds.

Subject Comments

We ask that the Draft EIS be revised to address the concerns raised in this letter. Please contact staff biologist Andy Yuen (841-2749) for additional information.

Sincerely,

Ernest Kosaka, Field Supervisor
Environmental Services

cc: BM
DEW
CDH, DRE
Land Use Division, DRE
Land Use Commission

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

December 11, 1987

Mr. Ernest Kosaka, Field Supervisor
Environmental Services
U. S. Department of Interior
Fish and Wildlife Service
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Subject: Draft Environmental Impact Statement (EIS) for the West Loch Estates Subdivision Ewa, Oahu, Hawaii

Thank you for the comments contained in your letter of November 23, 1987 on the Draft Environmental Impact Statement (EIS) for the proposed West Loch Estates. The comments have been reviewed by Dr. Andrew J. Berger, the wildlife consultant and our staff and we respond as follows:

1. General Comments

   The extensiveness of the prior consultation as described in your letter is acknowledged. It is indicative of our efforts to ensure that the impact of the project on the Wildlife Refuge is minimized or appropriately mitigated.

2. Specific Comments

   The likelihood of increased numbers of stray cats, dogs and wild mongooses is a recognized concern; however, identifying mitigation measures that are both cost-effective and practical, is extremely difficult.

   At present, we note that the Refuge is surrounded by a chain-link fence and that recent changes increasing the use of "meat-eating islands" should discourage introduction and predation by feral animals. These measures would be supplemented by the substantial landscaped area that will act as a buffer between the Refuge and the residential subdivision to further discourage entry and minimize any adverse effects of light, noise and activity associated with urbanization. The
also note, however, that Dr. Berger has cited in his study (attached as Appendix B) his own findings as well as those of Ronald L. Walker (State Division of Fish & Wildlife), that endangered species at Kanaha Pond, Paliku Lagoon, and Waikiki Lagoon are highly tolerant of human activities in the vicinity of their feeding and nesting areas.* (pp. 23, 24 Berger’s study). Berger further states that “small nesting sites within the Refuge provide the vital ingredient of safe nesting sites for the birds.” These will reduce the overall potential for predation by pet dogs and cats. Page V-9 will be revised to reflect these responses.

The recommended mitigation measures were reviewed by Dr. Berger and found to be either infeasible due to the difficulty of enforcement, costs and liability or result in an undesirable effect upon the relationship between the Refuge and the adjacent community. Each is separately discussed below:

1) Covenants prohibiting the ownership of cats and dogs are, as a practical matter, unenforceable and subject to legal challenge, particularly from homeowners with pets, or those wishing to acquire dogs for security purposes.

2) Construction of an additional fenced area and/or a moat around the refuge would entail acceptance of a major cost by the project which would adversely impact its affordable housing objectives.

3) Enforcement of existing leash laws is an ongoing problem that is subject to resource limitations of the Humane Society and the Honolulu Police Department.

4) Trapping of pet dogs and cats could create ill-feeling toward the Refuge and result in a backlash and vandalism.

b) The concerns regarding the need for an adequate buffer zone and landscaping to provide a visual and auditory screen for the Refuge have been provided to the project consultants. They will be formulating design alternatives that will be considered within the constraints of cost and practicality. At present, the use of smaller lots and higher densities is already necessary to minimize costs and alleviate the need for affordable housing.

c) Page IV-9, “Impacts and Mitigation Measures.” The statement contained in this section was made based on the summary conclusions of our technical consultant’s findings; further, three different design options are being considered for the most practical and cost-effective mitigation measure available at this time. As noted earlier, identifying appropriate mitigation measures for use as a part of this project is difficult. We are therefore very much appreciative of your agreement to survey FWS offices elsewhere to determine whether other feasible alternatives are available for consideration.

d) Pages III-3, 5: Your comments are acknowledged.

e) Page IV-9, Wildlife: The future use of the Apokeo fish ponds will be discussed in the separate EIS currently being prepared for the Golf Course and Shoreline Park.

f) The housing components of the West Loch Estates project do not lie upon wetland areas. The Honolulu floodplain which contains these wetland areas is being developed as a golf course and shoreline park, as noted above, will be discussed in a separate EIS that is currently being prepared.

g) The information regarding staff sightings of endangered birds has been provided to Dr. Berger by copy of this letter. We appreciate your sharing this information with us.

We appreciate the comments offered by your agency and plan to continue working closely with your office as the planning of this project continues. Thank you very much.

[Signature]

Mike Moon
Director
Mr. John F. Whalen, Director
Department of Land Utilization
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: West Loch Estates, West Loch, Ewa, Oahu

The subject draft environmental impact statement was reviewed by our staff. We have no comments to make at this time.

We appreciate the opportunity to review the subject report and are returning it for your future use.

Sincerely,

[Signature]

Acting District Chief

Enclosure

cc: Mr. Mike Hoon, Dept. of Housing & Community Development, HI 96813

NO RESPONSE NEEDED
November 3, 1987

Mr. John P. Whalen, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Draft Environmental Impact Statement for West Loch Estates, West Loch, Ewa, Oahu, Hawaii

We have reviewed the above document and have the following comments:

1. NECO has no existing 138KV transmission lines crossing or in close proximity to the subject development. However, our present route selection study for the proposed Wai'alu/CIP 138KV line indicates that it may be impacted by the subject development.

2. The proposed Ewa Hui Substation appears to be within the boundaries of this project.

Sincerely,

Brenner Munger

CC: Mr. Mike Hoon, Director
Department of Housing and Community Development

December 11, 1987

Dr. Brenner Munger, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Dr. Munger:

Subject: Draft Environmental Impact Statement (DEIS) for West Loch Estates, Ewa, Oahu, Hawaii

This is in response to your letter dated November 3, 1987 commenting on the subject DEIS.

Your comments have been made available to our engineering consultants for use in the planning of the project. They will be in contact with your firm as the design engineering progresses to ensure that all utility requirements are properly set.

Thank you very much.

Robert W. Hoon
Director
November 23, 1987

Mr. John P. Whalen, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Re: West Loch Estates Draft Environmental Impact Statement (DEIS)

Dear Mr. Whalen:

Hawaii's Thousand Friends is a non-profit land use planning organization appreciative for the opportunity to comment on this project, but disappointed that it was recently separated from its golf course and seaward park components. We believe these elements are intrinsic parts of the total community you have planned, no matter who funds which, and regardless of which administrative agency is responsible for oversight. It is most difficult to assess cumulative impacts when parts are piecemealed. We urge that you merge the segments in a supplemental environmental impact statement, and that in-house solutions for the reasons which have led you to separate them.

Hawaii's Thousand Friends is a supporter of the "Second City" concept and endorses, in general, the intent of this plan.

However, in developing the DEIS, we also hope that you will alter the plan's existing mix of housing needs to include a substantial percentage of housing (perhaps 10 percent) to meet the disparate needs of many residents for low-cost housing. We are sure many of the Waianae applicants would deeply appreciate an opportunity to qualify for such housing dispersed throughout the West Loch project. Such a policy of more affordable housing for the less fortunate could also be viewed as an economic benefit for society. We would also allow for relocation of Ho'omaluhia tenants, many of whom are poor, thus mitigating many of their problems, tears, and the trauma of disruption.

We do not believe you have been served well with your consultant's wildlife review, as he has not addressed cumulative impacts for the island ecosystem. Too many havens for migratory waterfowl have been ignored, filled, or developed on O'ahu, intensifying the need for care being given to the remaining havens. Native waterfowl are also reducing in numbers, increasing the need for protecting even pockets of habitat which may remain. Dr. Berger regrets the past; it is up to enlightened planners to now more sensitively address the future. We hope that Mr. Kosea (USFWS) has since taken you on the tour he has suggested. It should be noted that ponds and shoreline of the golf course might also be attractive to waterfowl, therefore, the whole project should be evaluated together. Will any work in the floodplain to develop the golf course or shoreline park require fill? What will be the fate of the ancient kahau? Will they be filled, or utilized as features of the course?

We are concerned with the paucity of archaeological work done, and the conclusions drawn. In the nearby Ewa plain, many sites were found sub-surface in cavities; all are to be destroyed by fill for roads. It is our hope that additional work can be affected to ensure that features likely to be found can be protected and their heritage incorporated into the new neighborhoods.

We are pleased that amenities such as the park and ride, senior housing, child care facilities, etc., have been recognized as essential, and commend you for their inclusion. We are less sure that the Navy will happily accept this "encroachment," but trust that some amicable solutions may be found.

Thank you again for the opportunity to comment on this project.

Sincerely,

Michael B. Seto,
Executive Director

Cc: Mike Moon, Director, Dept. of Housing & Community Development
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
350 MULBERRY STREET
HONOLULU, HAWAII 96817

December 11, 1987

Mrs. Muriel B. Seto
Executive Director
Hawaii's Thousand Friends
941 River Street, Suite 302
Honolulu, Hawaii 96817

Dear Mrs. Seto:

Subject: Draft Environmental Impact Statement (DEIS) for the West Loch Estates Subdivision, Ewa, Oahu

Thank you for the comments contained in your letter of November 21, 1987 on the Draft Environmental Impact Statement (DEIS) on the proposed West Loch Estates project. We have reviewed your comments and respond as follows:

1. Preparation of Separate EIS Documents

The decision to prepare separate EIS documents for the residential and golf course/shoreline park components of the project, though based largely on administrative considerations, also recognized that development within the wetland areas would pose a number of environmental issues requiring specialized study and evaluation. The fact that the project components will eventually interact and result in cumulative impacts is recognized. However, preparation of separate EIS documents will provide a better opportunity to address the individual impacts which are significant with respect to each component.

2. This project is consistent with, and enhances the concept of, the Second Urban Center. We appreciate your endorsement and support.

3. The West Loch Estates is intended to address the housing needs of the gap group which represents a very substantial segment of Honolulu's population. The needs of lower income households are also recognized and the development of the elderly housing has been planned as a means of addressing the needs of this group. The relocation needs of those residing at Ho'oulu Point are also being addressed and discussions are currently underway with them.

4. We believe your comments regarding wildlife, water fowl, and the U.S. Fish and Wildlife Service Refuge are appropriate subjects for discussion in the EIS being prepared for the Golf Course and Shoreline Park.

5. The archaeological consultant, Dr. Paul H. Rosendahl found that the residential areas of the project do not contain any sites of significant archaeological or historic value. He has been conducting field survey work in the Honolulu flood plain as a part of preparing the EIS for the golf course and a park, and his findings will be included in that document. You can be assured that any findings of significance will be handled within guidelines provided by the State Historic Preservation Office.

6. We appreciate your favorable comments on the community facilities planned for the residential component of the project. We have been meeting with the U.S. Navy regularly and believe their concerns can be satisfactorily resolved.

Thank you again for your comments and continuing interest.

[Signature]
[Signature]

Robert W. Munsor
Director
XIV. REFERENCES


XIV-1
XV. LIST OF PREPARERS

R.M. Towill Corporation - EIS Coordination
  Bruce Tsuchida
  Chester Koga
  Collette Sakoda
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  Mark Hastert
  Tom Fee
  Rick Phillips

Pacific Planning and Engineers - Traffic
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John Child and Company - Market Study
  Karen Char
  Uson Ewart

Char and Associates -- Botanical Study
  Winona Char

Decision Analysts Hawaii - Agricultural Impact
  Bruce Plasch

Community Resources, Inc. - Social Impact
  John Knox
  David Curry
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Y. Ebisu and Associates - Noise Impacts
  Y. Ebisu

J.W. Morrow - Air Quality Study

Andrew Berger - Wildlife

Paul Rosendahl and Associates - Archaeology
  Paul Rosendah, Principal Investigator

Environmental Communications, Inc. - Technical Writers
  Fred Rodriguez
  Taeyong Kim

XV-1
XVI. APPENDICES
APPENDIX A

Botanical Survey
West Loch Estates
Ewa District, Island of Oahu

by

Winona P. Char

CHAR & ASSOCIATES

September 1987
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Prepared for: R. M. TONELL CORPORATION
September 1987
SURVEY METHODS

Prior to undertaking the field survey a search was made of the existing topographic maps and recent aerial photographs to determine access, terrain characteristics, and potential logistical and physical hazards. The vegetation types of the study area were determined by a combination of aerial photographs and on-ground observations.

A walk-through vegetation survey was conducted to determine which species were present and the relative abundance of each species. A grid system of 50 x 50 metre squares was used to determine species distributions. The species present within each grid were recorded. A survey was conducted at the beginning of the rainy season (November through January) to assess the number of species present. A second survey was conducted at the beginning of the dry season (February through April) to assess the number of species present.

DESCRIPTION OF VEGETATION TYPES

A number of terrestrial surveys have been conducted in the study area. The results of these surveys have been compiled and reviewed. The results of these surveys have been compared to the results of the current survey to determine if any changes have occurred.

The vegetation types described in these two reports will also be reviewed.
on the West Loch Estates Development area. Sugar cane fields cover areas which are actively cultivated, while vegetation types dominated by introduced species, mostly kau-haole and kia, occur on the more or less undisturbed sites. No threatened and endangered plant species were recorded from the proposed West Loch Estates Development site in the USFS report and none were found on the nearby HIAM LI, West Loch Branch.

In this botanical survey report, seven major vegetation types are recognized on the project area and are discussed in detail below.

Abandoned Cane Fields (A)

A large parcel of land formerly under sugar cane cultivation is found on the northern sector of the project area adjacent to Waikele town. Roughly 65.8 acres of this parcel is planned for residential use; the remaining acreage will be incorporated into the planned waterfront park.

The vegetation on the abandoned cane fields is composed primarily of Guinea grass (Panicum maximum), which forms dense clumps up to 3 to 4 ft. high. Other commonly occurring grass species are buffalo grass (Buchloe dactyloides), swollen fingergrass (Chloris inflecta), and sourgrass (Tripsacum insulare).

Scattered frequently throughout the grass cover are small, shrubby plants such as 'haloa (Heliotropium indicum var. americana), hoary abutilon (Abutilon incanum), woody achyranthas (Achyranthas aspera), spiny amaranth (Amaranthus spinosus), fuzzy rattlepod (Crotalaria inermis), indigo (Indigofera suffruticosa), and cow-pea (Mesoalthus tetragonoides). In some places, these shrubby species, especially the last three mentioned above, may form localized patches and be the dominant plant cover.

Along the edges of these abandoned cane fields, woody, perennial species have become established. Scattered plants of kau-haole (Leucospermum hookerianum) are occasional. A few saplings of kiawe (Prosopis pallida) and 'opioia (Fritillaria aucheriana) trees can also be found here.

The network of cane-haul roads and irrigation systems which once serviced the fields are still evident, although overgrown in some places. Small clumps of dried out sugar cane plants (Saccharum officinarum) are found scattered throughout the abandoned fields.

A number of species used in landscaping have become established in this vegetation type, usually in low numbers. These plants are associated with the trash and yard clippings which have been dumped alongside the roads. Some of these plants include coconut (Cocos nucifera), mango (Manilkara indica), ba-stilt tree (Thyrsostachys), spineless opuntia (Opuntia sp.), cassava (Manihot esculenta), and monkeypod (Samanea saman).

Cane Fields (C)

The sugar cane fields which lie on the southern sector of the project area, along with their associated network of cane-haul roads and irrigation and drainage systems, cover approximately 165.0 acres. These fields are actively cultivated by Oahu Sugar Company; the lease on these fields will expire in 1993.

The cane fields occur on gently sloping, well-drained soils of alluvial origin.

Agricultural lands are geared to more or less intensive crop production and generally support nondominant stands of plants. Woody species associated with these cultivated areas are often annual species adapted to the frequent disturbances related to cultivation practices. They are often found along the margins of fields, drainage ditches, and roads.

On the project area, woody species frequently found in the cane fields include wild bitterwheat (Hordeum charantia var. purpureum), little bull (Ipomoea triloba), swollen fingergrass (Chloris inflecta), Bermuda grass (Cynodon dactylon), nutgrass (Cyperus rotundus), two species of amaranth (Amaranthus spinosus, Amaranthus retroflexus), red pua-lele (Emilia farinosa), and hairy spurge (Euphorbia hirta). Along the drainage ways, shrubby species such as kau-haole (Leucospermum hookerianum), taster bean (Ricinus communis), Chinese violet (Euphorbia griffithii), and Indian pluchea (Pluchea indica) predominate. Grasses often associated with the drainage ways include California grass (Brachytrichis nuticae), buffelgrass (Cenchrus
Guinea grass (Panicum maximum), and Job's tears (Coix lachryma- JOBII).

Pasturelands

Pasturelands which provide forage for cattle, horses, and goats are found in the middle portion of the project area. Two types of pastureland are recognized based on the most abundant plant species. Mixed grass and herb pastures generally occur on filllands, while Brachiaria or Californiagrass pastures are found in the Honolulu Stream drainage area.

1. Mixed grass-herb pastures (wph) - The largest of these pasture areas lies about (inland) of the Apoike Fish Ponds; a smaller mixed grass-herb pasture lies below the highway near some homes.

A mixture of various grass and herbaceous species characterizes this vegetation type, no single species is dominant. The most common grass components are Bermuda grass (Cynodon dactylon), buffelgrass (Cenchrus ciliaris), Guinea grass (Panicum maximum), and sourgrass (Eriochloa incisa); the most frequent herbaceous plants encountered are nettle-leaved gossampine (Phasmodium murale), golden crown-beard (Verbesina encelioides), hairy horseweed (Eriogonum hystrix), hairy spurge (Euphorbia hirta), and little mallow (Malva parviflora). Patches of bare soil with a few, low-growing, mat-forming plants of Australian saltbush (Atriplex sabulosa) and pigweed (Amaranthus retroflexus) are also occasionally observed.

Two pluchea species (Pluchea indica, Pluchea odorata) occur as scattered shrubs throughout the pastures. Around the margins of the pastures, the pluchea along with koa-aloa (Hamelia lucens) may form extensive thickets.

2. Brachiaria (Californiagrass) pastures (B) - These pastures occur in the Honolulu Stream drainage area and the soils here are wetter. A number of smaller streams and drainages cross these pasturelands and a few wetland species are found here.

California grass (Brachiaria mutica) is a spreading, long-lived perennial species widely planted for forage throughout the tropics (Whitney et al. 1939). In the Hawaiian Islands, it is one of the most important pasture grasses of lowland areas, growing best in wet localities. Californiagrass forms a dense cover which often excludes most other species.

On the project area, pastures which have been recently grazed have grass cover 1 to 2 ft. high; pastures which have not been grazed for a while may have dense mats of Californiagrass up to 4 ft. tall.

Large shrubs and trees of koa-aloa (Hamelia lucens), Christmas berry (Schiadium teretifoliatum), Indian pluchea (Pluchea indica), and kaua (Prosopis pallida), as well as napiergrass (Pennisetum purpureum), form somewhat dense clusters on the margins of these pastures and on elevated areas within the pastures. Where the Brachiaria pastures adjoin the Typha (cattail)-Scirpus (bulrush) marsh, scattered plants of cattail and bulrush can be found in the dense grass cover.

Wetlands

In this report, wetlands have been defined as those areas in which obligate plant species are the dominant component of the vegetation. Obligate wetland species or obligate hydrophytes are plant species which generally (more or less greater than 90% of the time) are found only in wetlands under natural conditions. Obligate species are often characterized by a number of morphological features which indicate their ability to occur in wet areas. These include pneumatophores; adventitious roots; spongy leaves, stems or roots; and floating leaves. Obligate wetland species which occur in the Hawaiian Islands have been inventoried in Elliot and Hall's Wetlands and Wetland Vegetation of Hawaii (1977).

The wetlands on the project area may be divided into marsh and swamp depending on the vegetation present. Marshes are wet areas dominated by herbaceous or nonwoody plants, frequently grasses and sedges (Fosberg 1960). Swamps are dominated by woody plants, shrubs and trees. Both types of wetland are present on the project area.
1. Rhizophora (mangrove) swamp (Rsw) – The mangrove (Rhizophora mangle), a native of tropical America, was introduced into the Hawaiian Islands in 1902 on the island of Moloka‘i. Since then it has spread rapidly into estuaries and sheltered coastal areas. Many of Pearl Harbor's coastal areas have become overgrown with mangrove swamps. Mangrove is considered a noxious weed by the State Department of Agriculture, Plant Pest Control Branch, as it blocks coastal and harbor waterways.

On the project area, mangrove may reach 40 ft. in height. Prop roots and aerial roots form a dense, tangled, impenetrable thicket. The mangrove swamps themselves support very few other species. Most of the other species occur along the margins of the mangrove swamp where there is more available light. These species usually include pigleaved (Sattis maritima), Guineat grass (Paricop maximum), and Indian plumes (Pluchea indica). Fruits of Rhizophora mangle germinate while still on the parent tree, this is known as vivipary. The young plants then fall to the mud or water below. In some parts of the mangrove swamp, the area beneath the larger trees is covered with a mass of young plants.

2. Typha (cattail)- Scirpus (bulrush) marsh (T-Sw) – This vegetation type occurs primarily along the margins of the Apoeka Fish Ponds; somewhat smaller areas lie in the Honolulu Stream drainage basin.

Cattail (Typha latifolia) and bulrush (Scirpus validus) propagate rapidly by creeping underground rhizomes (or stolons) and often form large, monodominant stands.

A number of obligate wetland species are associated with this vegetation type. These include Eleocharis geniculata, needle sedge (Cyperus longisus var. oligo) shore sedge (Cyperus parviflorus), duckweed (Lemna minor), and primrose willow (Juglans acutifolia). Widgeon grass (Scirpus maritima), an aquatic flowering plant, was found in one of the Apoeka ponds.

The cattail-bulrush marsh on the project area provides cover for aquatic wildlife including a number of endangered Hawaiian waterbirds as well as migratory waterfowl.

Scrub (S)

Scattered throughout the project area are patches of scrub vegetation. These usually occur as irregularly-shaped strips bordering other vegetation types. The scrub vegetation generally consists of low-hedge shrubs (Leucaena leucocephala), 12 to 18 ft. tall, with scattered trees of kiawe (Prosopis palala) and ʻopuna (Pithecellobium dulce) up to 30 or 40 ft. tall. In some places, however, the kiawe and ʻopuna may form somewhat dense forests. Guineat grass (Paricop maximum) often forms a dense cover beneath the taller trees and shrubs.

Old house sites are often associated with the scrub vegetation and a number of ornamental, landscape species are found in small numbers here. For example, the scrub located on a small bluff in the middle of the cane fields contains plants such as mango (Mangifera indica), date palms (Phoenix dactylifera), tamarisk (Tamarix sp.), night-blooming cereus (Hylocereus undatus), pomegranate (Punica granatum), aloha (Dipladenia sp.), red hibiscus (Hibiscus rosa-sinensis), and plumaria (Plumeria rubra).

RARE, THREATENED AND ENDANGERED SPECIES

Two officially listed federal and state endangered plant species are known from the ʻEwa Plains area. These two species are the ʻEwa Plains 'ahakea (Euphorbia skottsbergii var. haleakalana) and Antirrhinum rolandia. Both species, however, are restricted to the Campbell Industrial Park and Naval Air Station, Barbers Point.

During this survey no federal and/or state listed, proposed or candidate threatened and endangered species (U.S. Fish and Wildlife Service 1980; Herbst 1987) were found on the proposed West Loch Estates Development. Other botanical surveys which have included the project area and nearby areas (Char and Balakrishnan 1979; Hawaiian Agromics 1985) have also recorded similar findings. No species considered "Rare" (Fosberg and Herbst 1975) occur on the project site.
RESULTS AND DISCUSSION

The vegetation on the proposed West Loch Estates Development is dominated by introduced (or alien) species. Of a total of 164 plant species inventoried, 86.6% or 142 species are introduced; 16 are indigenous, i.e., native to the islands and elsewhere; 1 is endemic, i.e., native only to the islands; and 5 are of early Polynesian introduction. There is little of botanical interest on the project site. The native species are found in similar environmental habitats throughout the islands. Some plants, such as the koa (Acacia koa), koa-laewa (Acacia koa), 'amoa (Heliotrope wahlbergi), and haoa auburn (Gleditsia tridentata) are considered rather "weedy" natives which do well in open, more or less disturbed areas.

None of the native species are considered rare, threatened or endangered. The proposed project is not expected to have a significant impact on the total island populations of these species.

While the wetlands do not contain any species of botanical significance, they do provide habitat for a number of endangered Hawaiian waterbirds. The cattail-bush rushes marsh around the Ao Pepe Fish Ponds is especially valuable as wetland habitat. A cooperative program to manage these pond areas for wildlife should be established with the U.S. Fish and Wildlife Service.

LITERATURE CITED


APPENDIX 1. PLANT SPECIES LIST, WEST LOOH ESTATES DEVELOPMENT.
'IONA DISTRICT, ISLAND OF O'AHU

In the plant species list which follows, families are listed alphabetically within each of two groups of flowering plants: Monocotyledons and Dicotyledons. Taxonomy and nomenclature follow St. John (1973) except where more recently accepted names have been used. Hawaiian names used are in accordance with Porter (1972) or St. John (1973). The following information is provided:

1. Scientific name with author citation.
2. Common English or Hawaiian name, when known.
3. Biogeographic status of the species. The following symbols are used:
   E = endemic = native only to the Hawaiian Islands
   I = indigenous = native to the Hawaiian Islands and also to 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
   I = introduced or alien = not native to the islands; brought here intentionally or accidentally after Western contact.
4. Vegetation types. Seven major vegetation types are recognized on the project area and are discussed in detail in the text. They are:
   1 = abandoned Cane fields (aC)
   2 = Cane fields (C)
   3 = mixed grass and herb pastures (mph)
   4 = Sphagnum (Californiagrass) pastures (S)
   5 = Waiawa (mangrove) swamp (W)
   6 = Scrub (S)
   7 = Scrub (S)

5. Relative abundance within the different vegetation types. These ratings reflect the abundance or absence (+) of a particular species within the project area and are not applicable to areas outside the project. The following symbols are used in each vegetation type column:

A = abundant = the dominant species in a given vegetation type
C = common = distributed throughout a given vegetation type in large numbers
L = locally abundant = found in localized patches where it occurs in large numbers but otherwise occasional or uncommon in a given vegetation type
O = occasional = distributed widely throughout a given vegetation type in moderate numbers
U = uncommon = observed infrequently but more than 10 times within a given vegetation type
R = rare = observed less than 10 times within a given vegetation type.
<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>STATUS</th>
<th>VEGETATION TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARACEAE (Alocasia, Colocasia)</td>
<td>taro, kalo</td>
<td>P</td>
<td>1 2 3 4 R 5 6 7</td>
</tr>
<tr>
<td>Canna indica L.</td>
<td>canna</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>COMMELINACEAE (Spiderwort Family)</td>
<td>hairy honghono</td>
<td>X</td>
<td>U</td>
</tr>
<tr>
<td>Commelina diffusa</td>
<td>honghono</td>
<td>X</td>
<td>U</td>
</tr>
<tr>
<td>CYPERACEAE</td>
<td>umbrella plant</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>Cyperus papyrus</td>
<td>papyrus</td>
<td>X</td>
<td>U</td>
</tr>
<tr>
<td>Cyperus rotundus</td>
<td>nutgrass</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>Eleocharis palustris</td>
<td>swollen fingergrass,</td>
<td>X</td>
<td>C</td>
</tr>
<tr>
<td>Scirpus maritimus var. elegantus</td>
<td>great bulrush</td>
<td>I</td>
<td>L</td>
</tr>
<tr>
<td>Scirpus validus</td>
<td>makaʻi, makaʻi</td>
<td>I</td>
<td>L A A</td>
</tr>
<tr>
<td>GRAMINEAE (Grass Family)</td>
<td>California fescue</td>
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<tr>
<td>Brachiaria mutica (Forsk.) Stapf</td>
<td>xeric grass</td>
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<td>R</td>
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<tr>
<td>Cenchrus ciliaris</td>
<td>common sandbur</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>Chloris barbata</td>
<td>muʻulei</td>
<td>X</td>
<td>C L</td>
</tr>
<tr>
<td>Cynodon dactylon</td>
<td>Job's tears</td>
<td>X</td>
<td>U</td>
</tr>
<tr>
<td>Chordodes curvula</td>
<td>Bermuda grass</td>
<td>X</td>
<td>O C U L L</td>
</tr>
</tbody>
</table>

**SCIENTIFIC NAME**

| Echinochloa colona (L.) Link | Jungle-rice | X | U |
| Echinochloa sp. | goosegrass, wiregrass | X | U | U U U R |
| Eleocharis indica (L.) Gaertn. | stinkgrass | X | U R U |
| Eleocharis gigantea (Atkins) Vigna-Lutat | R |
| Leptochloa uniflora (Poir.) Hitchc. & Chase | leptochloa | X | R |
| Paspalum vaginatum | seashore paspalum | X | U U |
| Pennisetum clandestinum | kikuyu grass | X | R |
| Pennisetum purpureum | napiergrass | X | R |
| Rhynchosporum repens | elephantgrass | X | A L O L O U |
| Saccarum officinarum | Natal reedgrass | X | A R |
| Setaria verticillata (L.) Beauv. | sugar cane, koa | X | U O U U |
| Sorghum halepense (L.) Pers. | Johnson grass | X | O |
| Trichsacca insolita (L.) Nees | sougrass | X | O O |

**LAMIACEAE (Lavender Family)**

| Lippia minor | duckweed | X | R |

**LYCHEECEAE (Lychee Family)**

| Acer | aloe | X | U |

**MONOCOTYLEDONS**

| Musa × paradisiaca | banana, maile | P | R |

**PALEOCEAE (Palm Family)**

| Phoenix dactylifera | date palm | X | U R |
| Rostomoea lancea (Barbr.) Harms | royal palm | X | |

**RUPIACEAE (Rupia Family)**

<p>| Rupia maritima var. pacifica St. John &amp; Fosberg | rupia, widgeon grass | I | R |</p>
<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>STATUS</th>
<th>VEGETATION TYPES</th>
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<tr>
<td><strong>DICOTYLEDONS</strong></td>
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<td>ACANTHACEAE (Acanthus Family)</td>
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<td>1 2 3 4 5 6 7</td>
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<td>AIZOACEAE (Carpetweed Family)</td>
<td>S. portulacastrum</td>
<td>X</td>
<td></td>
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<td>ANANARCIACEAE (Anthurium Family)</td>
<td>A. andreanum</td>
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<td>ANACARDIACEAE (Mango Family)</td>
<td>A. indica</td>
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<td>APICIALACEAE (Periwinkle Family)</td>
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<td>ARALIACEAE (Ginseng Family)</td>
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<td>BASELLACEAE (Basella Family)</td>
<td>A. fruticosa</td>
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<td>BORAGINACEAE (Heliotrope Family)</td>
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<td>CAPPARIDAE (Caper Family)</td>
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<td>COMPOSITAE (Betsy Family)</td>
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<td>Cyrtococcarus violosus Less.</td>
<td>C. crocophalum</td>
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<tr>
<td>leds.</td>
<td></td>
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<td>St. Moore</td>
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<td>Eclipta alba (L.) Hassk.</td>
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<td>Erigeron bonariensis L.</td>
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<td>Pluches laxiflora Cooper &amp; Galang</td>
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<td>L</td>
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<td>Synchusa tetramera L.</td>
<td>saw thistle, pua-lele</td>
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<td>U Q O U O</td>
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<td>Tridax procumbens L.</td>
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<td>O Q O</td>
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<td>cocklebur</td>
<td>X</td>
<td>O U R</td>
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<td>Argretra nervosa (Burm. f.) Bajer</td>
<td>woolly morning-glory</td>
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<td>eng-chai</td>
<td>X</td>
<td>R</td>
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<td>koai</td>
<td>J</td>
<td>U</td>
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<tr>
<td>Ipomoea obscura (L.) Ker-Gawl</td>
<td>koalet</td>
<td>J</td>
<td>R U R U</td>
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<td>Ipomoea indica L.</td>
<td>little bell</td>
<td>X</td>
<td>Q R L</td>
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<td>pa'au-mi'li'i-aka</td>
<td>E</td>
<td>O R</td>
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<td>Merremia aestiviflora (L.) Urban</td>
<td>hairy merremia. koal-</td>
<td>X</td>
<td>O Q U U U</td>
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<td>wood rain</td>
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<td>CUCURBITACEAE (Squash Family)</td>
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<td>Cucumis hirsutus Ehrenb. et Schlecht.</td>
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<td>Monosoria charentia var. pepel Crantz</td>
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<td>O L</td>
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<td>Euphorbia goniocarpa Millsp.</td>
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<td>Euphorbia prostrata Att.</td>
<td>prostrate spurge</td>
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<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
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<th>VEGETATION TYPES</th>
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<td>Jacaranda curcas L.</td>
<td>physic nut</td>
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<td>Manihot esculenta Crantz</td>
<td>cassava, manihot</td>
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<td>Ricinus communis L.</td>
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<td>U L O G</td>
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<tr>
<td>LABIATAE (Mint Family)</td>
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<tr>
<td>Hyptis pectinata (L.) Poir.</td>
<td>comb hyptis</td>
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<td>R</td>
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<td>LEGUMINOSAE (Pav Family)</td>
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<td>Acacia farnesiana (L.) Willd.</td>
<td>kwu</td>
<td>X</td>
<td>R R</td>
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<tr>
<td>Canavalia estherica Thouars</td>
<td>maize-loa</td>
<td>X</td>
<td>R</td>
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<td>Cassia bioculata L.</td>
<td>kolomea</td>
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<td>R</td>
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<td>Cassia surattensis Burm.</td>
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<td>L Q U</td>
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<td>Indigofera grandiflora Jacq.</td>
<td>indigo</td>
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<td>L U Q R</td>
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<td>Indigofera suffruticosa Mill.</td>
<td>kaan-haole</td>
<td>X</td>
<td>L Q R L L</td>
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<td>Leucaena leucocephala (Lam.) de Vl.</td>
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<td>Mimosa pudica var. unijuga (Du cass. &amp; Valp.)</td>
<td>hilialahila</td>
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<tr>
<td>Phaseolus sp.</td>
<td>opuna</td>
<td>X</td>
<td>R L</td>
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<tr>
<td>Pithecellobium dulce (Kobub.) Benth.</td>
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<tr>
<td>Prosopis pallida (Kobub. &amp; Bap.) ex Willd.)</td>
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<td>SCIENTIFIC NAME</td>
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<td>LOGANIACEAE (Strawberry Family)</td>
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<td>Ruddleja estivate Lour.</td>
<td>dogtail, Asiatc butterfly bush</td>
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<td>Abutilon grandifolium (Kunstl.) Sweet</td>
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<td>O U - - - D</td>
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<tr>
<td>Abutilon saccatum (Link) Sweet</td>
<td>birdy abutilon</td>
<td>I</td>
<td>C - - - - U</td>
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<tr>
<td>Hibiscus rose-sinensis L.</td>
<td>rose</td>
<td>X</td>
<td>- - - - - R</td>
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<tr>
<td>Hibiscus tilcacas L.</td>
<td>hibiscus</td>
<td>I</td>
<td>- - - - - U</td>
</tr>
<tr>
<td>Malacca aculeata Jacq.</td>
<td>aculeata</td>
<td>X</td>
<td>- - - - U - R</td>
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<tr>
<td>Malva parviflora L.</td>
<td>little malva</td>
<td>X</td>
<td>- - - O - - - D</td>
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<td>Malva pereireaum marzina Jacq.</td>
<td>false mallow</td>
<td>X</td>
<td>O - O - - - -</td>
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<td>Sida acuta Burm.</td>
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<td>X</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Sida fallax Jeps.</td>
<td>fallax</td>
<td>I</td>
<td>O - - - - - U</td>
</tr>
<tr>
<td>Sida rhombifolia L.</td>
<td>cuba jute</td>
<td>X</td>
<td>- - - - - R</td>
</tr>
<tr>
<td>Sida spinosa L.</td>
<td>prickly side</td>
<td>X</td>
<td>U U U - - -</td>
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<tr>
<td>Theptasia populinea (L.) Solander, ex Correa</td>
<td>milo</td>
<td>P</td>
<td>- - - - U U U</td>
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<tr>
<td>MORACEAE (Mulberry Family)</td>
<td></td>
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<td></td>
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<tr>
<td>Alloacanthus sp.</td>
<td>alakan</td>
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<td>- - - - - R</td>
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<tr>
<td>Flous microcarpa L.</td>
<td>Chinese banyan</td>
<td>X</td>
<td>- - - - - U</td>
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<td>MORINGACEAE (Moringa Family)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Moringa oleifera L.</td>
<td>moringa</td>
<td>X</td>
<td>- - - - - R</td>
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<tr>
<td>MORINACEAE (Myrtle Family)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syzygium cumini (L.) Skeels</td>
<td>Java plum</td>
<td>X</td>
<td>R - - - - - U</td>
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<td>NYCTAGINACEAE (Four o'clock Family)</td>
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<tr>
<td>Boerhavia coccinea Mill.</td>
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<td>X</td>
<td>U U U - - -</td>
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<td>Boerhavia diffusa L.</td>
<td>diffusa</td>
<td>I</td>
<td>U U U - - - R</td>
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<tr>
<td>Mirabilis jalapa L.</td>
<td>common four o'clock</td>
<td>X</td>
<td>- - - - - - U</td>
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<td>ONAGRACEAE (Evening Primrose Family)</td>
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<td></td>
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<td>Ludwigia acutiloba (Jacq.) Raven</td>
<td>evening primrose, kenale</td>
<td>I</td>
<td>- R - R</td>
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<tr>
<td>OXALIDACEAE (Wood Sorrel Family)</td>
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<td>Oxlalis corniculata L.</td>
<td>yellow wood sorrel, thistle</td>
<td>I</td>
<td>- - - - - R</td>
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<td>PASSIFLORACEAE (Passionflower Family)</td>
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<td>Passiflora actinophylla Deg.</td>
<td>yellow lilikes</td>
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<td>- - - - - R</td>
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<tr>
<td>Passiflora foetida L.</td>
<td>scarlet-flowered passionflower</td>
<td>X</td>
<td>O U - - - U</td>
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<tr>
<td>PLANTAGINACEAE (Plantain Family)</td>
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<tr>
<td>Plantago major L.</td>
<td>common plantain</td>
<td>X</td>
<td>- - - - - -</td>
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<td>PLUMBAGINACEAE (Leadwort Family)</td>
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<td>Plumbago auriculata Lam.</td>
<td>blue plumbago</td>
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<td>- - - - - - R</td>
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<td>PORTULACACEAE (Purslane Family)</td>
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<td>Portulaca oleracea L.</td>
<td>common purslane, pigweed</td>
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<td>PUNICACEAE (Pomegranate Family)</td>
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<td>Punica granatum L.</td>
<td>pomegranate</td>
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<td>- - - - - R</td>
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<td>RHIZOPHORACEAE (Rhizophora Family)</td>
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<tr>
<td>Rhizophora mangle L.</td>
<td>American mangrove</td>
<td>I</td>
<td>- - - - A U R</td>
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<td>SOLANACEAE (Tomato Family)</td>
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<tr>
<td>Capsicum annuum L.</td>
<td>chili pepper</td>
<td>X</td>
<td>R - - - - - U</td>
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<td>Datura stramonium L.</td>
<td>jimson weed</td>
<td>X</td>
<td>- R - R - -</td>
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<tr>
<td>Lycopersicon pimpinellifolium Mill.</td>
<td>common tomato</td>
<td>X</td>
<td>L - - - - - U</td>
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<tr>
<td>Nicandra physalodes (L.) Geerin.</td>
<td>apple-of-Paro</td>
<td>X</td>
<td>U - - - - - U</td>
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<tr>
<td>Nicotiana glauca Graham</td>
<td>wild tobacco, maka</td>
<td>X</td>
<td>U - - - - - U</td>
</tr>
<tr>
<td>SCIENTIFIC NAME</td>
<td>COMMON NAME</td>
<td>STATUS</td>
<td>VEGETATION TYPES</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>--------</td>
<td>------------------</td>
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<tr>
<td>Nicotiana tabacum L.</td>
<td>tobacco, pake</td>
<td>X</td>
<td>R R R R R R</td>
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<tr>
<td>Solanum nigron L.</td>
<td>popolo</td>
<td>?</td>
<td>U U U U U U</td>
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<tr>
<td>Solanum seforthianum Andr.</td>
<td>blue potato vine</td>
<td>X</td>
<td>- - - - - R</td>
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<tr>
<td>STERCULIACEAE (Cocoa Family)</td>
<td>Malotera indica var. americana (L.)</td>
<td>kala, 'ukalua</td>
<td>I</td>
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<tr>
<td>TAMARICACEAE (Tamaris Family)</td>
<td>Tamaris apila (L.) Karst.</td>
<td>X</td>
<td>- - - - - R</td>
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<tr>
<td>VERBENACEAE (Verbena Family)</td>
<td>Stachytarpheta jamaicensis (L.) Vahl.</td>
<td>Jamaica vervain</td>
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<tr>
<td>ZYGOPHYLLACEAE (Tribulus Family)</td>
<td>Tribulus terrestris L.</td>
<td>puncture vine</td>
<td>X</td>
</tr>
</tbody>
</table>
APPENDIX B

Terrestrial Vertebrate Animals
of the West Loch Estates

by

Andrew J. Berger
Terrestrial Vertebrate Animals
of the West Loch Estates
By Andrew J. Berger

This study was made on instructions received from Mr.
Chester Koga in the offices of R. M. Towill Corporation on
August 3, 1987, and according to details in a contract signed
August 12, 1987. I talked via telephone with Mr. Coleto Sakan
on August 15, 1987, and I arrived at the R. M. Towill Corporation
offices at 7:15 a.m. on August 19. Field studies were conducted
on August 19 and August 21, 1987. I deemed two days of field
work adequate, because I have done work in the project region
in the past.

The Habitat

The entire region has been drastically disturbed for more
than 100 years. There is no semblance of any endemic ecosystem
in the vicinity of the project area. As stated in the
Environmental Impact Statement Preparation Notice for the
West Loch Estates Subdivision (page 4): "The proposed site of
West Loch Estates Increment I is former sugar land that is now
permanently fallow. The proposed sites of Increment II and
portions of the district park are presently still cultivated by
Oahu Sugar Company. Portions of the proposed West Loch Beach
Park are in residential and quasi-commercial uses, and portions
are unused and undeveloped." Mr. Winomo Chary, the botanist,
found no rare or threatened Hawaiian plants in the area.

Amphibians and Reptiles

There are no endemic amphibians or land reptiles in the
Hawaiian Islands. All, therefore, have been introduced (either
intentionally or accidentally) by man. None are endangered
of threatened species and none are of any significance for
an environmental impact statement.

I. Amphibians

Four species of frogs have been introduced to the island
of Oahu: the green-and-black poison-arrow frog (Dendrobates
auratus), the bullfrog (Rana catesbeiana), the wrinkled frog
(Rana rugosa), and the giant neotropical toad (Bufo marinus).
The four species typically occupy different habitats, and none
is of any concern for an environmental impact assessment
(Hanasky and Breeze 1967).

II. Reptiles

1. Blind Snake, Typhlops braminus

"This small, secretive snake was apparently introduced
from the Philippines in the dirt surrounding plants that were
brought in for landscaping the campus of Kanehamea Boys School
in Honolulu. It was first found there in January 1930" (Oliver and Shaw, 1933). These blind, worm-like snakes are
rarely seen until they are flooded from underground burrows by
heavy rain or unless one looks for them under branches and other
debris on the ground. These harmless snakes are of no significance
for an environmental assessment. They now are found on all of
the main islands (McKeown, 1978).

2. Skinks and Geckos

Eleven species of skinks (family Scincidae) and geckos
(family Gekkonidae) occur on Oahu. All are foreign to the
islands, all are insect eaters, and all adapt well to both urban
and rural areas. They are of no significance to an impact
assessment.

Birds of the West Loch/Waipio Region

Three groups of birds are found in the Hawaiian Islands:
1. endemic, 2. indigenous, and 3. introduced or alien birds.

1. endemic Birds

These are birds that are unique to the Hawaiian Islands;
they occur naturally nowhere else in the world. Many of these
endemic species are classified as endangered or threatened with
extinction by the U.S. Fish & Wildlife Service and by the
State Division of Forestry and Wildlife. Most of these
endangered species are forest birds, few of them still exist
on Oahu, and there is no suitable habitat on or near the project
site.

Four species of endangered Hawaiian waterbirds do occur on
Oahu: Kolos or Hawaiian duck (Anas wyvilliana), Hawaiian
gallinule or 'Alae 'ula (Gallinula chloropus audaciosa),
Hawaiian coot or 'Ala Ke'oke'o (Fulica americana alia), and
the Hawaiian stilts or Au'o (Himantopus mexicanus knudseni).

It is because of these endangered waterbirds that we can
point out that the only concern for the proposed project deals
with any possible detrimental effects on the bird sanctuaries
in West Loch of Pearl Harbor, specially the Koko and
Honouliuli National Wildlife Refuges in the area. For example,
then a Chevron Oil Company jet fuel pipeline ruptured on May
13, 1987, some 1,000 gallons of fuel were pumped into Kalawa
spring, from which water was pumped into the Kalawa NWR. This
pollution caused the death of several waterbirds and caused the
destruction of at least six Hawaiian stilts nests (Stephen
Berendzen, in Stine, 1987; Honolulu Star-Bulletin, May 14,

We note, however, that "Plans for the beach park and golf
course areas will be developed to address Corps of Engineers
and U.S. Fish and Wildlife Service concerns regarding alteration
of wetlands and impacts on Pearl Harbor National Wildlife Refuge
Honouliuli Unit" (page 5, Item C, of the Environmental Impact
Statement Preparation Notice).

With that in mind, I now will discuss the Hawaiian waterbirds.

1. Kolos or Hawaiian duck

To the best of our knowledge, this duck became extinct
on Oahu during the 1950s. A Kolos restoration project was
initiated by the State Division of Fish and Game in 1972. As
of April 1979, 347 Hawaiian ducks had been released on Oahu in an
attempt to reestablish the species on this island: 199 birds

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were released in Waimanalo Swamp; 103 at Waimale Falls Park; and
45 at Wai'ale Pond on the Kanoehe Marine Corps Air Station.
"Although release of captive-reared Koloa began on the windward
side of Oahu in 1969, we can find no reports of the species in
the Pearl Harbor area until 7/18/76, when two birds were counted
on the ponds on Kapi'olani Peninsula. Since that time, they have
also been observed at the Honouliuli refuge unit. Because of
the distance involved, it is questionable whether or not birds
from the windward side will successfully disperse in greater
numbers to this area" (Shallenberger, 1977:299). However, much
more is involved than a "greater dispersal." It seems doubtful
that the Pearl Harbor habitat offers the necessary food and
safe nesting sites required by this ground-nesting duck. I
know of no documented records of this duck nesting in the
vicinity of salt water.

2. Hawaiian Gallinule
The Pearl Harbor area does not provide good habitat for
the Hawaiian gallinule, and Shallenberger (1977) wrote that:
"Hawaiian Gallinule are even less common in Pearl Harbor areas
than are coots. No more than two birds have been reported in
the Honouliuli refuge in recent years." Walker et al. (1986)
reported no birds there during the summer census in 1985.
Shallenberger did find the gallinule nesting at the prawn farm
at Honouliuli. However, gallinule prefer fresh or brackish
water to salt water so that it is doubtful that the Pearl Harbor
habitat can ever be changed to provide optimal habitat for any
large numbers of gallinule. Walker et al. (1985) point out
that Hawaiian gallinule habitat "consists of thickly vegetated
marsh, intermixed with fresh water ponds, taro patches, lagoons,
reed margins of water courses (streams, irrigation ditches, etc.)
reservoirs, and wet pastures. . . . The key features of these
areas for gallinules are, 1) dense stands of robust emergent
vegetation near open water, 2) floating or rarely emergent mats
of vegetation, 3) water less than 3 feet deep and 4) fresh
water as opposed to saline or brackish." The ecology of nesting
by the gallinule has been discussed by Byrd and Zelllemaker (in
press).

3. Hawaiian Coot
According to Shallenberger (1977:296), "Coots find far
less suitable habitat in the Pearl Harbor wetlands than do
stilts. No more than 3 coots have been reported on individual
counts at Honouliuli refuge unit . . . Greatest numbers in
the Pearl Harbor area have generally been found in small fish
ponds in the Waikoale area, although HONSO/USGS counts for
this area average less than 15 birds." Walker et al. (1985:11)
state that the Hawaiian subspecies of the coot "is not known
to nest adjacent to salt water." One can conclude, therefore,
that the Pearl Harbor region does not provide good habitat for
the feeding and nesting of the Hawaiian coot.
4. Hawaiian Stilt

This is a subspecies of the North American black-necked stilt. The largest populations now occur on Maui and Oahu. Personnel of the State Division of Forestry and Wildlife take censuses of the Hawaiian waterbirds during the winter and the summer. The number of stilt in the state has varied from 523 birds during the winter of 1979 to 1,492 during the summer of 1986 (after the breeding season; see Walker et al., 1986). The endangered status of all of the Hawaiian waterbirds results from a number of factors. Eggs and newly hatched young are easy prey to mongooses, cats, and dogs. The downy young also enter the water shortly after hatching, where they are prey to bats, bullfrogs, and black-crowned night herons (Berger, 1981). Sudden changes in water level also cause the destruction of nests. Of equal importance to these predators is the historical destruction of so many lowland marsh areas. A potential problem that has been very little studied in Hawaii is that of the effects of various pesticides on birds and their reproduction, although the U.S. Fish and Wildlife Service has been studying this problem on the mainland for the past 40 years (see Hall, 1987).

II. Indigenous Birds

These are species that occur naturally in Hawaii and also in other parts of the world. These birds are native to the Hawaiian Islands but are not unique to them. In this category are 22 species of seabirds, the Hawaiian black-crowned night heron, and a number of migratory species that spend their winter or non-breeding season in the islands.

1. Black-crowned night heron, Nycticorax n. bocelli

The 'A'uku' is considered to be an indigenous rather than an endemic species because the Hawaiian birds have not been recognized as subspecifically distinct from the North American birds. Hence, it is not classified as threatened or endangered even though its fate depends upon the preservation of suitable wetlands. Although these herons feed predominantly on aquatic insects, fish, frogs, and mice, they also sometimes prey on the downy young of terns and undoubtedly on other marsh birds. Fourteen herons were counted in Waipio Peninsula, the Honolulu NWR, and the Waikawa NWR during the Christmas Bird Count of the Hawaii Audubon Society on December 22, 1986 (Bresler, 1987). It may be pointed out here that the State Land Board gave a special permit to destroy black-crowned herons which have been causing economic havoc at Oahu's Kahanu prawn farm as well as other aquaculture farms statewide (Honolulu Star-Bulletin, October 26, 1985, page A-9).

2. Winter Residents

The most conspicuous of these birds is the lesser golden plover (Pluvialis dominica fulva), which occurs from sea level to about 10,000 feet elevation on Hawaii and Maui. The birds frequent lawns in residential areas, golf courses, weedy pastures, open areas in the mountains, and mud flats along the shore. However, a number of other shorebirds and
ducks spend the winter season in the islands. Some 13 species were observed on one day during December 1986 (Bremer, 1987). None of these migratory species is endangered or threatened and their occurrence is of no concern in an environmental assessment.

3. Seabirds

There are no nesting seabirds in the vicinity of the project site.

III. Introduced or Alien Birds

More than 170 species of alien birds have been intentionally introduced to the Hawaiian Islands. The following have been reported in the Waipio/West Loch region.

A. Order Ciconiiformes

b. Family Ardeidae, Herons

1. Cattle egret, *Bubulcus ibis*

   This egret was imported to Hawaii to “aid in the battle to control house flies, horn flies, and other flies that damage hides and cause lower weight gains in cattle” (Breese, 1959). Most of the funds were provided by ranchers to have the birds released on their land. Cattle egrets were released on Oahu in 1959 and 1961. Thistle (1962) reported that the population of egrets on Oahu exceeded 150 birds by July 1962; 631 egrets were counted by personnel of the State Division of Forestry and Wildlife during January 1986 (Walker et al., 1986); and 116 egrets were counted in the Waipio region December 22, 1986 (Bremer, 1987). Thus, the Cattle egret is an abundant species in the Pearl Harbor area and I saw several flocks of 25 and more birds.

B. Order Galliformes

b. Family Phasianidae, Pheasants, Quail, Partridges

2. Ring-necked pheasant, *Phasianus colchicus*

   According to Coon (1933), this Asian pheasant was introduced to the islands in 1865 “probably by Dr. Hillebrand.” It also has been imported a number of times since then “through dealers in the United States as well as from the territorial game farm on Oahu” (Schearts and Schearts, 1949). It now is not a very successful species on Oahu. Hunters killed 235 birds during the 1960–1961 hunting season, but only one bird was reported during the 1983–1984 season (Saito, 1984). I did not see any pheasants during my recent field work, but four birds were reported on the Christmas count on December 22, 1986 (Bremer, 1987).

C. Order Columbiformes

c. Family Columbidae, Pigeons and Doves

3. Rock Dove or feral Pigeon, *Columba livia*

   The pigeon probably was the first exotic bird
introduced to the Hawaiian Islands; its importation
has been traced back to 1796. Schwartz and Schwartz
(1949) wrote that feral pigeons roost and nest the
year around in sheltered portions of cliffs along the
sea coast, in rocky gulches, and in collapsed lava
tubes up to 10,000 feet on Mana Kea. They noted
that "in certain places where rookeries are accessible
to humans, it was and still is the custom for local
residents to periodically take the squabs for food."
These authors also found heavy parasitism by tapeworms,
and they stated that tapeworm infestation retards
proper nutrition and "depletes the intestine, produces
undesirable toxins, and hinders breeding." Kishimoto
and Baker (1962) reported finding the fungus
Cryptosporidium meleagris in 13 out of 17 samples
of pigeon droppings collected on Oahu. The full
significance of their findings has not yet been
determined, but, in humans, this fungus causes a
chronic cerebral meningoencephalitis. Hull, 1963:469)
remarked that "in all but the cutaneous form the
prognosis in humans is very grave." The rock
dove is found in the project area.

4. Lace-necked or Spotted Dove, Streptopelia chinensis.

This Asian dove was introduced to the islands
at an early date; the exact date is unknown, but
the birds are said to have been very common on Oahu
by 1879. The species is now common to abundant on
all main islands, and, like the other doves in Hawaii,
is classified as a game bird. Although this dove
occurs where the rainfall exceeds 100 inches per
year, the highest densities are found in drier areas
where the introduced kiawe is one of the dominant
plants. Schwartz and Schwartz (1949) estimated
densities as great as 200 birds per square mile
in dry areas on Molokai. It is a common bird in
the fallow cane fields, along cane haul roads, and
in residential areas.

5. Barred or Zebra Dove, Geopelia striata

This dove is said to have been introduced to Hawaii
sometime after 1922 (Bryan, 1958). It has been a
remarkable successful species and it is now
abundant on all of the islands. The Zebra dove
also prefers drier areas where seeds are abundant.
Schwartz and Schwartz (1949) estimated densities
as great as 400 to 800 birds per square mile in
some areas on Oahu (e.g., from Barber's Point to
Makaha) and on Molokai. One study of the food
habits of this dove in Hawaii revealed that the
diet consists of 97 percent seeds and other plant
materials; the 3 percent animal matter included
several species of beetles, weevils, and wireworms.
larvae. The zebra dove is an abundant species throughout the project area.

D. Order Strigiformes

d. Family Tytonidae, Barn Owls

6. Barn owl, Tyto alba leucistic

Barn owls differ from other owls in that they have a heart-shaped facial disc of feathers, hence, the name "mokey-faced owl." Barn owls were first released on Oahu in 1999. Like the mongoose much earlier, the owls were introduced with the hope that they would prey upon rats in sugarcane fields. Few studies of the food habits of the barn owl have been conducted in Hawaii, but one study revealed that about 90 percent of the food consisted of house mice (Toulich, 1971). Byrd and Telfer (1980) reported that barn owls had killed more than 100 seabirds and their chicks on Kauai and Kaula Island. These owls are nocturnal in habits and I did not see any during my daytime field work. However, Breuer (1967) reported four barn owls in the Naipo area during December 1966.

E. Order Passeriformes

e. Family Alaudidae, Skylarks

7. Bramsian skylark, Alauda arvensis

The first skylarks were brought to Hawaii from England in 1865; others were imported from New Zealand (where they had previously been introduced from England in 1864) in 1870. Henshaw (1904) wrote that the introduction of the Skylark to Oahu had been "a great success," and that some birds had been released on the windward side of Hawaii. Skylarks were fairly common in suitable habitat on Oahu 20 years ago, but have become increasingly uncommon in many areas as the years have passed. The Naipo region continues to provide good habitat for the skylark and 17 birds were counted there during December 1986 (Breuer, 1967).

f. Family Pycnonotidae, Bulbuls

8. Red-vented bulbul, Pycnonotus cafer

Although all members of this Old-world family are listed as "prohibited entry" by the State Quarantine Division of the Department of Agriculture, two species are now well established on Oahu.

The history of the spread of this species since the mid-1960s has been discussed by Berger (1972, 1981). Bulbuls are a scourge to both fruit and flower growers. The birds eat buds, flowers, and ripe fruits of all kinds. They are found throughout the project area.

g. Family Turdidae, Thrushes and Bluebirds

9. White-rumped Shama, Copsychus malabaricus
Shama is the Indian name for this thrush, which is native to India, Nepal, Burma, Malaysia, and throughout Indochina. The Hui Manu imported Shamas in 1940 and released them in Hoolava Valley "and at some homes in the 2400 block on Makiki Heights road" (Harpham, 1953). The Shama is now common on both the windward and leeward slopes of the Koolau mountain. The birds prefer lush vegetation, but seven birds were seen in the Waipio region during December 1985.

b. Family Mimidae, Mockingbirds and Thrashers

10. Mockingbird, Mimus polyglottos

Very little has been published on the mockingbird in Hawaii. The Hui Manu released birds on Oahu in 1931, 1932, and 1933. The mockingbird has a very spotty distribution on Oahu, being absent from many areas but common in others (e.g., Diamond Head, Fort Shafter, Radford Terrace, and Barber's Point). A few birds inhabit the Waipio area.

i. Family Zosteropidae, White-eyes and Silver-eyes

11. Japanese White-eye, Zosterops japonicus

Long a favorite cage bird in the Orient, this species was first imported for release by the Territorial Board of Agriculture and Forestry in 1929 (Cowan, 1933). Later importation were made by the Hui Manu.

The Japanese name is Hejiro, and Hejiro clubs held singing competitions with these birds. The white-eye has been a remarkably successful introduction and this species undoubtedly is the most abundant song bird in the Hawaiian Islands. It occurs from sea level to 10,000 feet elevation on Hawaii, and it occupies near-desert areas (e.g., Kawai'aua) and those with an annual rainfall of more than 300 inches. The white-eye is a very common species through the project region.

i. Family Sturnidae, Myna and Starlings

12. Common Indian Myna, Acridotheres tristis

This myna is native to Sri Lanka, India, Nepal, and adjacent regions. It was introduced from India in 1865 by Dr. Williams Hillbrand to combat the plague of army worms that was ravaging the pasture lands of the islands. . . . reported to be abundant in Honolulu by 1879, it now is extremely common throughout the Territory" (Cowan, 1933). The myna continues to be common on Oahu and it occurs in the vicinity of man and his buildings, on golf courses, and throughout the Waipio region.

k. Family Ploceidae, Weaverbirds and their allies

13. Red Avadavat or Red Munia, Amadina amandava

Known as the strawberry finch in the petstore trade. Cowan (1933) wrote that "it is not known with certainty just when these birds came to Hawaii,
but it was probably sometime between 1900 and 1910. Many were imported as cage birds during this period and it is supposed that the present population is derived from individuals escaped from captivity." Ord (1967) wrote that the strawberry finch "can usually be found near gravelly open areas around sugar cane fields . . . in the lowlands about Pearl Harbor." The birds still inhabit this area, and 57 birds were counted during the December 1956 Audubon Society Christmas Count.

14. Nutmeg Mannikin or Ricebird, *Lonchura punctulata*
Also known as the spotted munia, this Asian species was released in Hawaii by Dr. William Hillebrand about 1865 (Cowan, 1933). Cowan wrote that the ricebird "feeds on the seeds of weeds and grasses and does considerable damage to green rice." Rice is no longer grown in Hawaii, but the ricebird has recently become a serious pest by eating the seeds of sorghum (to be discussed under house finch). The ricebird is another abundant species on all islands. I saw large flocks during my August field trips.

15. Black-headed Munia, *Lonchura malacca striatella*
This bird also is called the chestnut mannikin and black-headed munia. The species was first reported in the wild by Beverly (1960), who observed 10 adults and 15 juvenile birds near West Loch.

Pearl Harbor, on April 26, 1959. Ord (1967) reported that the species was abundant "in gravelly areas around Middle Loch and West Loch of Pearl Harbor." The species has spread since that time (e.g., to the West Beach area) and still is abundant in the Makpio-West Loch region. More than 200 birds were counted during the Audubon Society Christmas Count during December 1956.

16. Red-eared or Common Waxbill, * Estrilda tricolor*
Also called the black-rumped waxbill, this species was first reported at Diamond Head on January 2, 1966. Little has been published on this species in Hawaii but its range has expanded considerably and it now is found in the Makpio region and west at least to West Beach. More than 180 birds were counted during December 1956 in the Makpio region (Brunner, 1967).

17. House Sparrow, *Passer domesticus*
The house sparrow (erroneously called the English Sparrow) was first imported to Oahu in 1871 when nine birds were brought from New Zealand (where the species had previously been introduced from England). Cowan (1933) wrote that "whether or not there were further importations is not known, but the species was reported to be numerous in
Honolulu in 1879," The House Sparrow in North America (first introduced to Brooklyn, New York, in 1853) became a serious pest, and tens of thousands of dollars were spent in attempting to control the population. The house sparrow apparently never became a pest in Hawaii. It is omnivorous in diet, eating weeds seeds as well as insects and their larvae. The house sparrow is common throughout the project area.

1. Family Fringillidae, Sparrows, Cardinals, and Buntings.

18. Red-crested Cardinal, *Paroaria coronata*
This species traditionally has been called the Brazilian cardinal in Hawaii, but the native range includes Uruguay, Paraguay, Brazil, and parts of Bolivia and Argentina. This species was released in Hawaii several times between 1928 and 1931 (Caum, 1933). This cardinal is a common species in urban and residential areas as well as in the introduced vegetation of leeward Oahu. It is widespread in the general Waipio region.

19. Cardinal, *Cardinalis cardinalis*
This species has been given a number of vernacular names: Virginia cardinal, Kentucky cardinal, Red cardinal. Its native range is in the eastern part of North America east of the plains and northward into Ontario. The cardinal was released several times in Hawaii between 1929 and 1931 (Caum, 1933). The species is fairly common in some lowland areas, and is a characteristic bird of the leeward parts of Oahu. The birds visit the edges of cane fields but spend most of their time in hibiscus and other thickets whether inland or along the shore. They are found throughout the Waipio area.

20. House Finch, *Carpodacus mexicanus frontalis*
Also known as the Papayabird in Hawaii, the house finch was introduced from California "prior to 1870, probably from San Francisco" (Caum, 1933). The house finch is now an abundant species in both urban and rural areas on all of the islands, and probably is the second most common land bird species in Hawaii now. Although house finches do eat overripe papaya and other soft fruits at times, the species is predominantly a seed eater. House finches and ricebirds caused substantial damage to the experimental sorghum crops planted on Kauai and Hawaii during 1971-1972. "A report by the Senate Committee on Ecology, Environment and Recreation says rice birds and linnet / house finch / caused a 30 to 50 percent loss in the sorghum fields at Kilauea on Kauai last year. . . . seed-eating birds at Kohala ate about 50 tons of sorghum grain in a 30-acre experimental field that was expected to
produce 60 tons" (Honolulu Advertiser, March 14, 1972, p.9-21).

The house finch is an abundant species in the Wai'pio region. The birds feed along the edges of cane fields, in the fallow fields, as well as in any habitat where there are weed seeds.

Mammals

I. Endemic Mammals

The only endemic land mammal in the Hawaiian Islands is the Hawaiian bat (*Lasiurus cinereus semistans*), a subspecies of the North American hoary bat. The Hawaiian bat occurs primarily on the Islands of Hawaii and Kauai (Tomich, 1969; Kramer, 1971; Ten Bruggencate, 1983). I know of no evidence that there is a resident population on the island of Oahu.

II. Introduced Mammals

All of these introduced species of mammals in Hawaii have proven highly detrimental to man, his buildings, products, agricultural crops and/or to the native forests and their animal life. None is an endangered species and none is of concern as far as detrimental effects resulting from the proposed project. It would, in fact, be a great boon to the islands if it were possible to exterminate all of them.

With the possible exception of the house mouse (*Mus musculus*), all of the smaller alien mammals prey on birds, their eggs, or young. These small mammals include the roof rat (*Rattus rattus*), Australian rat (*Rattus onotatus*), Norway rat (*Rattus norvegicus*), and the small Indian mongoose (*Herpestes auromarginatus*), as well as feral cats (*Felis catus*), and dogs (*Canis familiaris*). Because all of these mammals are serious pests, I did not set traps in order to sample the nocturnal rodents. It is reasonable to assume that all of them occur in the project site (Tomich, 1969; Kramer, 1971).

Summary and Conclusions

1. A substantial portion of the project site and adjacent areas consists either of sugarcane land (some now fallow and some still under cultivation) or of a dense growth of exotic or alien trees, shrubs, vines, and grasses (especially along the shore of Kaua'i Loch). In its present condition, therefore, the area properly can be called a "waste land" as far as endemic or native vegetation and its animal life is concerned.

2. There are no endemic forest birds in the project area or anywhere near it.

3. The Honolulu and Oahu National Wildlife Refuges are of special value to the endangered Hawaiian stilts and, to a lesser degree, for the other Hawaiian waterbirds. As pointed out on page 4 (above), it is of utmost importance that no polluting substances reach these sanctuaries. This potential problem has been addressed on page 5 (item C) of the Environmental Impact Statement Preparation Notice where it states that plans for the beach park and the golf course will be coordinated.
with personnel of the U.S. Fish and Wildlife Service and the Corps of Engineers. If this is done, I see no problem in the development of the project.

A buffer zone may be necessary, but there is ample evidence that the birds become habituated to both buildings and people (see, for example, Berger, 1973, 1976; Berger and Walker, 1976).

To the best of my knowledge, the only extensive published results of research on the effects of noise on birds are those of the U.S. Environmental Protection Agency (1972, 1980). The two reports give the results of research on a number of bird species that show that birds are little affected by artificially produced noises, airplanes, and sonic booms.

"It was reported that to scare birds a noise level of approximately 85 db S.P.A. at the bird’s ear was required" (1971: 36). The two reports cite many other examples of research dealing with behavior and reproductive biology in relation to both airplane and construction noises. In Hawaii, Berger (1973), in writing about the Hawaiian stilts said that "all of the bird species that inhabit Kaahua Pond ignore automobile traffic on the highway as well as airplanes that fly over the Pond," and Kriessler (in Doty, 1969), also writing about Kaahua Pond, reported that "we did not notice one instance when planes frightened ducks or any other waterbird into flight." Finally, speaking on behalf of the Board of Land and Natural Resources in testimony before the State Senate Committee on Ecology, Environment, and Recreation on February 10, 1976, Mr. Ronald L. Walker of the then State Division of Fish and Game said, in part: "Contrary to commonly held opinion that resident and migratory waterbirds do not adapt well to habitat subjected to human disturbance, it has been our experience that the Hawaiian stilts and migratory shorebirds and waterfowl are highly tolerant of human activities in the vicinity of their feeding and resting areas. This has been demonstrated not only at Paho Lagoon . . ., but at Keahi Lagoon off the International Airport, which is subjected to daily disturbance by aircraft, motorists, vehicles and recreationists on foot."

4. None of the 20 species of introduced or alien birds found in the project area is an endangered species and a number have proven to be serious pests in Hawaii. The destruction to sorghum crops by the ricebird and the house finch already has been mentioned. The dove and the myna have been implicated in spreading the seeds of such noxious plants as Lantana camara. The red-vented bulbul and the Japanese white-eye cause considerable damage to ornamental flowers and to fruit crops (see Keffer, 1961, 1976). The barn owl is known to eat birds on Kauai and perhaps on other islands (Byrd and Tefer, 1980). Some of the introduced birds apparently cause no damage to crops or to the endemic forest birds, and they do provide pleasure for many people. However,


Hollingworth, and W. Durham, editors. American Chemical Society, Washington, D. C.


APPENDIX C

Traffic Noise Impact Study
For the Proposed
West Loch Estates Subdivision

by

Y. EBISU & ASSOCIATES

September 1987
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BY

T. EBISU & ASSOCIATES

SEPTEMBER, 1987
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1. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed West Loch Estates Subdivision were evaluated for their potential impact on present and future residences in the project environs. The traffic noise level increases along Fort Weaver Road were calculated for the CF 1991 and 1997 time periods, and traffic noise increases associated with project and non-project traffic were assessed. Increases in traffic noise of 3.8 to 4.2 Ldn are predicted to occur as a result of project and non-project traffic on Fort Weaver Road. Traffic noise increases of 0.4 to 1.3 Ldn are projected to occur as a result of project traffic on Fort Weaver Road.

Project traffic noise impacts on existing residences along Fort Weaver Road in the vicinity of Kenton Road are predicted to be relatively small, with project related increases in the order of 0.5 Ldn. Although significant increases in non-project traffic noise levels are predicted to occur by 1991, existing residences should remain in the "Acceptable, Moderate Exposure" category due to the large setbacks of the residences from Fort Weaver Road.

The existing Hale O'Ulu School on the west side of Fort Weaver Road is currently in the "Normally Unacceptable, Significant Exposure" category. Projected increases in non-project traffic by 1991 are expected to increase traffic noise levels at the school by 2.0 Ldn. Project related traffic is not expected to be a significant noise source at the school, with the contribution from project traffic predicted to be 0.5 Ldn.

Future traffic noise impacts on West Loch residents can be minimized by the use of buffer zones of adequate depth on the Diamond Road side of Fort Weaver Road, and along the internal roadways of the development. In order to not preclude federal assistance on the project, it is suggested that minimum setback distances to the future 65 Ldn contour be used when practical in sited future residential units. Because these setback distances are large along some sections of Fort Weaver Road, the use of other noise mitigation measures may be desirable. These other measures include the construction of sound attenuating barriers or walls along Fort Weaver Road, or the use of sound attenuating windows for two story homes.
II. PURPOSE AND METHODOLOGY

The purpose of this noise study was to predict the traffic noise level increases associated with the proposed West Loch Estates Subdivision project, and to evaluate possible noise impacts on the surrounding area resulting from the project's traffic noise sources. Additionally, the possible traffic noise impacts on future residents of the proposed subdivision along Fort Weaver Road and internal roadways were evaluated.

Traffic noise predictions were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (Reference 1), and traffic assignments from the traffic study for the project (Reference 2). Historical traffic counts obtained by the State Department of Transportation at stations on Fort Weaver Road (References 3 and 4) were used to develop the relationships between peak hour Leq(h) and daily Ldn traffic noise levels. (See Worksheet #1 of APPENDIX C). Natural shielding effects from the terrain features along Fort Weaver Road were included in the traffic noise prediction model. As-built plans of the roadway were used to obtain roadway and right-of-way elevations. Receptor elevations were assumed to be 5 ft above existing terrain.

Existing traffic noise measurements at three locations along Fort Weaver Road were obtained in August, 1987 to calibrate the noise prediction model, and to refine future traffic noise predictions. The relative noise contributions from project and non-project traffic were obtained from the traffic projections of Reference 2 for the 1991 time period. Additionally, the project plus non-project traffic volumes for the 1997 time period contained in Reference 2 were used to describe the future traffic noise environment along Fort Weaver Road. Potential traffic noise impacts resulting from non-project and project traffic in CY 1997 were identified, and possible noise mitigation measures were described.

III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

Two noise descriptors currently used to relate outdoor noise levels to land use compatibility, and to assess environmental noise in general, are the Equivalent Noise Level (Leq) and the Day-Night Average Sound Level (Ldn). Both of these descriptors are averages of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. In traffic noise evaluations, the averaging period for the Leq descriptor is usually an hour, and more specifically, the peak hour of traffic. In all evaluations, the minimum averaging period for the Ldn descriptor is 24 hours (by definition), with the recommended averaging period being one year for land use compatibility evaluations. Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the Ldn descriptor. A glossary of acoustical descriptors is contained in APPENDIX D.

TABLE 1, which follows, contains information contained in Reference 5, presents current federal standards and acceptability criteria for residential land uses exposed to various levels of environmental noise. As a general rule, noise levels of 55 Ldn or less occur in rural areas or urbanized areas which are shielded from high volume streets. In urbanized areas, Ldn levels generally range from 55 to 65 Ldn, and are usually controlled by motor vehicle traffic noise. Buildings which front major roadways are generally exposed to levels of 65 Ldn, and as high as 72 Ldn when the roadway is a high-speed freeway. Due to noise shielding effects from intervening structures, buildings which are located within interior lots are exposed to lower exterior noise levels of 60 Ldn or less.

For the purposes of determining noise acceptability for funding assistance from federal agencies (FHWA/DOH and HUD), an exterior noise level of 65 Ldn or lower is considered acceptable for residential developments. This standard is applied nationally
TABLE 1
EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

<table>
<thead>
<tr>
<th>Noise Exposure Class</th>
<th>Day-Night Sound Level</th>
<th>Equivalent Sound Level</th>
<th>Federal Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal Exposure</td>
<td>Not Exceeding 55 Ldn</td>
<td>Not Exceeding 55 Leq</td>
<td>Unconditionally Acceptable (1)</td>
</tr>
<tr>
<td>Moderate Exposure</td>
<td>Above 55 Ldn</td>
<td>Above 55 Leq</td>
<td>Acceptable (2)</td>
</tr>
<tr>
<td></td>
<td>But Not Above 65 Ldn</td>
<td>But Not Above 65 Leq</td>
<td></td>
</tr>
<tr>
<td>Significant Exposure</td>
<td>Above 65 Ldn</td>
<td>Above 65 Leq</td>
<td>Normally Acceptable</td>
</tr>
<tr>
<td></td>
<td>But Not Above 75 Ldn</td>
<td>But Not Above 75 Leq</td>
<td></td>
</tr>
<tr>
<td>Severe Exposure</td>
<td>Above 75 Ldn</td>
<td>Above 75 Leq</td>
<td>Unacceptable</td>
</tr>
</tbody>
</table>

Note: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.
(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours.

Source: Reference 5.

(see Reference 6), including Hawaii. Because of our open living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior to interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 Ldn in local residential neighborhoods does not eliminate all risks of noise impacts. For these reasons, and as recommended in Reference 7, a lower level of 55 Ldn is considered as the "Unconditionally Acceptable" (or "Near Zero Risk") level of exterior noise for residential uses. However, after considering the cost and feasibility of applying the lower level of 55 Ldn, government agencies such as FHA/HUD and VA have selected 65 Ldn as a more appropriate regulatory standard.

For commercial and light industrial developments, exterior noise levels in the order of 65 to 75 Ldn are considered acceptable. FIGURE 1, extracted from Reference 8, depicts suggested noise level compatibility guidelines for various land use categories. Note that for commercial land uses, "Compatible" (or "Unconditionally Acceptable") noise levels are approximately 10 Ldn higher than for residential uses. This is due to the generally higher tolerance for noise in nonresidential settings, and the higher probability of total closure and air conditioning of commercial structures. Federal agencies utilize similar land use compatibility guidelines (Table 2 of Reference 5) for commercial and light industrial developments.
## Land Use

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Yearly Day-Night Average Sound Level in Decibels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential - Single Family,</td>
<td>50 60 70 80 90</td>
</tr>
<tr>
<td>Extensive Outdoor Use</td>
<td></td>
</tr>
<tr>
<td>Residential - Multiple Family,</td>
<td></td>
</tr>
<tr>
<td>Moderate Outdoor Use</td>
<td></td>
</tr>
<tr>
<td>Residential - Multi Story</td>
<td></td>
</tr>
<tr>
<td>Limited Outdoor Use</td>
<td></td>
</tr>
<tr>
<td>Transient Lodging</td>
<td></td>
</tr>
<tr>
<td>School Classrooms, Libraries,</td>
<td></td>
</tr>
<tr>
<td>Religious Facilities</td>
<td></td>
</tr>
<tr>
<td>Hospitals, Clinics, Nursing Homes,</td>
<td></td>
</tr>
<tr>
<td>Health Related Facilities</td>
<td></td>
</tr>
<tr>
<td>Auditorium, Concert Halls</td>
<td></td>
</tr>
<tr>
<td>Music Shells</td>
<td></td>
</tr>
<tr>
<td>Sports Arenas, Outdoor Spectator Sports</td>
<td></td>
</tr>
<tr>
<td>Neighborhood Parks</td>
<td></td>
</tr>
<tr>
<td>Playgrounds, Golf Courses, Riding</td>
<td></td>
</tr>
<tr>
<td>Horses, Water Rec., Cemeteries</td>
<td></td>
</tr>
<tr>
<td>Office Buildings, Personal Services</td>
<td></td>
</tr>
<tr>
<td>Business and Professional</td>
<td></td>
</tr>
<tr>
<td>Commercial - Retail, Shopping Centers,</td>
<td></td>
</tr>
<tr>
<td>Amusements, Restaurants</td>
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</tr>
<tr>
<td>Commercial - Wholesale, Some</td>
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<td>Retail, Ind., Mfg., Utilities</td>
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<tr>
<td>Livestock Farming, Animal Breeding</td>
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<td>Agriculture</td>
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</tr>
<tr>
<td>Extensive Natural Wildlife and</td>
<td></td>
</tr>
<tr>
<td>Recreation Areas</td>
<td></td>
</tr>
</tbody>
</table>

![Cell](image)

**FIG. 1**: Land use compatibility with yearly day-night average sound level at a site for buildings as commonly constructed. (See standard for Sound Level Descriptors for Determination of Appropriate Land Use: AS 5223-1983)

## Existing Noise Environment

Along the Fort Weaver Road Right-of-Way, existing traffic noise levels are in the "Significant Exposure, Normally Unsatisfactory" category. Existing setback distances to the 65 Ldn contour line are estimated at 235 ft and 128 ft from the centerline of the roadway at the north and south sections, respectively, of the roadway (see FIGURE 2). In the vicinity of the proposed residential subdivisions of West Loch Estates, which are located on the Diamond Head (east) side of the roadway, traffic noise levels are in the "Significant Exposure, Normally Unsatisfactory" category (approximately 65 to 70 Ldn) along the first row of proposed lots which will front the highway.

The results of the August, 1987 highway noise measurements are summarized in TABLE 2. The locations of the measurement sites and their relationships to the existing Ldn contours are shown in FIGURE 2. The agreement between the measured highway noise and the computed values was good at all three measurement Sites A through C, as indicated in the last column of TABLE 2.

In the vicinity of the Renton Road intersection, existing residences of Fernandes Village are in the "Moderate Exposure, Acceptable" category due to the large setback distances (240 ft) from the centerline of Fort Weaver Road, and due to the lower vehicle speeds near the signalized intersection. To the north, the existing Hale O Ulu School on the west side of Fort Weaver Road is exposed to traffic noise levels of 65 to 70 Ldn, which are considered "Unsatisfactory" for naturally ventilated schools. Existing houses on the project site and south of the Hancóilai Stream Bridge are in the "Significant Exposure, Normally Unsatisfactory" category (approximately 65 to 70 Ldn). These existing structures will be removed under the proposed project.

Along the existing concrete haul road which runs through the southern portion (Phase II) of the project, haul trucks are the dominant noise sources during the harvesting season, which occurs...
### TABLE 2
**AUGUST, 1987 TRAFFIC NOISE MEASUREMENTS**

<table>
<thead>
<tr>
<th>Location</th>
<th>Time of Day (hrs)</th>
<th>Ave. Speed (MPH)</th>
<th>Hourly Traffic Volume</th>
<th>Measured Leq (dB)</th>
<th>Predicted Leq (dB)</th>
<th>Measured Noise Predicted (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SITE A On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>0930 TD</td>
<td>35</td>
<td>1,114</td>
<td>22</td>
<td>23</td>
<td>63.4</td>
</tr>
<tr>
<td>2. SITE A On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>1400 TD</td>
<td>35</td>
<td>1,175</td>
<td>24</td>
<td>24</td>
<td>62.0</td>
</tr>
<tr>
<td>3. SITE B On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>0700 TD</td>
<td>50</td>
<td>1,335</td>
<td>28</td>
<td>28</td>
<td>71.1</td>
</tr>
<tr>
<td>4. SITE B On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>1600 TD</td>
<td>50</td>
<td>1,697</td>
<td>40</td>
<td>40</td>
<td>69.7</td>
</tr>
<tr>
<td>5. SITE C On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>0930 TD</td>
<td>50</td>
<td>1,175</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>6. SITE C On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>1700 TD</td>
<td>50</td>
<td>1,599</td>
<td>40</td>
<td>40</td>
<td>68.5</td>
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<tr>
<td>7. SITE C On project site, 100' from Fort Weaver Rd. centerline.</td>
<td>1800 TD</td>
<td>50</td>
<td>1,712</td>
<td>36</td>
<td>36</td>
<td>69.1</td>
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</tbody>
</table>

**Notes:**
1. Flat-out view at Sites A, B, and C assumed from 0 degrees (left) to 90 degrees (right).
2. Soft ground conditions assumed along Fort Weaver Road.
on a 2.5 year cycle. FIGURE 3 presents the worst case (hard
ground or elevated sources) Ldn vs. centerline distance curves
along the haul road for the peak and average hauling days of the
harvesting season, and for the annually averaged day. The
following assumptions were used in computing the existing Ldn
values associated with haul truck noise:
a. Total cultivated area serviced: 1,826 acres.
b. Total cane haul truck loads per acre harvested: 4.49
loads (or inbound trips) per harvested acre.
c. Total hauling (work) days per harvesting season: 190
days per season.
d. Total 24-hour (3-shift) hauling days per harvesting
season: 31 days per season.
e. Maximum number of loads during 24-hour hauling day: 72
daytime (7:00 AM to 10:00 PM) loads, and 44 nighttime (10:00 PM to
7:00 AM) loads.
f. Average daily number of loads during 190 day harvesting
season: 41 daytime loads, and 3.6 nighttime loads.
g. Annually averaged (365 days/year), daily number of
loads during year of harvest: 21.3 daytime loads, and 1.4
nighttime loads.

During a peak harvesting day of 24-hour operation, haul truck
noise levels could exceed 65 Ldn within 190 ft setback distance
from the haul road's centerline. However, average Ldn values for
the 190 day harvest season or for the 365 day annual period do not
exceed 65 Ldn at setback distances of 80 ft, and cane haul truck
noise levels are in the "Moderate Exposure, Acceptable" category
at the proposed residential lots along the haul road.
V. FUTURE TRAFFIC NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments for the 1993 and 1997 time periods as contained in Reference 2. FIGURE 4 depicts the future traffic noise contours on the Diamond Head side of Fort Weaver Road following project completion by the Year 1997. The contours of FIGURE 4 do not include the sound attenuation effects of sound barriers or berms which may be incorporated into the project, or the shielding effects of the structures planned within the project. The contours do include the shielding effects from natural terrain features as well as from the elevated roadway shoulders. Portions of the north and south residential parcels which are located within 400 FT of the Fort Weaver Road centerline are predicted to be within the 65 Ldn traffic noise contour, and are expected to be in the "Significant Exposure, Normally Unacceptable" category.

The predicted increases in PM peak hour traffic noise levels from the present to CT 1997 are shown in TABLE 3 for the various sections of Fort Weaver Road in the project environs. TABLE 4 presents the predicted increases in the setback distances to the 60, 65, and 70 Ldn traffic noise contours under unobstructed line-of-sight sound propagation conditions, and with the project traffic included. As noted in TABLE 4, the difference between Ldn and peak hour Leq(h) was computed to be equal to 1.3 dB. By CT 1997, increases in the setback distances to the 65 Ldn contour are predicted to be approximately 200 FT along Fort Weaver Road at the north and central portions of the project, and approximately 150 FT along Fort Weaver Road at the south portion of the project. It should be noted that the predicted increases in the noise contour setback distances are the result of both project and non-project traffic volume increases.

Future traffic noise levels were also calculated separately with and without the project traffic in CT 1991. The contributions of project and non-project traffic to the total noise
FIGURE 4 (CONT.)
FUTURE (CT 1997) TRAFFIC NOISE CONTOURS; FORT WEAVER ROAD
(Approximate Scale: 1" = 400')

-21-

FIGURE 4 (CONT.)
FUTURE (CT 1997) TRAFFIC NOISE CONTOURS; FORT WEAVER ROAD
(Approximate Scale: 1" = 400')

-22-
### Table 3
Comparisons of Existing and Future Traffic Noise Levels in Project Environs

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SPEED (MPH)</th>
<th>VPH</th>
<th>AUTO</th>
<th>MT</th>
<th>MT</th>
<th>HT</th>
<th>HT</th>
<th>All Yr.</th>
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</thead>
<tbody>
<tr>
<td><strong>YEAR 1987 PM PEAK HOUR TRAFFIC:</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Ft. Weaver Rd. (North)</td>
<td>50</td>
<td>2.083</td>
<td>66.2</td>
<td>60.4</td>
<td>64.8</td>
<td>69.3</td>
<td></td>
<td></td>
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<tr>
<td>Ft. Weaver Rd. (Center)</td>
<td>40</td>
<td>2.083</td>
<td>66.3</td>
<td>60.4</td>
<td>64.8</td>
<td>69.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ft. Weaver Rd. (South)</td>
<td>43</td>
<td>2.083</td>
<td>64.5</td>
<td>58.9</td>
<td>63.9</td>
<td>67.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ft. Weaver Rd. (To EB)</td>
<td>35</td>
<td>1.806</td>
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<td>56.2</td>
<td>62.0</td>
<td>65.3</td>
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<tr>
<td><strong>PROJECTED 1997 PM PEAK HOUR TRAFFIC:</strong></td>
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<tr>
<td>Ft. Weaver Rd. (North)</td>
<td>50</td>
<td>5.320</td>
<td>70.4</td>
<td>64.5</td>
<td>68.9</td>
<td>73.3</td>
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<td>4.1</td>
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<td>Ft. Weaver Rd. (Center)</td>
<td>50</td>
<td>5.320</td>
<td>70.4</td>
<td>64.5</td>
<td>68.9</td>
<td>73.3</td>
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<td>4.1</td>
</tr>
<tr>
<td>Ft. Weaver Rd. (South)</td>
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<td>4.959</td>
<td>68.3</td>
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<td>67.7</td>
<td>71.6</td>
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<td>3.8</td>
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<tr>
<td>Ft. Weaver Rd. (To EB)</td>
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<td>4.857</td>
<td>65.6</td>
<td>60.4</td>
<td>66.2</td>
<td>69.5</td>
<td></td>
<td>4.2</td>
</tr>
</tbody>
</table>

**Notes:**
1. Assumed traffic mix of 96% Autos, 2% Medium Trucks, and 2% Heavy Trucks.
2. Soft ground conditions and 180 degree field-of-view assumed.
3. North Section is from Ferrington Hwy. to proposed Road "A"; Center Section is from proposed Road "A" to "B"; South Section is from proposed Road "B" to Arizona Rd., and EB Section is from Arizona Rd. toward Lomita Beach.
4. Average speeds vary from 50 MPH to 35 MPH along South Section from Road "B" to Arizona Road.

### Table 4
Existing and Future Distances to 60, 65, and 70 Leq Contours

<table>
<thead>
<tr>
<th>STREET SECTION</th>
<th>60 Leq SETBACK (FT)</th>
<th>65 Leq SETBACK (FT)</th>
<th>70 Leq SETBACK(FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft. Weaver Rd. (North)</td>
<td>505</td>
<td>944</td>
<td>235</td>
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<tr>
<td>Ft. Weaver Rd. (Center)</td>
<td>505</td>
<td>944</td>
<td>235</td>
</tr>
<tr>
<td>Ft. Weaver Rd. (South)</td>
<td>403</td>
<td>723</td>
<td>187</td>
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<tr>
<td>Ft. Weaver Rd. (To EB)</td>
<td>275</td>
<td>526</td>
<td>128</td>
</tr>
</tbody>
</table>

**Notes:**
1. All setback distances are to the roadway centerline.
2. Setback distances are for unobstructed lines-of-sight conditions.
3. Computed Leq equal to PM Peak Hour Leq(b) plus 1.3 dB.
(project plus non-project) levels were calculated. TABLE 5 presents the anticipated increases in traffic noise levels, and the contribution of project traffic to these increases. As indicated in TABLE 5, the increases in traffic noise levels associated with project traffic are predicted to range from 0.5 to 1.5 dB (A) by the year 1991. The greatest increases are expected along the south portion of Port Weaver Road. Non-project noise levels are predicted to be in the order of 1.3 dB (A). Relatively insignificant increases of 0.5 dB (A) are expected along the north portion of Port Weaver Road.

TABLE 5
SUMMARY OF TRAFFIC NOISE INCREASES ASSOCIATED WITH PROJECT AND NON-PROJECT TRAFFIC CY 1991

<table>
<thead>
<tr>
<th>ROADWAY SECTION</th>
<th>** PM PEAK HR VOLUME (VPH)**</th>
<th>** PEAK HR NOISE (dB)**</th>
<th>** INCREASE IN dB **</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WITHOUT PROJECT</td>
<td>WITH PROJECT</td>
<td>WITHOUT PROJECT</td>
</tr>
<tr>
<td>Ft. Weaver Rd. (North)</td>
<td>3,502</td>
<td>4,752</td>
<td>71.5</td>
</tr>
<tr>
<td>Ft. Weaver Rd. (Center)</td>
<td>3,281</td>
<td>4,326</td>
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<td>Ft. Weaver Rd. (South)</td>
<td>3,142</td>
<td>3,719</td>
<td>69.8</td>
</tr>
<tr>
<td>Ft. Weaver Rd. (To EB)</td>
<td>3,042</td>
<td>3,229</td>
<td>67.5</td>
</tr>
</tbody>
</table>

Notes:
1. All noise levels computed at 100 FT setback distance from centerline of Ft. Weaver Road.
2. See TABLE 3 for assumptions used in traffic noise predictions.
VI. DISCUSSION OF FUTURE NOISE IMPACTS

Without noise mitigation measures, future traffic noise levels are expected to be in the "Significant Exposure, Normally Unacceptable" noise exposure category along the first row of West Loch Estates house lots which front Fort Weaver Road. If development of West Loch residences within the future 65 Ldn contour (see Figure 4) is necessary due to the difficulties in achieving adequate setback distances, adverse noise impacts on future residents are expected to occur.

Unavoidable traffic noise impacts are predicted to occur in the form of increased traffic noise along all sections of Fort Weaver Road as a result of project and non-project traffic. By 1997, traffic noise levels at existing homes and at the Hale O Ulu School are predicted to increase by approximately 3.8 Ldn to 4.2 Ldn above existing levels, which are significant. Project-related traffic noise contributions to these increases are anticipated range from 0.4 to 1.3 Ldn. Growth in non-project traffic is predicted to contribute 2.8 to 3.8 Ldn to the total increases in noise along Fort Weaver Road. Traffic noise increases associated with the West Loch Estates Subdivision project are predicted to represent 10% and 32% of the total increases predicted along the south and north sections, respectively, of Fort Weaver Road by 1997. The degree of project contribution to future increases in traffic noise are considered to be moderate to insignificant. The major contributor to the expected increases in traffic noise at existing noise-sensitive properties south of the proposed "Road B" intersection is non-project traffic.

VII. POSSIBLE NOISE MITIGATION MEASURES

The results of this noise study indicate that sufficient setback distances do not exist to meet FPA/HUD noise criteria at the proposed Phase I and Phase II residential lots which front Fort Weaver Road. Minimum barrier heights of 6 to 9 ft will probably be required along the east highway Right-of-Way to reduce future traffic noise levels below 65 Ldn. If two story homes are located within 65 Ldn contour of Figure 4, the upper level spaces will not be adequately shielded by a 6 to 9 ft high wall, and the use of other mitigation measures, such as air conditioning of affected rooms or the installation of window sound attenuators, may be employed.

Table 6 is a summary of probable top elevations and locations of the required sound attenuation barrier segments. The barrier segments are located on the Diamond Head side of Fort Weaver Road, with start and end points keyed to the highway station numbers (see Annex B, plans for Fort Weaver Road). For example, the first barrier segment, which is approximately parallel to the roadway from Station 94+00 to Station 95+00, should be between 100 to 155 ft ("T-START" and "T-END") east of the roadway centerline, and should have an average top elevation of 74.5 ft. Sections of sound attenuation barrier are required from STA 94+00 to STA 112+00, and from STA 152+00 to STA 195+00. The top elevations shown for each barrier segment were computed so as to meet the 65 Ldn FPA/HUD standard for the first row of single story homes east of the barrier. The indicated top elevations should be confirmed following completion of the lot grading plans, and prior to actual construction. Earth berms, concrete blocks or rock walls, or combination berms plus walls are acceptable methods of implementing the sound barriers. In order to minimize traffic noise reflections toward the west and across the highway, the sound absorption or scattering characteristics of the walls should be maximized. The use of lava rock, the avoidance of painting or sealing the pores (on the side facing the highway) of a concrete...
<table>
<thead>
<tr>
<th>START STA. NO.</th>
<th>END STA. NO.</th>
<th>T-START (FT)</th>
<th>T-END (FT)</th>
<th>AVE. TOP ELEV. (FT)</th>
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<tr>
<td>94+00</td>
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**TABLE 6 (CONTINUED)**

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<th>START STA. NO.</th>
<th>END STA. NO.</th>
<th>T-START (FT)</th>
<th>T-END (FT)</th>
<th>AVE. TOP ELEV. (FT)</th>
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</table>

-29-                                               -30-
block wall, the use of specially constructed, sound absorbent concrete blocks, and the use of foliage to visually screen the wall from the highway are possible methods of increasing the sound absorption or scattering characteristics of the wall. If two-story homes are constructed within the 65 to 70 Ldn contours of FIGURE 4, the use of sound attenuating windows at the upper floor is the recommended mitigation measure. The first floor should be adequately shielded by the sound barrier described previously. Examples of sound attenuation windows are at Kalakaua Homes on Oahu, and at the Knoll Village and Maie Hono Subdivisions on Maui.

A. REFERENCES


(2) Existing, CT 1991, and CT 1997 PM Peak Hour traffic volumes at the Fort Weaver Road intersections in the project area; draft transmitted from Pacific Planning & Engineering, Inc.; September 9, 1987.

(3) Hawaii State Department of Transportation; 24-Hour Traffic Counts; Station C-10-U, Fort Weaver Road at Hoomaluhia Bridge; January 20-21, 1986.

(4) Hawaii State Department of Transportation; 24-Hour Traffic Counts; Station C-10-J, Fort Weaver Road at Farrington Highway; January 20-21, 1986.


### EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

In the determination of sound levels for the purpose of compliance with the provisions of this section, the term "sound level" shall mean the "sound level", or the "sound pressure level", or both. "Sound level" shall be determined by means of an audiometer or similar instrument which measures the intensity of sound in decibels. The term "sound pressure level" shall be determined by means of a sound level meter or similar instrument which measures the pressure of sound in dynes per square centimeter.

### TABLE I: Recommended Descriptors List

<table>
<thead>
<tr>
<th>Term</th>
<th>Symbol</th>
<th>Unit</th>
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</thead>
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<tr>
<td>A-weighted Sound Level</td>
<td>$L_A$</td>
<td>dB</td>
</tr>
<tr>
<td>A-weighted Sound Power Level</td>
<td>$L_{PA}$</td>
<td>dB</td>
</tr>
<tr>
<td>Maximum A-weighted Sound Level</td>
<td>$L_{AM}$</td>
<td>dB</td>
</tr>
<tr>
<td>Fast A-weighted Sound Level</td>
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<td>Level exceeded at the beginning of the year</td>
<td>$L_{TBF}$</td>
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<td>Equivalent Sound Level</td>
<td>$L_{eq}$</td>
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<td>Equivalent Sound Level over day</td>
<td>$L_{eq(1)}$</td>
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<td>Day Sound Level</td>
<td>$L_D$</td>
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<td>Day-Night Sound Level</td>
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(1) "Alternative" symbols may be used to assure clarity or consistency.
(2) Only one symbol may be used, and the choice of symbol shall be made consistent throughout the report.
(3) In general, the term "pressure" is used for the unweighted level.
(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., "for a working machine").
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<td>1.0</td>
<td>1.0</td>
<td>58.8</td>
<td>49.8</td>
</tr>
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TOTAL VPD: 25,017  LIN @ 50 FT:  LIN @ 100 FT: 70.2

STA: C-10, NEWPORT WEYER ROAD AT FAR. INV, TWO-WAY TRAFFIC (1/20-21/86)

APPENDIX C. WORKSHEET 1
APPENDIX D

Air Quality Impact Report
West Loch Estates

by

J.W. Morrow
Environmental Management Consultant
Kailua, Hawaii

September 28, 1987
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<td>Estimates of Maximum 8-Hour Carbon Monoxide Concentrations in the Vicinity of the Fort Weaver Road - Road &quot;B&quot; Intersection, 1991</td>
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<td>1986 Emissions Inventory, City &amp; County of Honolulu</td>
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<td>Frequency Distribution of Wind Direction in Percentage, Month of January, Honolulu International Airport.</td>
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<td>2</td>
<td>Frequency Distribution of Wind Direction in Percentage, Month of August, Honolulu International Airport.</td>
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<td>Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Road &quot;A&quot; (1987)</td>
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<td>Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Road &quot;B&quot; (1987)</td>
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<td>Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Renton Road (1987)</td>
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<td>Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Road &quot;A&quot; (1991 With Project)</td>
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<td>9</td>
<td>Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Road &quot;B&quot; (1991 With Project)</td>
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**LIST OF FIGURES (Con't)**

- Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Renton Road (1991 Without Project)
- Estimates of Maximum 1-Hour Carbon Monoxide Concentrations: Fort Weaver Road at West Loch Estates, AM-Peak Hour - Road "A" (1991 With Project)
AIR QUALITY IMPACT REPORT
WEST LOCK ESTATES

1. INTRODUCTION

West Lock Estates is a two-phase residential development being proposed for construction on some 235 acres of sugarcane lands along Fort Weaver Road in the Ewa District of Oahu. Phase I calls for the completion of 366 homes by 1991 while Phase II includes an additional 916 dwellings by 1997.

The purpose of this report is to assess the impact of the proposed development on air quality both on a local and regional basis. The overall project is clearly an "indirect source" of air pollution as defined in the federal Clean Air Act [1] since its primary association with air pollution is due to its inherent generation of mobile source, i.e., motor vehicle activity. Each of the focus of this analysis therefore is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing (1990) and future (1991 & 1997) conditions.

Residential projects such as this also have off-site impacts due to increased demand for electrical energy which must be met through the combustion of some type of fuel. Disposal of the refuse generated by the residents will also result in offsite impact as it will most probably be burned in the City's proposed resource recovery facility. Both of these combustion processes result in pollutant emissions to the air which have been addressed.

Finally, during construction of the various buildings and facilities air pollutant emissions will be generated due to vehicular movement, grading and general dust-generating construction activities. These impacts have also been addressed.

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1 [2, 3]. Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [4].

Some of Hawaii's standards are clearly more stringent than their federal counterparts but, like their federal counterparts, may be exceeded once per year. It should also be noted that in April, 1986, the Governor signed amendments to Chapter 59 (Ambient Air Quality Standards) making the state's standards for particulate matter and sulfur dioxide the same as national standards. In the case of particulate matter, however, this uniformity did not last long. On July 1, 1987, the EPA revised the federal particulate standard to apply only to particles 10 microns or less in diameter (PM-10) [5], leaving the state once again with standards different than the federal ones.

In the case of the automotive pollutants (carbon monoxide (CO), oxides of nitrogen (NOx), and photochemical oxidants (Ox)), there are only primary standards. Until 1983, there was also a hydrocarbons standard which was based on the precursor role hydrocarbons play in the formation of photochemical oxidants rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January, 1983 [6].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the federal standards in light of new research findings [7]. The last review resulted in the relaxation of the oxidant standard from 160 to 240 micrograms/cubic meter (mg/m3) [8]. The carbon monoxide (CO), particulate matter, sulfur dioxide (SO2), and nitrogen dioxide (NO2) standards are currently under review, but final action has not been taken yet [9].

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [10]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

The two nearest State Department of Health air monitoring stations to the project area are located at the Campbell Industrial Park about 6 miles to the southwest and at Pearl City, some 10 miles to the northeast. The State Department of Health has monitored air quality at the park since 1971, and a summary of the data is presented in Table 2. Total suspended particulates (TSP), sulfur dioxide (SO2), and nitrogen dioxide (NO2) were all monitored on a 24-hour basis. Initially, the site was at the Barbers Point Lighthouse, but the proximity to the ocean resulted in very high TSP levels due to salt spray. The station was therefore moved to the Chevron Refinery site about 1.7 kilometers north of the lighthouse on March 17, 1972. In 1976, NO2 monitoring was ceased. On August 7, 1979, the monitoring station was moved to a rooftop location at the base Chevron site.
It should also be noted that level suspended particulate monitoring with a high-volume sampler was ceased at the site in October, 1987. In November, 1987, a new PM-10 sampler was installed. This instrument measures respirable particulate matter under 10 microns in aerodynamic diameter. PM-10 and SO2 monitoring data for 1986 are summarized in Table 3. Table 4 lists PM-10 and TSP data at the Pearl City site for calendar year 1986.

It is evident from the data in Tables 2, 3 and 4 that both the National Ambient Air Quality Standards (NAAQS) and Hawaii Ambient Air Quality Standards (HAQS) are being met at those monitoring sites.

Because the Campbell Industrial Park monitoring station is situated relatively close to the elevated sources, i.e., the stacks, located at the industrial park, the data collected may not be representative of the highest ambient pollutant levels resulting from the various industrial sources at the park. Computer modeling done in conjunction with the City's resource recovery facility permitting indicated maximum SO2 concentrations occurring some 1.0 to 1.5 kilometers north of the park in the flat terrain as well as on the hillside also north of the park.

Unfortunately, there are no routine monitoring data for the primary automotive pollutant, i.e., carbon monoxide. The nearest CO monitoring site is at the Department of Health building in downtown Honolulu some 11 miles east-southeast of the project area. Because the area is presently at an early stage of development, it can be surmised that present CO levels are also relatively low.

A spot sampling of carbon monoxide concentrations along Fort Weaver Road was conducted during two recent a.m. peak hour traffic periods as part of this impact analysis. The results were as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Date/Time</th>
<th>Wind Direction</th>
<th>Wind Speed</th>
<th>1-Hour CO Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 m east of</td>
<td>17 Sep 87 Thursday</td>
<td>NE</td>
<td>3-5 kts</td>
<td>3.4 mg/m³</td>
</tr>
<tr>
<td>Fort Weaver Road</td>
<td>at eastbound H-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on-ramp of Kunia</td>
<td>6-7 am</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 m east of</td>
<td>22 Sep 87 Tuesday</td>
<td>W</td>
<td>2-7 kts</td>
<td>2.8 mg/m³</td>
</tr>
<tr>
<td>Fort Weaver Road</td>
<td>near Project access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-7 am</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that during the September 17, 1987 sampling, the monitoring instrument was located upwind of the Fort Weaver Road traffic due to the light northwesterly winds; thus, the low CO levels measured were due to vehicles operating on the P-i freeway upwind (northeast) of the sampling site.

During the September 22, 1987 sampling, onsite winds were very light and at times calm. During the calm periods, CO concentrations leveled off at about 0.0 - 1.5 mg/m³.

4. CLIMATE & METEOROLOGY

Weather conditions in the project area are typical of sites located on the leeward coast of Oahu. Long-term climatic data collected at Barbers Point Naval Air Station indicate mean daily maximum and minimum temperatures of 81 and 69 degrees Fahrenheit, respectively; mean annual rainfall of 20.3 inches; and prevailing winds from the northeast at 9 knots [11]. Annual rainfall is of interest because of its role in particulate matter removal from the atmosphere, while wind speed and direction are determinants of pollutant concentration and potential receptor exposure. Atmospheric stability is an important factor in determining the potential for air pollution problems.

Historical data from Honolulu International Airport were reviewed and indicated a seasonal variation in wind direction. This winter-summer disparity is clearly shown in Figures 1 and 2 which depict January and August wind roses.

Historical meteorological data from Barbers Point NAS which had been processed using the Turner method were also reviewed [14,15,16]. They confirmed the annual predominance of northwesterly trade winds, but also indicated a significant occurrence of onshore winds primarily associated with a midday surface observing high pressure. A screening of the 1967 - 71 Barbers Point surface observations indicated SE to SW winds occurred 64 - 1,032 hours per year. This is equivalent to 6.5 - 11.6% of the time.

Secondly, they indicate that almost 25% of the time is about moderately unstable conditions exist. Such conditions are conducive to bringing smoke plumes from elevated sources, e.g., stack down, to the ground within a relatively short distance downwind. Somewhat surprisingly, the data also show a
very significant percentage (45%) of stable air conditions which tend to carry plumes largely intact for great distances. Such conditions can result in high pollutant concentrations if the plume reaches hills which are at approximately the same height as the stack. Such stable conditions can also contribute to high pollutant concentrations if they coincide with peak traffic hours because automotive pollutants are emitted close to the ground.

5. MOBILE SOURCE IMPACT

5.1 Mobile Source Activity. A traffic impact report was prepared for the proposed development and served as the basis for this mobile source impact analysis [17]. Existing and projected p.m. peak-hour volumes for 1991 and 1997 at the following intersections with Fort Weaver Road were provided:
- Project Access Road "A"
- Project Access Road "B"
- Renton Road

Average daily hour-by-hour distributions for 1995 and 1997 were also provided. Morning peak-hour volumes were estimated based on the a.m. peak/ADT and p.m. peak/ADT ratios. A 6:00 - 7:00 a.m. traffic count made during the September 22, 1997 CO sampling indicated northbound traffic on Fort Weaver Road at 1227 vph and southbound at 131 vph which was consistent with the estimates.

5.2 Mobile Source Emission Factors. Carbon monoxide (CO) emission factors for vehicles were generated using the MOBILE-3 emissions model [18]. The emission factors were localized by use of the age distribution of registered vehicles in the City & County of Honolulu [19]. Fraction of vehicle miles travelled (VMT) was assumed to be directly proportional to the registration distribution. Emission factors were based on traffic speeds ranging from 10 - 40 mph depending on the volumes on each leg of the intersections. Intersections were assumed to be signalized with green/cycle ratios proportional to approach demands. Queue lengths and emission strengths at intersection approaches were determined by an EPA method [20].

5.3 Modeling Methodology. While emissions burden analysis is one means of evaluating a project's impact, it is generally more important to estimate the ambient impact since air quality standards are expressed as ambient concentrations, and it is the ambient concentrations to which living things are exposed. Computer modeling is normally employed to generate these ambient concentration estimates, most commonly with non-active pollutants. This is due to the complexity of modeling pollutants which undergo chemical reactions in the atmosphere and are subject to the effects of numerous physical and chemical factors which affect reaction rates and products. For projects involving motor vehicles as the principal air pollution source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (about 1 month) [21], and it comprises the largest fraction of automotive emissions.

The EPA guideline model CALINE-3 [22,23] was employed to estimate maximum 1-hour CO concentrations at receptor locations 10 - 40 meters from the intersection during the worst-case AM peak hour traffic. Worst-case meteorological conditions were selected accordingly.

Because of the time of day of the analysis (AM peak hour), the currently low level of urbanization in the area which would otherwise contribute to a "heat island" effect and increased turbulence, a stable atmosphere (Pasquali-Clifford Class "P") [24] and 1 meter per second (m/sec) wind speed were assumed as worst-case meteorological conditions. A background CO level of 1.0 milligram/cubic meter (mg/m³) was also assumed to account for the existing low level of traffic activity.

Preliminary modeling with 15, 45, 70, 80, and 90 degree wind-road angles with Fort Weaver Road indicated that the 15 degree angle would produce the maximum pollutant concentrations; thus, this angle was input to the CALINE-3 model. Specifically, due to the traffic volumes and predicted queuing, north-northwest winds direction were used for the "worst-case" analysis. In subsequent runs, north-northeast winds (yielding similar wind/road angles) were used because of their greater frequency.

5.4 Results: 1-Hour Concentrations. The results of the modeling for existing conditions are presented in Figures 3 - 5 for the three intersections under study. It is evident that both state and federal 1-hour CO standards appear to be met even under "worst-case" conditions of traffic, meteorology, and receptor location. The modeling results are also of the same magnitude as the CO samples collected on September 17 and 22, 1997 during a.m. peak-hour traffic.

Figures 6 through 8 depict the predicted CO concentrations at the intersections in 1991 if the proposed project were not built. The results suggest that the state's 1-hour CO standard of 10 mg/m³ may be exceeded, but the federal standard (40 mg/m³) would not. Note that the possible exceedence occurs within 10 meters of the roadway, and that concentrations drop off rather sharply with distance from the intersection.
The modeling results for the 1991 "with project" scenario are presented in Figures 9 through 11. The possibility of exceedences of the state standard out to 40 meters from the intersection is indicated. Again, however, the federal standard still appears to be met.

In 1997 with the project, predicted CO levels again show possible exceedences of the State standard, but only at the Road "A" and Road "B" intersections (Figures 12 and 13). Concentrations in the Renton Road area appear to have dropped back below the standard (Figure 14).

5.5 Results: 8-Hour Concentrations. Estimates of 8-hour concentrations can be derived by applying a "persistence" factor of 0.6 to the 1-hour concentrations. This "persistence" factor is recommended in an EPA publication on indirect source analysis [14] and has been further corroborated by analysis of carbon monoxide monitoring data in Honolulu which yielded the same 8-hour-to-1-hour ratio [25]. When using this approach any 1-hour CO concentration greater than 8.4 mg/m³ would indicate exceedence of the State's 8-hour standard. Similarly, any 1-hour concentration over 16.7 mg/m³ would indicate exceedence of the federal 8-hour standard.

Applying this factor to the 1-hour results indicates compliance with federal (10 mg/m³) and state (5 mg/m³) 8-hour standards under existing conditions. Violations of the State's standard, however, are indicated for 1991 and 1997 both with and without the project. For the "with project" scenarios in 1991 and 1997, exceedence of the federal standard also appears possible.

5.6 Correlation With Meteorological Data. In light of the high CO levels predicted for the intersections under study, a more detailed analysis of the Barbers Point meteorological data was undertaken in order to estimate the frequency of occurrence of these high concentrations. First, five years (1967-71) of meteorological data were screened for the occurrence of "worst-case" conditions, i.e., 8 m/sec wind in a stable atmosphere (Pequignot-Gifford Category "F"), during the 6:00 - 8:00 a.m. period. None were found. A total of three hours out of the five years had similar conditions except 1.5 m/sec wind speed.

Next, the highest 1-hour CO scenario (Figure 10) was rerun with less stable conditions (Categories "E" and "D") in order to see if standards exceedances would still show up. The results of this modeling are depicted in Figures 15 and 16. The predicted concentrations are less than the "worst-case" levels but still indicate exceedence of the State 1- and 8-hour standards.

The meteorological data were again screened, this time for the frequency of 1 m/sec N/E winds and "E" and "D" stability. In two

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Total: 37 10.18

Finally, wind data for the September - December, 1984 and January - February, 1985 period were manually screened in an effort to identify the "worst-case" 8-hour period. These months were selected because of the predominance of trade winds during the other months of the year and the greater likelihood of lower wind velocities during the Fall and Winter seasons. Because of the hourly traffic volume distribution along Fort Weaver Road, the screening focused on the 6:00 a.m. to 2:00 p.m. period. The screening criteria included:

- low wind speed
- consistent wind direction
- atmospheric stability

of the five years, there were two hours for "E" and one hour for "D" during the specified morning hours. Again, the frequency of occurrence was very low.

Given knowledge of the greater frequency of NE winds in Hawaii, a modeling run was made with 1 m/sec NE (45 degrees) winds and "F" stability. The results in Figure 17 indicate exceedence of the State 1-hour standard and imply exceedence of the State and federal 8-hour standards. The high concentrations, however, do not appear to extend as far from the roadway as under the N/W wind conditions.

A screening of the 1971 and 1984 Barbers Point wind data indicated the following frequencies of 1 m/sec NE (30 - 60 degrees) winds and "F" stability:

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- low wind speed
- consistent wind direction
- atmospheric stability

of the five years, there were two hours for "E" and one hour for "D" during the specified morning hours. Again, the frequency of occurrence was very low.

Given knowledge of the greater frequency of NE winds in Hawaii, a modeling run was made with 1 m/sec NE (45 degrees) winds and "F" stability. The results in Figure 17 indicate exceedence of the State 1-hour standard and imply exceedence of the State and federal 8-hour standards. The high concentrations, however, do not appear to extend as far from the roadway as under the N/W wind conditions.

A screening of the 1971 and 1984 Barbers Point wind data indicated the following frequencies of 1 m/sec NE (30 - 60 degrees) winds and "F" stability:
Three days (4 Sep 84, 25 Nov 84, and 4 Jan 85) were selected as offering the greatest promise of maximum 8-hour CO concentrations. All three days tended to have low wind velocities. The predominant wind was from the west with high stability (Class "F") in the early hours followed by neutral stability (Class "G") during the main period. Most of the rejected data had either changes in wind direction in mid-afternoon due to onset of the marine layer or simply higher wind speeds.

The hourly meteorological and traffic data for these three 8-hour periods was combined with the "worst-case" year (1991) and run in the CANER-3 model. The results are presented in Table 5. The highest concentration, 7.3 mg/m³, indicates exceedance of the state but not the federal 9-hour standard.

5.4 In-Car CO Levels. It should also be noted that operators and passengers can be exposed to levels of carbon monoxide inside vehicles significantly higher than that indicated by the microscale ambient air quality impact analysis. This exposure is, of course, exacerbated as congestion increases. When volume capacity ratios reach the 0.90 - 1.0 range and service levels drop to 5 and 6, this occurs. With vehicles at idle or very low speed, CO emissions increase sharply and the occupants of the vehicles are delayed in traffic; thus, for both reasons their CO exposure increases sharply. Unfortunately, there is currently no standardized methodology to estimate this exposure, and this particular instance, these conditions might occur during portions of a commute trip to Honolulu.

Carbon monoxide measurements were made during one such commute on September 22, 1987. The trip originated at the center of the city on the islands, proceeded to the K-l eastbound on-ramp, then east on the 95-H to the Vineyard Street off-ramp, and terminated in the vicinity of the Cultural Plaza on North Kukui Street. The commute began at 7:30 a.m. and thus was near the end of the usual rush hour traffic. The total trip time was 33 minutes and the average CO level in the vehicle was 12.8 mg/m³. This is comparable to levels found during a previous study of a.m. peak hour commutes along the H-1 Highway [24].

6. STATIONARY SOURCE IMPACT

6.1 Electrical Generation. The estimated 10,800 kilowatt hours of annual electrical demand within the city is equivalent to the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated by the Hawaiian Electric Company's Waimea Power Station located near Waimea on the leeward coast. This is currently a six-unit, approximately 650-megawatt facility firing low-sulfur fuel oil. A seventh 150-megawatt unit has been recently proposed [27], and in the future some units may fire a coal-derived fuel, but for the purposes of this analysis, coal-firing was assumed. Estimates of annual emissions were computed based on EPA emission factors and the fuel required to meet 10.8 million kWh demand. The results are presented in Table 6.

6.2 Solid Waste Disposal. The refuse generated by the residents of the 1.5 million homes in West Loch Estates will require disposal. Presently, about 60% of Oahu's refuse is being disposed of in the remaining 200 being burned at the Maipalani landfill. In the future, most refuse will be burned at the City's proposed resource recovery facility. Estimates of annual emissions attributable to the combustion of West Loch Estates refuse at that facility are included in Table 6.
pollutants to the Ewa air. The responsible government agencies will have to watch the situation closely to ensure that standards continue to be complied with.

8. SHORT-TERM IMPACT

The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along Fort Weaver road as well as in the vicinity of the project site itself. Because of the moderate existing off-peak traffic volumes, the additional construction vehicle traffic should not exceed road capacities although the presence of large trucks can reduce a roadway's capacity as well as lower average travel speeds.

The site preparation and earth moving will create particulate emissions as well building and on-site road construction. Construction vehicles movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderatesilt content (40%), and a precipitation/evaporation (P/E) index of 50 [31,32].

The principal soil type in the project area is a Horomauli clay with a silt content of about 30%. The precipitation/evaporation (P/E) Index for the area is 39. Compared to the EPA estimates and conditions, it would appear that there is a somewhat greater potential for fugitive dust due to the drier local climate, i.e., P/E Index of 39 versus 50.

9. DISCUSSION AND CONCLUSIONS

9.1 Mobile Source Impacts

The presence of project-generated traffic will clearly increase the probability that state 1-hour and 8-hour CO standards will be exceeded within 40 meters of Fort Weaver Road by 1991 and later. Due to the federal motor vehicle control program [33], ambient levels could decline by 1997 and beyond unless offset by additional traffic generated by non-residential development.

Exceedance of the federal 1-hour CO standard does not seem likely, but there appears to be a non-zero probability that the 8-hour standard could be exceeded in close proximity (within 20 meters) of Fort Weaver Road. Whether or not there will be a simultaneous occurrence of human exposure within that distance and timeframe will depend on the nature of development in the area.

9.2 Stationary Source Impacts

The emissions estimates may be compared to the 1980 county emissions inventory in Table 7 in order to provide some perspective on their significance. The project's contribution to county emissions appears to be less than 1%.

9.3 Other Long-Term Impacts. As noted in Section 7, there will be at times exposure to the smoke from agricultural field burning. Until urbanization entirely replaces sugar cane cultivation in the Ewa District, this will result in some human exposure and complaints about cane fire smoke. The State Department of Health and federal EPA have indicated that they are continuing efforts to better characterize the exposure and potential health affects [34]. Depending on the results of those efforts, the smoke exposure may be reduced or eliminated before cane cultivation ceases in Ewa.

In the case of industrial air pollution sources at Campbell Industrial Park, the likelihood of those sources significantly affecting West Loch Estates seems rather low given the distance (about 7 miles) and low frequency of winds which would carry source emissions toward the development. A screening of the 1981-71 wind data from Barbers Point indicated about 0.5 - 1% of the time winds were heading from the industrial park toward West Loch Estates.

9.4 Short-Term Impacts. Since as noted in Section 6, there is a potential for fugitive dust due to the dry climate and fine soils, it will be important for adequate dust control measures to be employed during the construction period. Dust control could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50%. The nearest possible landscaping of completed areas will also help.

9.5 Conclusions. Based on the foregoing analysis, the following conclusions may be drawn:

- The proposed project will result in increased air pollutant emissions due to its inherent traffic generation ability, and its requirement for electrical power and solid waste disposal;
- The addition of project-related traffic will increase the probability of exceedance of state 1-hour and 8-hour carbon monoxide standards within 40 meters of Fort Weaver Road by 1991 and later;
- Project-related traffic will also contribute to the small probability that the federal 8-hour carbon monoxide standard will be exceeded within 20 meters of Fort Weaver Road;
- Annual emissions of criteria pollutants due to electrical generation and solid waste disposal attributable to West Loch Estates will increase county emissions by less than 0.1%; and
- Due to the relatively dry climate and fine soil in the area, dust control measures during construction will be important to prevent violations of state fugitive dust standards.

9.6 Mitigation Measures. The principal means available to reduce the predicted CO concentrations are:
- improve intersections to increase capacity
- increase bus service to area
- encourage car-pooling
- modify business/school starting hours
- develop mass transit system
- restrict residential development

REFERENCES

10. State of Hawaii. Title 11, Administrative Rules, Chapter 60, Air Pollution Control.
REFERENCES (Con't)

19. City & County of Honolulu, Department of Data Systems. Age Distribution of Registered Vehicles in the City & County of Honolulu (unpublished report), September, 1986.

REFERENCES (Con't)

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### Table 2
**AIR MONITORING DATA**
**CAMPBELL INDUSTRIAL PARK**
**1971-80**

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**NOTES:**
1. TSP = total suspended particulates
2. \( \text{SO}_x \) = sulfur dioxide
3. \( \text{NO}_x \) = nitrogen dioxide
4. \( \text{NO}_x \) = number of violations of state air quality standard
5. All concentrations are in micrograms per cubic meter of air.
6. Sampling station was moved from a floor level to a rooftop on 7 August 1973.
7. The sampling station was moved from a floor level to a rooftop on 17 March 1972.
8. Source: State Department of Health

### Table 3
**TEMP & SO2 MONITORING DATA**
**BARRIERS POINT, OHIO**
**1986**

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**ANNUAL**
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**SOURCE:** Department of Health
| TABLE 4 | PM-10 & TSP MONITORING DATA |
| PEARL CITY, OAHU | 1986 |

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<td>27</td>
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| ANNUAL | 60 | 17 | 65 | 30 | 60 | 9 | 32 | 16 |

**SOURCE:** Department of Health

| TABLE 5 | Estimates of Maximum 8-Hour Carbon Monoxide Concentrations in the Vicinity of the Fort Weaver Road - Road 14 intersection 1991 |

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<th>Hours/ Receptor</th>
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**Meteorological data:** 4 Jan 85

| TABLE 6 | Hourly CO Concentrations (mg/mL) |

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**Meteorological data:** 26 Nov 84
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Meteorological data: 8 Sep 84

### TABLE 6

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<td>TOTAL IN TONS PER YEAR</td>
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FIGURE 3
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
AM-Peak Hour - Road "A" (1987)

| 358 deg | Fort Weaver Road |
| 9 deg   | Road "B" |

azimuth

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NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 358 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3

FIGURE 4
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
AM-Peak Hour - Road "B" (1987)

| 9 deg | Fort Weaver Road |
| 9 deg | Road "B" |

azimuth

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NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 360 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3
**Figure 5**

Estimates of Maximum 1-Hour Carbon Monoxide Concentrations

Fort Weaver Road at Renton Road

**An-Peak Hour - Renton Road (1987)**

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<td>2.3</td>
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</table>

**Notes**

- CO concentrations = milligrams per cubic meter (mg/m³)
- Receptor spacing = 10 meters
- Wind direction = 332 deg
- Wind speed = 1 meter per second (m/s)
- Atmospheric stability = "F" (P-G Class 6)
- Background CO concentration = 1.0 mg/m³
- Emissions model: EMBILE-3

**Figure 6**

Estimates of Maximum 1-Hour Carbon Monoxide Concentrations

Fort Weaver Road at West Loch Estates

**An-Peak Hour - Road "A" (1981 Without Project)**

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</table>

**Notes**

- CO concentrations = milligrams per cubic meter (mg/m³)
- Receptor spacing = 10 meters
- Wind direction = 343 deg
- Wind speed = 1 meter per second (m/s)
- Atmospheric stability = "F" (P-G Class 6)
- Background CO concentration = 1.0 mg/m³
- Emissions model: EMBILE-3

Emissions model: EMBILE-3
FIGURE 7
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCH ESTATES
AM-Peak Hour - Road "B" (1991 Without Project)

90 deg
axis
Fort Weaver Road

Road "B"

347 deg
axis
Fort Weaver Road

Rantone Road

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NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind speed: 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3

FIGURE 8
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT RENTON ROAD
AM-Peak Hour (1991 Without Project)

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<th>3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>deg</td>
<td>9.3</td>
<td>6.9</td>
<td>3.3</td>
<td>3.0</td>
</tr>
<tr>
<td>deg</td>
<td>10.2</td>
<td>7.0</td>
<td>3.5</td>
<td>4.4</td>
</tr>
</tbody>
</table>

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind speed: 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3
FIGURE 9
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
ALL-PAY Hour – ROAD "A" (1999 WITH PROJECT)

256 deg

9 deg

azimuth

azimuth

Road "A"

Road "B"

19.4 17.2 14.7 12.5
16.8 16.4 14.0 12.0
16.2 15.6 13.8 11.7

19.8 17.6 15.2 12.9
17.0 16.7 14.4 12.4
16.4 15.8 14.0 12.0

NOTES
CO concentrations = alligpess per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 312 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3

FIGURE 10
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
ALL-PAY Hour – ROAD "B" (1999 WITH PROJECT)
FIGURE 11
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT RENTON ROAD
AN-PEAK HOUR (1991 WITH PROJECT)

345 deg
azimuth

Fort Weaver Road

Renton Road

11.7 9.0 6.6 4.4
12.1 9.0 6.8 4.8
12.5 9.3 7.1 5.1

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 345 deg
Wind speed = 3 meter per second (m/s)
Atmospheric stability = "F" (P-O Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3

FIGURE 12
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCH ESTATES
AN-PEAK HOUR - ROAD "A" (1997 WITH PROJECT)

358 deg
azimuth

Fort Weaver Road

Road "A"

17.3 15.2 12.9 4.9
14.8 14.6 12.4 9.2
13.3 14.0 12.2 8.6

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 358 deg
Wind speed = 3 meter per second (m/s)
Atmospheric stability = "F" (P-O Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3
### FIGURE 12
**ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS**

**FORT WEAVER ROAD AT WEST LOCK ESTATES**

An-peak hour: Road "B" (1997 with Project)

<table>
<thead>
<tr>
<th>9 deg</th>
<th>347 deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.3</td>
<td>9.0</td>
</tr>
<tr>
<td>14.3</td>
<td>6.7</td>
</tr>
<tr>
<td>14.9</td>
<td>6.9</td>
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<tr>
<td>17.7</td>
<td>4.6</td>
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<td>11.2</td>
<td>3.4</td>
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<tr>
<td>12.6</td>
<td>5.3</td>
</tr>
<tr>
<td>10.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Road "B"

**NOTES**
- CO concentrations = milligrams per cubic meter (mg/m³)
- Receptor spacing = 10 meters
- Wind direction = 354°
- Wind speed = 1 meter per second (m/s)
- Atmospheric stability = "F" (P-G Class 6)
- Background CO concentration = 1.0 mg/m³
- Diffusion model: CALINE-3
- Emission model: MOBILE-3

### FIGURE 14
**ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS**

**FORT WEAVER ROAD AT RENTON ROAD**

An-peak hour: 1997 with Project

<table>
<thead>
<tr>
<th>347 deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.6</td>
</tr>
<tr>
<td>7.0</td>
</tr>
<tr>
<td>5.3</td>
</tr>
<tr>
<td>3.7</td>
</tr>
</tbody>
</table>

Renton Road

**NOTES**
- CO concentrations = milligrams per cubic meter (mg/m³)
- Receptor spacing = 10 meters
- Wind direction = 332°
- Wind speed = 1 meter per second (m/s)
- Atmospheric stability = "F" (P-G Class 6)
- Background CO concentration = 1.0 mg/m³
- Diffusion model: CALINE-3
- Emission model: MOBILE-3
FIGURE 15
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
A.M.-PEAK HOUR (1991 WITH PROJECT)
(STABILITY "B")

9 deg

exposure

Fort
Weaver
Road

Road "B"

14.7 13.2 11.5 10.3
13.0 12.0 10.5 9.3
12.3 11.2 10.0 8.9

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 294 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "E" (P-G Class 3)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3

FIGURE 16
ESTIMATES OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
A.M.-PEAK HOUR (1991 WITH PROJECT)
(STABILITY "B")

9 deg

exposure

Fort
Weaver
Road

Road "B"

12.1 10.9 9.7 8.7
10.8 9.7 8.6 7.6
11.4 8.7 7.9 7.4

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 294 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "E" (P-G Class 3)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: MOBILE-3
FIGURE 17
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
FORT WEAVER ROAD AT WEST LOCK ESTATES
AM-Peak hour (1991 with project)
(Northeast Wind)

<table>
<thead>
<tr>
<th>9 deg</th>
<th>Fort Weaver Road</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
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<table>
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<td>5.3</td>
<td>7.6</td>
<td>13.3</td>
</tr>
<tr>
<td>5.1</td>
<td>7.0</td>
<td>11.8</td>
<td>19.1</td>
</tr>
</tbody>
</table>

NOTES
CO concentrations = milligrams per cubic meter (mg/m³)
Receptor spacing = 10 meters
Wind direction = 90 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (F-G Class 6)
Background CO concentration = 1.0 mg/m³
Diffusion model: CALINE-3
Emissions model: NBIL-3
APPENDIX E

Archaeological Reconnaissance Survey
For Environmental Impact Statement
West Loch Estates - Residential Increments I and II
Land of Honolulu
Ewa District, Island of Oahu

by

PAUL H. ROSENDAHL, Ph.D., INC.
Consulting Archaeologist

September 1987
ARCHAEOLOGICAL RECONNAISSANCE SURVEY
FOR ENVIRONMENTAL IMPACT STATEMENT
WEST LOCH ESTATES - RESIDENTIAL INCREMENTS I AND II

Land of Honouliuli
Ewa District, Island of Oahu

September 1987

by
Paul H. Rosendoahl, Ph.D.
Principal Archaeologist

Prepared for
City and County of Honolulu
c/o R.M. Towill Corporation
677 Ala Moana Blvd., Suite 1016
Honolulu, Hawaii 96813

September 1987

305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 or 966-8038
INTRODUCTION

BACKGROUND

At the request of Mr. Chester King of R.M. Towill Corp., acting for their client, the City and County of Honolulu, Paul R. Rosendahl, Ph.D., Inc. (PUR) conducted a combined surface and subsurface archaeological reconnaissance survey of the approximately 122 ac West Loch Estates - Residential Increment I and II project area in Honolulu, Oahu, Island of Oahu. The primary objective of this survey was to provide information concerning the presence or absence of any sites or features of possible archaeological significance within the project area, adequate for the Environmental Impact Statement (EIS) being prepared in accordance with Chapter 345-Rev. Stat. and in anticipation of a Land Use Boundary District Amendment petition to be submitted to the State Land Use Commission.

Reconnaissance survey field work was carried out during the period July 20-September 15, 1985, under the supervision of PUR, Principal Archaeologist Dr. Paul R. Rosendahl (Principal Investigator) and PUR, Site Supervisor-Archaeologist Mr. A. Merrill Dick (Project Field Director). Approximately 30 man-houres of labor were expended in carrying out the field work. An oral report on field work findings and preliminary conclusions was given to Mr. Chester King of R.M. Towill Corp. on September 14, 1985. Field work findings were also discussed with Dr. Joyce Bith, staff archaeologist for Oahu in BLM-HST. The present report constitutes the final report on the reconnaissance survey.

SCOPE OF WORK

The goal of the reconnaissance survey was to identify—and locate on available maps—sites and features of potential archaeological significance. A reconnaissance survey comprises the initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological resources within a specified project area. Reconnaissance survey indicates both the general nature and variety of archaeologica remain present, and the general distribution and density of such remains. A reconnaissance survey permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendatons and estimates for further work as might be necessary or appropriate. Such work could include intensive survey—data collection involving detailed recording of sites and features, and selected test excavations; and possibly subsequent mitigation—data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural value.
The principal objectives of the combined reconnaissance survey of the West Loch Estates - Residential Increments I and II project area were:

1. To review and evaluate available archaeological and historical literature relevant to the immediate project area;

2. To conduct a combined surface and subsurface survey of the approximately 225 acre project area to determine the presence or absence of any potentially significant archaeological remains;

3. To determine the nature of the physical conditions of the project area that would influence the conduct of any subsequent archaeological field work, should such be necessary; and

4. To prepare an appropriate scope of work (including specific field work and other non-field tasks) and accurate man-hour estimates for any subsequent archaeological work that might be necessary.

The potential significance of any archaeological remains identified during the combined reconnaissance survey was to be evaluated in terms of the National Register criteria contained in 36 CFR Part 60, Section 6. The State Department of Land and Natural Resources-Historic Sites Section (DLNR-HIS) uses these criteria to evaluate eligibility for both the State of Hawaii and National Register of Historic Places. It was anticipated that the potential significance of any identified remains would most likely relate to National Register criterion (d), which refers to remains "...that have yielded, or may be likely to yield, information important in prehistory or history". Once potential significance had been tentatively evaluated, DLNR-HIS would consult in order (a) to determine and fix formally the significance of the remains, and (b) to determine appropriate mitigation actions to be undertaken.

In order to facilitate future cultural resource management decisions regarding site treatments, any significant sites identified within the project area would also be evaluated in terms of three value nodes - scientific research, interpretive, and cultural values - which are derived from the previously mentioned State and National Register eligibility criteria. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural values, within the framework for significance evaluation used here, refer to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

PROJECT AREA DESCRIPTION

The West Loch Estates - Residential Increments I and II project area consists of approximately 322 acres located in the area of Honolulu, Ewa District, Island of Oahu. Comprised of two non-contiguous parcels separated by the Honolulu Stream floodplain, the project area includes two parcels:

- Parcels A and B - the 116-acre parcel located in the area of the Ewa Plain in the southwest part of Oahu, immediately east of and adjacent to the West Loch of Pearl Harbor (Figure 1). Increment I (66 ac) is bounded by Fort Weaver Road on the west, the adjacent light industrial area of Wai'anae on the north, the approximate limits of the railroad (roughly the 20-ft contour) and a portion of the rail line (approximately 100 feet). The Increment II (50 ac) is bounded by Fort Weaver Road on the west, the railroad (approximately 100 feet) on the northeast, and the railroad (about the 20-ft contour) on the southeast.

- Parcels C and D - the 166-acre parcel located in the area of the Ewa Plain in the southwest part of Oahu, immediately east of and adjacent to the West Loch of Pearl Harbor (Figure 1). The Increment I (66 ac) is bounded by Fort Weaver Road on the west, the railroad (approximately 100 feet) on the northeast, and the railroad (about the 20-ft contour) on the southeast. The Increment II (50 ac) is bounded by Fort Weaver Road on the west, the railroad (approximately 100 feet) on the northeast, and the railroad (about the 20-ft contour) on the southeast.

Comprised almost entirely of land owned by the Estate of James Campbell and leased by Oahu Sugar Company, the entire project area has been extensively modified in recent times, primarily by sugarcane cultivation. The Increment I land has recently been fallowed, and has a low, variable density cover of weeds and shrubs. The Increment II land is currently mostly under cultivation by Oahu Sugar Company, and most of the land therefore has a dense cover of sugarcane (Saccharum spp.). Other grasses and scattered stands of vegetation (Leaves plantaginis var. ruth.) are present primarily as a fringe along shallow gullies and drainages that cut through the project area and as a cover on very steep, uncultivated slopes.

PREVIOUS ARCHAEOLOGICAL WORK

Although no archaeological remains are known to exist within the project area, an extension component of one previously identified site is situated immediately adjacent to it. While the portion of the Oahu Railroad and Land Company Right-of-Way (railroad) which bounds the
Field Methods and Procedures

Reconnaissance survey field work conducted during the period July 28–September 11, 1997 by PHRI completed limited systematic pedestrian coverage and subsurface sampling, and a combination of vehicular coverage and pedestrian point inspections. Field work was greatly facilitated by black-and-white aerial photographs (approx. scale 1"=8000'; R.M. Towill, Photo No. 8-B17-2, 5/13/84, and Photo No. 2-2005-4, 7/26/87), and a blue line topographic map (scale 1"=2000', 4'-contour; R.M. Towill, based on 7/26/87 aerial photogrammetry). Systematic pedestrian coverage concentrated on those very limited portions adjacent to several shallow gullies and depressions and the very steep slopes which, on the basis of the aerial photographs and initial field inspection, appeared to have been least modified by sugarcane cultivation and other activities. The combination of vehicular coverage and pedestrian point inspections was used to check accessible locations throughout the project area primarily to verify the essentially total modification of the project area in recent times by sugarcane cultivation. Subsurface testing was limited in scope, and consisted of facing-off vertical auger holes and digging shallow pits and short trenches in areas suspected of possibly having subsurface cultural deposits. Excavated fill was processed through 0.25 in. mesh screens to facilitate recovery and recognition of potential cultural remains.

All identified sites were assigned sequential temporary field numbers prefixed with "T-", beginning with T-1. The location of sites identified during the reconnaissance was plotted onto a field copy of the 1"=2000' scale topographic map. A standard PHRI site survey record form was completed for each site. Sketch maps of sites were drawn where appropriate. Sites and features were photographed using 35 mm black-and-white film (PHRI Field Staff No. 322-1). Each site, or the primary feature of each site complex, was marked with blue plastic flagging tape and tagged with an aluminum tag denoting temporary site number, PHRI project number (87-222), the letters "PHRI", and the date.
FIELD WORK FINDINGS

Only four archaeological sites were identified within the West Loch Estates — Residential Increments I and II project area. These sites are summarized in Table I according to formal type, tentative functional interpretation, significance evaluation (in terms of value nodes), recommended further field work tasks, and comments. Site locations are indicated in Figure 1, based on the preliminary review of available documentary literature and records, and on surface reconnaissance field work observations. It is considered quite likely that potentially significant sites are present on both the immediately adjacent Honolulu Stream floodplain and the shoreline areas along the West Loch of Pearl Harbor; however, these areas are outside the limits of the West Loch Estates — Residential Increments I and II project area, and are being investigated during the currently in progress combined surface and subsurface reconnaissance survey of the West Loch Estates — Golf Course and Shoreline Park project areas.

SITE DESCRIPTIONS

Site T-1 Hidden Deposit (7)

This site is located at the southeast tip of the Increment I portion of the project area. It is comprised of a band of marine shell in a soil matrix that is exposed at four discontinuous points along an approximately 100 m long section in the face of a low cut along the inland side of the old cane haul road situated immediately above the old DIALÈ-RIN railroad cut. A single short test trench was dug by shovel into each of the four exposures. Shovel Test 1 (ST-7), which was placed across a short alignment of basalt boulders that appeared to be a remnant of a low retaining wall along the cane haul road, revealed only fragmentary marine shell and coarse, well-sorted alluvial gravels beneath 15 cm of sterile overburden. ST-2, -3, and -4 all revealed a similar situation of fragmentary shell in a 10-30 cm thick brown silty clay loam matrix beneath 30 cm of sterile red silty clay overburden. A series of quick shovels probes a few meters inland of the exposed face demonstrated that the horizontal distribution of the deposits was restricted essentially to the exposed face.

The marine shell in the deposits consisted almost entirely of broken fragments of the brackish water bivalve Brachidontes caribbeanus. No portable artifacts of any kind were recovered, and the only other accretional remains noted were a very few pieces of other marine shell. The nature of the deposits suggested that if they were cultural in origin (i.e., a hidden deposit), then they have been extensively disturbed.

Site T-2 Surface Artifact Collection Area

This site consists of an area about 50 m in diameter, situated approximately along the 40-ft contour, in the middle of the falls cove.

Table I.

<table>
<thead>
<tr>
<th>Site</th>
<th>Formal Feature</th>
<th>Tentative Functional Interpretation</th>
<th>Significance Evaluation</th>
<th>Field Work Tasks</th>
<th>Comments</th>
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<tr>
<td>T-1</td>
<td>Hidden deposit</td>
<td>Habitation? L L L  - - -</td>
<td>Minimal integrity (greatly disturbed); poss. pre-cultural</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T-2</td>
<td>Surface assemblage</td>
<td>Habitation L L L  - - -</td>
<td>Historic site; minimal integrity (greatly disturbed)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T-3</td>
<td>Complex (5)</td>
<td>Modern cemetery M L H  + + +</td>
<td>Minimum 5 graves found, possible more present; 5 graves have names</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T-4</td>
<td>Surface assemblage</td>
<td>Habitation L L L  - - -</td>
<td>Historic/modern refuse area; minimal integrity (greatly disturbed)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significance Evaluation: N = scientific research, I = interpretive, (Value Nodes) C = cultural; Degree: H = high, M = moderate, L = low.
#Field Work Tasks: SR = detailed recording (scaled drawings, photographs, and written descriptions), SC = surface collections, EX = test excavations.
+Number of component features within complex.
Site T-3: Complex (Modern Cemetery)

This site is located in Increment II, immediately adjacent to an abandoned section of the old Due Beach Road. A cluster of five historic period graves found scattered in flat area on the island of a small, this complex was initially identified during field survey. Subsequent study of an old state of the grave (1922-26, Waipahu) revealed a designated cemetery in the same approximate location. Three of the graves (all undated) had the same approximate locations. The general appearance of this complex indicates a modern cemetery, and suggests the probable presence of additional, unmarked graves.

Site T-4: Surface Artifact Collection Area

Extending through the middle of Increment II, this site consists of an extensive concentration of historic period artifacts remains, distributed for over 500 along the base of a steep slope along the 40-ec contour in the presently cultivated area. The remains are well concentrated in the remaining evidence to be reconstituted. This settlement was made in the early 1800s, prior to the construction of the new Fort Weaver Road. A surface collection of diagnostic artifacts was made by collecting items in 50-meter increments along the base of the slope, while most of the materials recovered, principally glass and ceramic items, indicate the period 1900-1950. Occasional sites indicate the pre-1900 and recent age of the settlement. Occasional sites indicate the pre-1900 and recent age of the settlement. Deposits at the base of the slope probably derive from formal, well-developed refuse disposal, the deposits have been so eroded and disturbed that no primary context stratigraphic situations are likely to be present.

CONCLUSIONS

COMMENTS

The combined surface and subsurface reconnaissance survey of the West Loch Estates - Residential Increment I and II project area confirmed an initial impression that the project area had been extensively modified by decades of historic period excavation, cultivation, and construction. Only four sites were identified during the survey field work. Three of these (Sites T-3, -4, and -8) were found to be historic period in age, while the fourth (T-1) was ambiguous as to whether or not it even was a cultural feature. The surface artifact collection area (T-4) appears to be related to a small relatively recent sugar plantation occupation, while the third — a small surface artifact collection area (T-2) — appears to date somewhat earlier.

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

To facilitate State and County review, general significance assessments and recommended general treatments for all sites identified during the combined reconnaissance survey are summarized in Table 1. Significant criteria for a site to be listed in the Hawaii State Register of Historic Places are listed in Table 2. Sites determined to be historically significant for information content (Category A, Table 2) fall under Criterion B, which defines significant as: "...having yielded, or likely to yield, information important in prehistory or history. Sites potentially significant as representative examples of site types (Category B, Table 2) significant as representative examples of a type, period, or method of construction, or that express a significant and distinctive entity whose components may lack individual distinction".

Sites with potential cultural significance (Category C, Table 2) are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values" (ACHP 1985). The guidelines define cultural value as: "...the contribution made by an historic cultural property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth" (1985:1). The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value" (1985:7).
Based on the findings of the combined reconnaissance survey field work, the cultural remains identified within the West Loch Estates - Residential Incidents I and II project area appear to be, for the most part, of minimal significance in terms of potential information content. In view of the essentially negative results of the reconnaissance survey, it is concluded that, with the exception of appropriate treatment of Site T-3, no further archaeological work of any kind is necessary, and it is recommended that all archaeological clearance of the project area be halted. The information recovered during the present survey from Sites T-1, T-2, and T-4 is considered adequate and sufficient to warrant recommending that no further archaeological work is necessary for any of these sites. Only one site (T-3), an apparently modern cemetery complex, is believed to be culturally significant; preservation "as is" is recommended as the more desirable treatment for this site. If this course of action is not practical, then proper disinterment and burial in accordance with State Health Department regulations and procedures should be carried out. The latter alternative should include an attempt to locate any living relatives of individuals buried at Site T-3, as it is considered likely that such relatives may still reside in the East District.

Finally, it is recommended that a qualified archaeologist selectively monitor initial grading activity and/or vegetation clearing within the project area. The general significance evaluations and recommended general treatments presented in this report are based on the findings of the combined reconnaissance survey field work, which involved only minimal subsurface testing. Therefore, these evaluations and recommendations are given with the general qualifications that during any development activity involving the extensive modification of the land surface, there is always the possibility—however remote—that previously unknown or unsuspected subsurface cultural features, deposits, or burials might be encountered. In such a situation, immediate archaeological consultation should be sought.

### Table 2.

**SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS**

WEST LOCH ESTATES - RESIDENTIAL INCIDENTS I AND II

<table>
<thead>
<tr>
<th>Site or Feature No.</th>
<th>Significance Category</th>
<th>Recommended Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>A</td>
<td>PAI</td>
</tr>
<tr>
<td>T-2</td>
<td>B</td>
<td>FDC</td>
</tr>
<tr>
<td>T-3</td>
<td>B</td>
<td>FDC</td>
</tr>
<tr>
<td>T-4</td>
<td>B</td>
<td>FDC</td>
</tr>
</tbody>
</table>

**General Significance Categories:**

- **A:** Important for information content, further data collection necessary (FRP=research value);
- **B:** Important for information content, no further data collection necessary (FRP=research value, A=non-significant);
- **C:** Excellent example of site type at local, regional, state, or National level (FRP=interpretive value); and
- **D:** Culturally significant (FRP=intricate value).

**Recommended General Treatments:**

- **FDC:** Further data collection necessary (intensive survey and testing, and possibly subsequent data recovery/mitigation excavation);
- **PAI:** No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential;
- **FIC:** Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and
- **PAI:** Preservation "as is," with no further work (and possible inclusion in future development), or appropriate data recovery/disinterments.
REFERENCES CITED

ACHP (Advisory Council on Historic Preservation)


CFR (Code of Federal Regulations)


McAllister, J. Gilbert

APPENDIX F

Traffic Impact Assessment Report
For the Proposed West Loch Estates Subdivision
Ewa, Oahu, Hawaii

by
PACIFIC PLANNING & ENGINEERING, INC.

September 1987
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Prepared for:
City and County of Honolulu
Department of Housing and Community Development

TRAFFIC IMPACT ASSESSMENT REPORT
FOR THE PROPOSED WEST LOCH ESTATES SUBDIVISION

Ewa, Oahu, Hawaii

September 1987

Pacific Planning & Engineering, Inc.
INTRODUCTION

The Department of Housing and Community Development (DHCD) of the City and County of Honolulu is proposing to construct a residential development composed of 1,500 residential single-family housing units and 150 elderly housing units in the West Waipahu area.

The development is divided into two phases. Phase I consists of 556 single-family units, an 18-hole golf course, and a Nature Conservation park along the shoreline of Pearl Harbor. Phase II consists of 744 single-family units, 150 elderly units, a commercial business area, a district park, a park and ride facility, an elementary school site and child care facility.

The project site is located along Fort Weaver Road in the area commonly referred to as West Loch, near Waipahu. Figure 1 shows the general project location. The project is bordered by Waipahu to the North, Fort Weaver Road to the West, Arizona Road to the South and Pearl Harbor to the East. Phase I of the development will be located across Fort Weaver Road from the new Saint Francis Hospital West, which is presently under construction.

The proposed project will have two access permitted locations, access Roads "A" and "B", which will provide the major access to Phases I and II, respectively. Secondary access to the proposed development will be through Leilehua Street in the Wai'ahilo industrial area and another with Arizona Road. The 18-hole golf course will be located on both sides of Fort Weaver Road with a golf cart underpass providing access across the highway. The park and ride facility will provide a bus pick-up and drop-off area, a bus turn-around area, and a 350-space parking lot for bus riders.

This traffic study report identifies and evaluates the expected impact of forecast traffic generated by the proposed development in the year 1991. The analysis will also consider present and future developments along Fort Weaver Road and the overall impact on traffic on nearby roadways. The report includes a description of existing conditions and projected future conditions when the proposed developments are completed.

This report addresses impacts in the afternoon (pm) peak hour (3:30 - 4:30 PM), when recent traffic counts indicate the pm peak hour traffic volume averaged about ten percent greater than the morning (am) peak hour traffic volumes. The proposed project is expected to generate more traffic during the pm peak hour due to the residential nature of the development.
EXISTING CONDITIONS

Area Conditions and Roadway System

The general area is undeveloped or under case cultivation, with some twenty or so homes on the project site. The nearest residential area, Honolulu, is located west and across of Fort Weaver Road. There are no major developments planned for the immediate area. Major new residential areas are planned for the area south of Renon Road. The traffic impacts of these are addressed in a later chapter.

Fort Weaver Road provides the primary access to the proposed development and serves as a major arterial roadway between H-1 Freeway and the existing Ewa Beach Community. The roadway is a four-lane divided highway with a wide grassed median that provides roadway width for left-turn storage lanes into the proposed subdivision.

There are no sight distance or other physical roadway constraints which would result in unusual traffic safety concerns or conditions at the proposed intersections with Fort Weaver Road. The speed limits are 35 and 45 miles per hour. There is a designated bike-way on the east side of the roadway. There are no driveway access points. All access is controlled by the State Department of Transportation, Highways Division.

Intersection improvements for the St. Francis Hospital West, presently under construction, will provide deceleration and left turn storage lane for northbound Fort Weaver Road traffic turning left into the hospital site. In addition, a traffic signal system was recommended at the intersection to improve access during the afternoon peak hour.

Arizona Road is located along the southern portion of the project and will serve as the secondary access for Phase II. It is an extension of Renton Road and is signalized at the intersection with Fort Weaver Road. It is presently an unpaved road serving the West Loch U.S. Naval Magazine installation.

Leilehua Street is located along the northern portion of the project and serves as the secondary access for Phase I. Leilehua Street is intersected by Leilehua Street which accesses Farrington Highway in Waipahu. These streets serve the industrial area located northeast of the proposed project.
### Table 1. Intersection Traffic Counts

<table>
<thead>
<tr>
<th>Traffic Count</th>
<th>Fort Weaver Road Northbound</th>
<th>Fort Weaver Road Southbound</th>
<th>Farrington Highway Eastbound</th>
<th>Farrington Highway Westbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>State DOT (Mechanical Count)</td>
<td>12,414</td>
<td>12,851</td>
<td>12,741</td>
<td>12,809</td>
</tr>
<tr>
<td>Dec 18-19, 1985 (24-Hour)</td>
<td>11,141</td>
<td>746</td>
<td>907</td>
<td>854</td>
</tr>
<tr>
<td>AM Peak Hour (12/19/85)</td>
<td>832</td>
<td>1,286</td>
<td>1,218</td>
<td>1,038</td>
</tr>
<tr>
<td>PM Peak Hour (12/16/85)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aug 14-15, 1983 (24-Hour)</td>
<td>-</td>
<td>-</td>
<td>13,741</td>
<td>12,809</td>
</tr>
<tr>
<td>AM Peak Hour (8/12/85)</td>
<td>-</td>
<td>907</td>
<td>854</td>
<td></td>
</tr>
<tr>
<td>PM Peak Hour (4/14/85)</td>
<td>-</td>
<td>1,218</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>PPE (Manual Count)</td>
<td>769</td>
<td>1,142</td>
<td>1,867</td>
<td>1,691</td>
</tr>
<tr>
<td>PM Peak Hour (8/19/87)</td>
<td>769</td>
<td>1,142</td>
<td>1,857</td>
<td>1,691</td>
</tr>
</tbody>
</table>

**Figure 4.** 1987 PM Peak Hour Traffic Volumes.
TRAFFIC FORECASTS

Future traffic were estimated for the year 1991 for two conditions—with and without West Loch Estates. All other variables such as the number of lanes on Fort Weaver were assumed to be the same until that time. Intersection changes are addressed in the chapter entitled Traffic Impacts. Future traffic generated by developments south of Pohono Road were estimated. The year 1991 was selected for analysis as it was deemed to be the year when the project would be completed and occupied.

Trip Generation

The methodology used to determine number of trips generated by proposed or new projects is based upon trip rates established in the Institute of Transportation Engineers Trip Generation Report (Third Edition) 1982. These vehicle trip rates are based on average conditions and were reviewed for possible adjustment for local conditions.

The rates are used to calculate vehicles entering and exiting the project during the peak hour. The analysis accounts for the two phases being physically separated. Two zones were created to account for the separation and necessary assignment to the Fort Weaver intersections.

Phase I development includes 586 single family residential units, a Nature Conservation Park and an 18-hole golf course with clubhouse and parking area. Phase II consists of 766 single family dwelling units, 150 elderly housing units, a district park, a commercial development with 40,000-50,000 gross square feet of space, a civic center consisting of a day care center for 250 pre-schoolers, a park and ride area with 350 parking stalls and an area reserved for future Elementary School.

These land use activities are expected to generate trips in and out of the project. Certain uses will contribute negligible trips during the afternoon peak hour. For example, school traffic will be negligible after 3:30 pm. The analysis also accounts for internal trips within the project during the p.m. peak hour, as well as a potential reduction in the number of trips as a result of the park and ride facility.

The analysis estimates vehicle trips during the p.m. peak hour for the residential areas and the commercial center in Phase I and II. Table 2 lists the land use (parameter) and the trip generation rates, while Table 3 lists the number of trips generated by the land use activities.

Trip Distribution

Trip distribution determines the predicted origins and destinations of traffic generated by new projects. The trips distribution used in this study is based on completion of Phase I and II of West Loch Estates. The trips were distributed in these directions representing the major areas of Oahu that would have vehicles traveling between them and this area of Ewa. The directions are north to H-1 Freeway or Waipahu, south to Ewa Beach, and west to Ewa Village from West Loch Estates and new developments in the area, serviced by Fort Weaver Road.

Distribution tables based on population, employment, and dwelling units from various references were analyzed. In addition, as recommended by travel forecasting publications from the Institute of Traffic Engineers, trip distribution tables from the local urban transportation planning process were reviewed. Trip tables from the most recent forecasting effort, HALI 2000, by the Oahu Metropolitan Planning Organization were obtained and assisted for application in forecasting trip interchanges. The distribution results from these tables were modified based on dwelling unit and job distributions to account for the differences between the specific study zone boundaries and the data summarized for areas within the Ewa Development Area.

Traffic Assignment

Trip interchanges between zone pairs were estimated, and assigned to the roadways serving the future development. Timing of movements at each interchange were estimated for the estimated traffic for each of the land use activities identified in Tables 2 and 3.

Analyses included the estimation of vehicle trips to the p.m. peak hour for the park and ride lot. Trips entering and exiting the lot include buses as well as vehicles. Bus frequencies were investigated and a frequency of 10 buses during the peak hour was utilized. Passengers boarding and exiting were estimated based on service to other areas. An average car occupancy of 1.5 was used for exiting vehicles. For simplicity, it was assumed that vehicles would be from West Loch and areas south of the project. (Usage levels beyond 1991 were not investigated, and no conclusions should be drawn.
### Table 2. Trip Generation Rates

<table>
<thead>
<tr>
<th>Land Use (Parameters)</th>
<th>Daily (vph)(^1)</th>
<th>AM Peak Hour (vph)(^2)</th>
<th>PM Peak Hour (vph)</th>
<th>Daily (vph)</th>
<th>AM Peak Hour (vph)</th>
<th>PM Peak Hour (vph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enter &amp; Exit</td>
<td>Enter</td>
<td>Exit</td>
<td>Enter</td>
<td>Exit</td>
<td>Exit</td>
</tr>
<tr>
<td><strong>Phase I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Family</td>
<td>10.00/unit</td>
<td>0.21</td>
<td>0.55</td>
<td>0.63</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>Recreational</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf Course</td>
<td>6.50/acre</td>
<td>0.20</td>
<td>0.05</td>
<td>0.05</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>Nature Conserv. Park</td>
<td>3.00/acre</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Phase II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Family</td>
<td>10.00/unit</td>
<td>0.21</td>
<td>0.55</td>
<td>0.63</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>Elderly Housing</td>
<td>3.30/unit</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Recreational</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District Park</td>
<td>3.00/acre</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Civic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>1.00/sexudent</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Day Care Facility</td>
<td>1.00/child</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Park and Ride</td>
<td>2.00/acre</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood Center</td>
<td>0.1179/s.f.</td>
<td>2.07</td>
<td>2.05</td>
<td>6.84</td>
<td>7.03</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Vehicles per day  
\(^2\) Vehicles per hour

### Table 3. Trip Generation

<table>
<thead>
<tr>
<th>Land Use (Parameters)</th>
<th>Daily (vph)(^1)</th>
<th>AM Peak Hour (vph)(^2)</th>
<th>PM Peak Hour (vph)</th>
<th>Daily (vph)</th>
<th>AM Peak Hour (vph)</th>
<th>PM Peak Hour (vph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enter &amp; Exit</td>
<td>Enter</td>
<td>Exit</td>
<td>Enter</td>
<td>Exit</td>
<td>Exit</td>
</tr>
<tr>
<td><strong>Phase I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>585 Single Family</td>
<td>5,860</td>
<td>123</td>
<td>322</td>
<td>369</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>155 Ac. Golf Course</td>
<td>1,070</td>
<td>31</td>
<td>8</td>
<td>8</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>20 Ac. Nature Park</td>
<td>72</td>
<td>-</td>
<td>-</td>
<td>N(^3)</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td><strong>Total Trip Ends Phase I</strong></td>
<td>7,002</td>
<td>154</td>
<td>330</td>
<td>377</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td><strong>Phase II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>764 Single Family</td>
<td>7640</td>
<td>160</td>
<td>420</td>
<td>481</td>
<td>283</td>
<td></td>
</tr>
<tr>
<td>150 Elderly Housing</td>
<td>495</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.8 Ac. District Park</td>
<td>64</td>
<td>-</td>
<td>-</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Civic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 Student Elmo</td>
<td>612</td>
<td>-</td>
<td>-</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>250 Child Day Care</td>
<td>255</td>
<td>-</td>
<td>-</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>300 Space Park &amp; Ride</td>
<td>700</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40,500,000 Sq Ft</td>
<td>5,305</td>
<td>43</td>
<td>91</td>
<td>308</td>
<td>316</td>
<td></td>
</tr>
<tr>
<td>Neighborhood Center</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Total Trip Ends Phase II</strong></td>
<td>15,071</td>
<td>253</td>
<td>511</td>
<td>789</td>
<td>599</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Vehicles per day  
\(^2\) Vehicles per hour  
\(^3\) Negligible
based on these near-term estimates of transit service. Future changes and higher
frequencies are subject to fleet size, operational considerations, and other factors.

The general method used consists of adding the traffic volumes during the peak
hour for the present conditions or 1987, the traffic volumes on the roadways generated by
new residential units south of Renton Road, and the expected traffic volumes generated by
West Loch Estates. Present year volumes are shown in Figure 2. Volumes for other
intersections not shown are based on DOT tube counts. The 1991 traffic forecast results
for the conditions "with West Loch" and "without West Loch" are presented in Appendix
B. These worksheets are provided for more detailed information on specific turning
movements at the intersections with Fort Weaver Road.

TRAFFIC IMPACTS

Impacts are usually measured by the change in level-of-service (LOS) for a given
intersection or series of traffic movements. These terms are defined in Appendix A and
provide the reader with a basis for interpreting the results of the following capacity
analysis.

Impacts may be measured in terms of capacity level at signalized intersections.
"Planning Analysis" of an intersection is an evaluation of the capacity of an intersection
without considering the details of signalization contained in the Highway Capacity Manual.
It is a basic assessment of whether capacity is likely to be exceeded for a given set of traffic
volumes and intersection geometries.

As part of the analysis requirements, the study assumes the major intersections are
either signalized or will be signalized, and the traffic lights synchronized to obtain
maximum green time along Fort Weaver Road, between the proposed access connection to
Phase I West Loch Estates development project and Renton Road intersection.

Intersection analysis was conducted for the following intersections:

1. Fort Weaver Road and Road "A" (Primary Access to Phase I),
2. Fort Weaver Road and Road "B" (Primary Access to Phase II),
3. Fort Weaver Road and Renton-Arlington Road (Secondary Access to Phase II), and

The Critical Movements Analysis Planning Application (Planning Analysis) from the
revised (1985) Highway Capacity Manual (HCM) was used to estimate the capacity for the
above intersections. It was assumed that those intersections not now signalized would be
in 1991 for the purpose of analysis.

The 1991 volume forecasts for Phase I and II were assigned to the intersections to
estimate pm peak hour turning movements at each of the four intersections. These were
added to existing volumes and future traffic forecasts generated by other residential
development to be occupied prior to 1991.
The method to analyze the level of intersectional capacity attainment consists of comparing the higher sum of conflicting straight and left turn movements for one roadway and adding the greater to its complement for the other roadway. An example of the Worksheet is provided in Appendix C. The analysis was made for the four intersections for 1987, 1991 without West Loch, and 1991 with West Loch.

The results of the intersection analysis are presented in Table 4. It presents the critical volumes for the named intersections. The following ranges are given by the HCM as general indicators of intersection capacity:

- Less than 1,200 vehicles per hour indicates "under-capacity" conditions at the intersection.
- Between 1,200 and 1,400 indicates "near-capacity" conditions.
- Exceeding 1,400 indicates "over-capacity" and may require additional lanes, or other intersection improvements.

Table 4 shows that only the Farrington-Leoole Street intersection is now operating near capacity. It indicates that during the peak hour level in 1991 none of the intersections would be operating at or over capacity. With the West Loch project, the intersections of Ft. Weaver Road with Phase I and Phase II would operate near capacity in 1991.

Table 4. Critical Volumes for 1991 Forecasts

<table>
<thead>
<tr>
<th>Intersection</th>
<th>1987</th>
<th>C.L.*</th>
<th>w/o West Loch</th>
<th>C.L.</th>
<th>w/ West Loch</th>
<th>C.L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>650</td>
<td>Under</td>
<td>1145</td>
<td>Under</td>
<td>1321</td>
<td>Near</td>
</tr>
<tr>
<td>2</td>
<td>650</td>
<td>Under</td>
<td>987</td>
<td>Under</td>
<td>1280</td>
<td>Near</td>
</tr>
<tr>
<td>3</td>
<td>735</td>
<td>Under</td>
<td>1074</td>
<td>Under</td>
<td>1142</td>
<td>Under</td>
</tr>
<tr>
<td>4</td>
<td>1206</td>
<td>Under</td>
<td>1327</td>
<td>Near</td>
<td>1327</td>
<td>Near</td>
</tr>
</tbody>
</table>

*Without West Loch
1 Ft Weaver Road & Access Road "A"
2 Ft Weaver Road & Access Road "B"
3 Ft Weaver Road & Roscoe-Arizona Road
4 Farrington Highway & Leole-Leoku Street
CONCLUSIONS AND RECOMMENDATIONS

The results of the 1991 forecasts show that the proposed West Loch Estates project will increase traffic volumes along Fort Weaver Road during the peak period. The critical traffic flows are expected to occur during the afternoon peak hour, when both the ambient traffic and projected traffic are at a peak. Based on the capacity analysis results, it is concluded that West Loch traffic will not bring on intersection to over-capacity levels.

With the anticipated growth in future years, it is recommended that turning lanes on Fort Weaver Road be considered for the Phase I and II intersections. Such improvements will contribute to better flow and less delay at the intersections, as well smoother merges onto Fort Weaver Road.

During Phase I development, it is recommended that the contemplated traffic signal operation of Fort Weaver Road and the access Road "A" intersection be upgraded to provide for a protected left turn for southbound traffic using left into Phase I of West Loch Estates. Provision should be made for a left turn storage lane on Fort Weaver Road for that movement.

Access from the Phase I development through the Wai'alea Industrial Area will increase traffic volumes slightly along Leekane and Leoleole Streets. To provide increased traffic capacity at the signalized intersection of Leekane Street and Fairview Highway, a possible action would be to modify the existing pavement markings on the south leg in two northbound lanes and one southbound lane. Given the proportion of turning movements on the northbound approach, the right lane should be made to allow left, straight and right turns. The left lane should be an exclusive left turn lane. Traffic signal warrants for interruption of traffic flow are likely to be met for the Access Road "B" intersection with Fort Weaver Road which serves the Phase II development plans for West Loch. Signals should be considered and plans developed based on future traffic volumes. It is recommended that new developments south of Renton Road be included in the traffic signal timing plans.

Access for the Phase II development on Arizona and Ft. Weaver Roads will not require any significant remedial action since the signalized intersection is expected to operate under
APPENDIX A

DEFINITION OF LEVEL-OF-SERVICE

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service Definitions—In general, the various levels of service are defined as follows for uninterrupted flow facilities:

**Level-of-service A** represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorists, passengers, or pedestrians is excellent.

**Level-of-service B** is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

**Level-of-service C** is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.
Level of service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level of service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accompanied by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level of service F is used to define forced or breakdown flow. This condition exists whenever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go-wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

APPENDIX C

PLANNING APPLICATION WORKSHEETS

INTERSECTION CAPACITY ASSESSMENT
### WORKSHEET FOR FOUR-LEG INTERSECTIONS

<table>
<thead>
<tr>
<th>STEP 1: RT From Minor Street</th>
<th>( V_i )</th>
<th>( p_i )</th>
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<tbody>
<tr>
<td>Conflicting Flows, ( V_i )</td>
<td>1/2 ( V_i + V_{i+1} = V_{i+1} )</td>
<td>( e_i = \frac{5}{18} )</td>
</tr>
<tr>
<td>Critical Gap, ( T_i ) (Tab 10-3)</td>
<td>( c_{i+1} = \frac{5}{18} )</td>
<td>((v_{i+1})_c = 28)</td>
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<tr>
<td>Potential Capacity, ( c_i ) (Fig. 10-3)</td>
<td>( P_i = 0.6 )</td>
<td>((v_{i+1})_c = 28)</td>
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<tr>
<td>Percent of ( c_i ) Utilized</td>
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<td>Impedance Factor, ( P_i ) (Fig. 10-3)</td>
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### WORKSHEET FOR FOUR-LEG INTERSECTIONS

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<tr>
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<td>( e_i = \frac{5}{18} )</td>
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<tr>
<td>Actual Capacity, ( c_{i+1} )</td>
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### WORKSHEET FOR FOUR-LEG INTERSECTIONS

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<th>( v_{i,j} ) (pph)</th>
<th>( c_{i,j} ) (pph)</th>
<th>( c_{i,j}(pph) )</th>
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<th>( c_{i,j} = c_{i,j} - v )</th>
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<td>59</td>
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<td>260</td>
<td>250</td>
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### COMMENTS

- Where 2 movements share a lane
  \( c_{i,j} = \frac{v_{i,j} + v_{i,j}}{(c_{i,j})_c + (c_{i,j})_c} \)
- Where 3 movements share a lane
  \( c_{i,j} = \frac{v_{i,j} + v_{i,j} + v_{i,j}}{(c_{i,j})_c + (c_{i,j})_c + (c_{i,j})_c} \)
APPENDIX G

Socio-Economic Impact Assessment For Proposed
West Loch Estates Subdivision
Ewa Division, Island of Oahu

by

COMMUNITY RESOURCES, INC.

September 1987
COMMUNITY RESOURCES, INC.

SOCIIO-ECONOMIC IMPACT ASSESSMENT FOR PROPOSED
WEST Loch ESTATES SUBDIVISION
AND WEST LOCH GOLF COURSE AND SHORELINE PARK,
EWA DIVISION, ISLAND OF OAHU

September 1987

Prepared for:
R. M. Towill Corporation

Prepared by:
Community Resources, Inc.

ACKNOWLEDGEMENTS

Sections of this report were prepared with assistance from subcontractors:

- Earthplan (Section 4.4 on community issues and concerns; Section 4.5.1 on surrounding civilian uses; and Sections 4.6.1 through 4.6.5 on uses to be displaced);
- John R. K. Clark (Section 4.4.4 on recreational issues);
- David W. Rae (Section 4.6.7 on relocation).
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1.0 PROJECT DESCRIPTION

The West Loch Estates subdivision -- proposed by the City
and County of Honolulu Department of Housing and Community Devel-
opment -- is a two-phase, 1,500-unit housing project which will
also include:

- a 1.6-acre commercial site for convenience-type activi-
ties;
- a 2.8-acre park-and-ride facility;
- a 1.7-acre child care facility;
- an 8-acre district park;
- a 6.1-acre elementary school site;
- 34 acres of green belts, buffers, and setbacks, as well
  as 16 acres of roads and circulation.

In coordination, the City Department of Parks and Recreation
is also proposing:

- a new 18-hole, 175-acre municipal golf course; and
- a 39-acre shoreline park extending along the entire
  coastal area of the West Loch Estates housing project.

The combined projects -- which will be treated as a single
effort for purposes of this report -- are to be situated on
approximately 500 acres of land located south of Waiʻalae between
the Fort Weaver Road bypass and the West Loch of Pearl Harbor
(Figure 1). Geographically, the major uses within the project
site would be the residential housing development (173 acres) and
the 175-acre golf course (Figure 2).

Of the total 1,500 housing units planned for construction,
900 units (60 percent) are proposed for “gap group” families --
i.e., households with incomes too high to qualify for most
housing subsidy programs but too low to afford most market
housing. Of these 900 units, 150 units would be targeted for the
elderly. The remaining 600 units will be sold at market prices.
All residential units will be single-family homes, except for the
elderly units, which will be townhouses.

Phase I of development is expected to include the construc-
tion of the golf course and approximately 286 housing units,
along with some roads and green belts. Phase II will include the
remaining housing units (approximately 914, including all 150
elderly units), plus all additional activities -- i.e., both
parks, the commercial area, and civic amenities.

Construction is expected to begin on Phase I in 1988 and on
Phase II in the following year, with all aspects of the project
being completed by 1991. It is expected that the majority of
residential units will be sold and occupied by 1993.
2.0 DESCRIPTION OF SURROUNDING REGION

This section focuses on the general region in which the project is to be located. More detailed descriptions of current socio-economic conditions in (1) the project site itself and (2) immediately surrounding small communities are reserved for Section 4 of this report, which addresses project impacts.

2.1 DEFINITION OF STUDY AREA

For purposes of this study, the surrounding region -- or "study area" -- will be defined as the Ewa Development Plan Area and the Waipahu Census Designated Place (CDP).

The City and County of Honolulu divides the island of Oahu into eight Development Plan Areas (Figure 1). The project falls within the Ewa Development Plan Area, although it borders the Central Oahu Development Plan Area.

Because the Central Oahu Development Plan Area encompasses a large area with several dissimilar communities, it was decided to include only Waipahu in the "study area" for this report. Waipahu is the Central Oahu community closest to the project site and would be closely linked to West Loch Estates by the existing highway system, whereas the other major Central Oahu communities (Mililani and Wahiakea) are located off the H-2 freeway, which represents a separate transportation route to and from Honolulu.

Figure 3 shows the boundaries of the Waipahu CDP. It may be noted that several small communities sometimes considered part of Waipahu -- Village Park, Creativeview/Sewview, Waipio Gentry, and the future Waikele area -- are not included in the CDP. These are primarily bedroom communities separated from Waipahu by the H-1 freeway, and they sometimes have community identities to some degree separate from Waipahu.

2.2 HISTORIC AND ECONOMIC FORCES AFFECTING STUDY AREA

The study area has been shaped by at least three significant forces: national defense needs, the growth of large-scale sugar cultivation, and the post-Statehood expansion of single-family suburban housing opportunities on Oahu.

Military: A significant military establishment developed in the area when the U.S. Navy based Pacific naval operations at Pearl Harbor. Waipahu's growth as an industrial and commercial center is tied in part to nearby defense activities. Many area residents work for the military, either as civilian or uniformed personnel, and live in communities -- Iroquois Point and Barbers Point Naval Air Station Housing -- consist almost entirely of military service people and their dependents. The presence of significant numbers of military families in the area would tend to shift population characteristics toward a younger population, with a
greater proportion of Caucasians, people born elsewhere in the United States, and with slightly lower education levels.

Sugar: Sugar has been grown on the Ewa Plain since the early days of the industry in Hawaii. Many families with ties to the industry still live in Waipahu and Ewa, and one group of Ewa communities—called the “Ewa Villages” — were forced from plantation housing areas. Immigrant groups brought to Hawaii as contract labor still predominate in some communities, along with more recent immigrants. Waipahu’s growth can also be tied to the location of the Oahu Sugar Company’s major cane sugar mill there. However, Hawaii’s sugar industry has faced increasingly difficult times in recent decades. Since a consolidation in 1970, Oahu Sugar is the only surviving plantation in the study area, and one of only two surviving sugar operations on Oahu. Virtually all the land now cultivated by the Anekow-owned Oahu Sugar Co. is leased from the Campbell Estate, and the leases expire in the early 1990’s.

Housing Development and Population Shifts: As the amount of land needed for sugar has decreased, the demand for housing has grown. The agricultural lands in Ewa and around Waipahu have found increasing value to developers seeking to satisfy demand for moderately-priced, single-family homes on Oahu. Waipahu’s and Ewa’s population have come to include greater numbers of residents who work in other areas, and whose livelihoods are tied more to the island’s general economy than to the local military and sugar industries traditionally central to the local communities of Ewa and Waipahu. Increasing numbers of suburbanites would tend to increase the proportion of homeowners, younger families, and persons moving from elsewhere on the island, as well as increasing housing values and monthly mortgage payments.

While much of the population in new housing development meets the “suburbanite” description, the turnover of existing housing stock — particularly in the Waipahu-CDP itself — has resulted in long-time Hawaii residents “moving up” to higher-priced homes closer to Honolulu, with some tendency for replacement by recent immigrants from the Philippines or, secondarily, Samoa. The recent Filipinos may themselves by “moving up” from rental housing to urban Honolulu to far-away work in Waipahu. A recent survey of Ilocano immigrants found that homes ownership is much higher in Waipahu (60 percent) than in lower population Institute and Operation Manoh, 1985, p. 5).

2.3 STUDY AREA EMPLOYMENT AND ECONOMIC BASE

The Hawaii State Department of Transportation’s 1982 Urban Transportation Planning Package (UTPP), comprised of special computer printouts, provides 1980 Census data on place of work. Thus, it gives information on the number of jobs located in the study area, as compared with the number of employed persons living in the area. It is topic which will be discussed in the following Section 2.4. The UTPP data provide information on primary workplaces as of April 1980 and thus would exclude second jobs.

State Traffic Assignment Zones (TZ’s) 143 to 146 are roughly comparable to the Waipahu CDP, although this aggregated traffic zone would also include Honolulu and part of the project site. According to the UTPP data, Waipahu was the site of 5,880 primary jobs in 1980, all of them civilian in nature. The industry with the largest single number of jobs (1,617) was retail trade, thereby underscoring Waipahu’s role as a regional center of trade. The industries comprising sugar plantation operations — agriculture and manufacturing — provided a combined 1,156 jobs.

TZ’s 137 to 139 encompass southeastern Ewa, the area served by Fort Weaver Road and lying to the south of the project site. The UTPP data indicate a total of 6,170 jobs in 1980, but the majority of these — 3,225 were for active-duty armed forces personnel. The 2,867 civilian jobs were distributed across a wide variety of industries, many of these presumably involving defense-related activities, as well as retail activities and field activities for the sugar plantation.

TZ’s 140 and 142 comprise the remainder of Ewa (plus a slice of Waianae east of Nanakuli), consisting of Makakilo, Campbell Industrial Park, and other areas served by Farrington Highway. This area had 3,445 jobs in 1980 — 2,345 civilian and 1,100 military. Expectably, principal civilian industries included manufacturing and retail trade.

Major civilian employers in the study area would include the collective activities at Campbell Industrial Park, which provide approximately 2,500 jobs at present. The industrial real estate manager, Campbell Estate, David McCoy, Industrial Real Estate Manager, Campbell Estate, September 11, 1987) and Oahu Sugar Company, which maintains a total payroll of about 450 workers (personal communication, Naso "Cranky" Watanabe, Consultant, Oahu Sugar Co., September 14, 1987).

The principal military installation actually located in the study area — Barbers Point Naval Air Station — was the workload

Thus, it gives information on the number of jobs located in the study area, as compared with the number of employed persons.
Table 1: Total Population and Demographic Characteristics: City and County of Honolulu and Various Parts of Study Area, 1970 and 1980

<table>
<thead>
<tr>
<th>City and County of Honolulu (C.T., Oahu)</th>
<th>Designated Places</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td></td>
<td>21,121</td>
<td>21,218</td>
</tr>
</tbody>
</table>

**Ethnicity**

<table>
<thead>
<tr>
<th></th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>16,192</td>
<td>15,653</td>
</tr>
<tr>
<td>Japanese</td>
<td>1,014</td>
<td>1,044</td>
</tr>
<tr>
<td>Chinese</td>
<td>810</td>
<td>785</td>
</tr>
<tr>
<td>Filipino</td>
<td>790</td>
<td>789</td>
</tr>
<tr>
<td>Korean</td>
<td>100</td>
<td>103</td>
</tr>
<tr>
<td>Other</td>
<td>514</td>
<td>527</td>
</tr>
</tbody>
</table>

**Age**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 yrs</td>
<td>1,934</td>
<td>1,948</td>
</tr>
<tr>
<td>12-17 yrs</td>
<td>2,537</td>
<td>2,545</td>
</tr>
<tr>
<td>18-24 yrs</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>25-34 yrs</td>
<td>2,888</td>
<td>2,938</td>
</tr>
</tbody>
</table>

**Race**

<table>
<thead>
<tr>
<th>Race</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>16,192</td>
<td>15,653</td>
</tr>
<tr>
<td>Black</td>
<td>2,537</td>
<td>2,545</td>
</tr>
<tr>
<td>Other Asian</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Other White</td>
<td>2,888</td>
<td>2,938</td>
</tr>
<tr>
<td>Other</td>
<td>2,888</td>
<td>2,938</td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11,207</td>
<td>10,912</td>
</tr>
<tr>
<td>Female</td>
<td>9,914</td>
<td>10,306</td>
</tr>
</tbody>
</table>

**Place of Birth**

<table>
<thead>
<tr>
<th>Place of Birth</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other U.S.</td>
<td>1,014</td>
<td>1,044</td>
</tr>
<tr>
<td>Foreign Country</td>
<td>1,014</td>
<td>1,044</td>
</tr>
</tbody>
</table>

**Reference Year, Previous**

<table>
<thead>
<tr>
<th>Reference Year, Previous</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same House</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Same Neighborhood</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Education**

<table>
<thead>
<tr>
<th>Education</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1,014</td>
<td>1,044</td>
</tr>
<tr>
<td>High School</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Income**

<table>
<thead>
<tr>
<th>Income</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10,000</td>
<td>2,537</td>
<td>2,545</td>
</tr>
<tr>
<td>10,000-19,999</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>20,000 or more</td>
<td>2,888</td>
<td>2,938</td>
</tr>
</tbody>
</table>

**Occupation**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>White collar</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Blue collar</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Family Size**

<table>
<thead>
<tr>
<th>Family Size</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 person</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>2 persons</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>3 persons</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>4 persons</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Receipt of Public Assistance**

<table>
<thead>
<tr>
<th>Receipt of Public Assistance</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food stamps</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Housing assistance</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Health Status**

<table>
<thead>
<tr>
<th>Health Status</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Fair</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Poor</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Religion**

<table>
<thead>
<tr>
<th>Religion</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catholic</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Protestant</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Jewish</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Other</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Marital Status**

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Single</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Widow</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Citizenship**

<table>
<thead>
<tr>
<th>Citizenship</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. citizen</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>Non-citizen</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Hispanic Origin**

<table>
<thead>
<tr>
<th>Hispanic Origin</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2,829</td>
<td>2,849</td>
</tr>
<tr>
<td>No</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Other**

<table>
<thead>
<tr>
<th>Other</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>2,829</td>
<td>2,849</td>
</tr>
</tbody>
</table>

**Summary**

The City and County of Honolulu has experienced a rapid growth in population over the past decade, with the City's population growing from 21,121 in 1970 to 21,218 in 1980. The population growth has been largely due to an increase in the number of residents, particularly in the younger age groups. The City's population density is relatively high, with an estimated population density of 7,700 per square mile. The City's population is diverse, with a significant number of residents being of Asian descent. The city also has a relatively young population, with 45.7% of residents being under 18 years of age.
### Table 2:

<table>
<thead>
<tr>
<th>City and County of Honolulu and Various Parts of Study Area, 1970 and 1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITY AND COUNTY OF HONOLULU</td>
</tr>
<tr>
<td>Population in Families</td>
</tr>
<tr>
<td>as a percentage of total population</td>
</tr>
</tbody>
</table>

#### Races

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>128,227</td>
<td>178,616</td>
<td>9,329</td>
<td>6,301</td>
</tr>
<tr>
<td>Black</td>
<td>68,668</td>
<td>82,809</td>
<td>9,618</td>
<td>9,711</td>
</tr>
<tr>
<td>Asian</td>
<td>5,568</td>
<td>6,416</td>
<td>5,108</td>
<td>7,063</td>
</tr>
<tr>
<td>Native American</td>
<td>4,478</td>
<td>4,443</td>
<td>3,939</td>
<td>3,423</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>with own cell phone user</th>
<th>55.4</th>
<th>56.4</th>
<th>55.3</th>
<th>56.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female head</td>
<td>8.2</td>
<td>7.8</td>
<td>8.2</td>
<td>7.8</td>
</tr>
</tbody>
</table>

#### Length of Poverty

<table>
<thead>
<tr>
<th>Duration</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2</td>
<td></td>
<td>7.5</td>
</tr>
</tbody>
</table>

#### Non-Family Households

<table>
<thead>
<tr>
<th></th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage below poverty level</td>
<td>N/A</td>
<td>15.3%</td>
</tr>
</tbody>
</table>

### Table 3:

<table>
<thead>
<tr>
<th>City and County of Honolulu and Various Parts of Study Area, 1970 and 1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITY AND COUNTY OF HONOLULU</td>
</tr>
<tr>
<td>Potential Labor Force</td>
</tr>
<tr>
<td>Civilian Population</td>
</tr>
<tr>
<td>Total Employed</td>
</tr>
</tbody>
</table>

#### Occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>manager/professional</td>
<td>15.0</td>
<td>17.8</td>
</tr>
<tr>
<td>technical/ sales</td>
<td>12.4</td>
<td>14.2</td>
</tr>
<tr>
<td>farm/forestry</td>
<td>3.7</td>
<td>4.0</td>
</tr>
<tr>
<td>public service</td>
<td>4.9</td>
<td>5.4</td>
</tr>
<tr>
<td>operatives, mechanics, repair</td>
<td>10.0</td>
<td>12.0</td>
</tr>
</tbody>
</table>

#### Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>agriculture</td>
<td>8.2</td>
<td>6.8</td>
</tr>
<tr>
<td>manufacturing</td>
<td>10.3</td>
<td>7.7</td>
</tr>
<tr>
<td>retail trade</td>
<td>16.0</td>
<td>20.6</td>
</tr>
</tbody>
</table>

#### Income

<table>
<thead>
<tr>
<th>Income</th>
<th>1970</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean total income</td>
<td>12,540</td>
<td>15,453</td>
</tr>
</tbody>
</table>

### Base

All figures based on 15% sample; house, numbers represent estimates.

### Notes

- "All" is "at least one half" in calculated figures. *N = 20,000 (100,000 for Honolulu) for 1980 Census.

### Housing Stock and Characteristics: City and County of Honolulu and Various Parts of Study Area, 1970 and 1980

<table>
<thead>
<tr>
<th>CITY AND COUNTY OF HONOLULU</th>
<th>EWA D.P. AREA (C.T. 86-06-051)</th>
<th>MAUI COUNTY (CENSUS DESIGNATED PLACE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL YEAR-ROUND OCCUPIED UNITS</strong></td>
<td>174,110</td>
<td>32,014</td>
</tr>
<tr>
<td>- Vacant (total)</td>
<td>5,454</td>
<td>0</td>
</tr>
<tr>
<td>- Vacant for sale</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Vacant for rent</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Held for owner's use</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Vacant, not elsewhere classified</td>
<td>476</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL YEAR-ROUND OCCUPIED UNITS</strong></td>
<td>168,658</td>
<td>32,014</td>
</tr>
<tr>
<td><strong>RESIDENTS</strong></td>
<td>45,010</td>
<td>9,004</td>
</tr>
<tr>
<td>- Under-occupied</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Rent-rented</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>SELECTED CONDITIONS</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Insufficient water or no plumbing</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Insufficient space to live</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Inadequate food</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>PERCENT FOR LOW INCOME</strong></td>
<td>3.0%</td>
<td>3.1%</td>
</tr>
<tr>
<td><strong>RENTAL RENTS</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>RENTAL RENTS (RENTER-OWNED)</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>AS % OF Median Family Income</strong></td>
<td>10.3%</td>
<td>10.3%</td>
</tr>
<tr>
<td><strong>Median Family Income</strong></td>
<td>$30,000</td>
<td>$32,000</td>
</tr>
<tr>
<td><strong>Median Family Income</strong></td>
<td>$30,000</td>
<td>$32,000</td>
</tr>
</tbody>
</table>

**Notes:**
- For 1980, median values are for one-person housing units.
- Figures based on 100 sample/house, numbers represent estimates.
- The tables for "Median Cash Rent" and "Median Value" under Rent Development Planning Area reflect values among the
- Housing stock and characteristics for Ewa D.P. Area (C.T. 86-06-051) and Maui County (Census Designated Place) as of 1970 and 1980.

### Sources:
- The data for Honolulu and Hawaii, 1970 and 1980, is from the U.S. Census Bureau, "Housing Characteristics: City and County of Honolulu and Various Parts of Study Area, 1970 and 1980."
Labor Force: After adjusting for the high proportion of Ewa residents aged 15 years or above in the military as of 1980, labor force participation rates are relatively lower for Ewa (61 percent) than for Oahu as a whole (66 percent). Other census data indicate the low labor force participation rates are primarily due to proportionately fewer females in the workforce. Additionally, it may be noted that Ewa's 1980 unemployment rate of 8.0 percent was significantly higher than the islandwide average of 4.6 percent.

In terms of occupational category, Ewa workers are more likely than workers islandwide to be found in service employment (19.3 percent, compared with 17.6 percent for all of Oahu); farming, fishing, and forestry (12.9 percent, vs. 1.8 percent); precision, craft, and repair (15.5 percent, compared with 11.2 percent); and operators, fabricators, and laborers (11.3 percent, as opposed to 10.9 percent). Also, fewer Ewa workers are employed in managerial and professional or technical, sales and administrative categories than is the case for all of Oahu.

In terms of industry, Ewa workers are more likely than most other Oahu workers to be employed in agriculture, forestry, fishing, and mining; construction and manufacturing. However, fewer Ewa workers (13.4 percent) are employed in public administration than for all of Oahu (10.9 percent); this could be attributed to military and Federal facilities located in the area. The work force in Ewa is less likely than average to be employed in retail trade; finance, insurance, and real estate; personal and other services, or health, education and professional services.

Housing: Housing tenure in Ewa resembles the pattern for all of Oahu: 49.8 percent of all families are owner-occupied, and 41.1 percent are rental. Crowded units — those occupied by more than 1.01 persons per room — are somewhat more common in Ewa, where 11.5 percent of all homes would be defined as crowded by this standard. This could be related to a larger-than-average family size in Ewa (3.42 persons per household, compared with 3.15 for all of Oahu). While incomes per household for the island as a whole are somewhat lower than $514) were higher than the islandwide average of $514. This would suggest that Ewa homeowners had, in general, purchased their homes more recently than was the islandwide norm, a proposition supported by the fact that Ewa residents were more likely to be in-migrants to Hawaii than Oahu residents as a whole.

24.4.2 Waipahu

The Waipahu CDP includes census tracts 87.01, 87.02, 89.01, and a portion of tract 88. As previously suggested, several of the more suburban-oriented neighborhoods — such as Village Park, Waipahu and Mokuleia, View — are within the Waipahu Neighborhood Board area, but not within the census designated place of Waipahu.

Demographics: Waipahu's ethnic characteristics indicate a substantially greater proportion of Filipinos than is the case for the island as a whole. This is consistent with the historic roots of Waipahu as a plantation community comprised heavily of immigrants. More than 40 percent of Waipahu residents (41.6 percent) reported Filipino ancestry, far greater than the 12.8 percent for the island as a whole. Each of Hawaii's other major ethnic groups show lower representation in Waipahu than for all of Oahu. Differences are most pronounced for Caucasians, who made up 33.1 percent of Oahu's population in 1980 but just 13.5 percent among Waipahu residents.

Waipahu has a relatively young population. Considerably higher proportions of Waipahu residents are less than five years of age (10.7 percent) than for the City and County (7.9 percent). Waipahu's median age of 24.5 years is much younger than all of Oahu's 28.1 years.

The population of Waipahu contains considerably larger numbers born in a foreign country than in the case for the entire island. More than one in every four Waipahu residents (27.8 percent) was born abroad, compared with 14.6 percent of all Oahu residents. Waipahu also has a slightly higher proportion of Hawaii-born residents (56.0 percent) than the country as a whole (55.6 percent) and only about half as many people who were born in other countries (16.0 percent) as the United States (24.0 percent, compared with 30.1 percent for all of Oahu).

Mobility patterns, measured by residence five years prior to the 1980 Census, are similar for Oahu and Waipahu residents. The chief differences, as suggested by differences in birthplaces, are that greater proportions of Waipahu residents (9.3 percent) than of Oahu residents as a whole (6.6 percent) lived in a different state other than one in every four Waipahu residents (27.8 percent) was born abroad, compared with 14.6 percent of all Oahu residents. Waipahu also has a slightly higher proportion of Hawaii-born residents (56.0 percent) than the country as a whole (55.6 percent) and only about half as many people who were born in other countries (16.0 percent) as the United States (24.0 percent, compared with 30.1 percent for all of Oahu).

Education levels of Waipahu residents are somewhat lower than for Oahu or for all of Oahu. While 14.4 percent of Oahu's population aged 25 years and above completed eight school years or more, the comparable statistic for Waipahu was 27.6 percent. Less than ten percent of Waipahu residents (8.7 percent) have four or more years of education beyond high school, compared with 21.7 percent of all Oahu residents. Education levels rose for the island as a whole between 1970 and 1980. The proportion of Waipahu's population with some education beyond high school almost doubled over the decade, moving from 17 percent to 23.6 percent.

Family and Income Characteristics: Data on family characteristics show that some of the measures associated with poverty apply to Waipahu to a somewhat more widespread degree than for the island as a whole. The number of families headed by a female (36.9 percent) is greater in Waipahu than the 27.7 percent figure for Oahu. Considerably more households with children present are
headed by women in Waipahu (13.9 percent) than in the island as a whole (7.5 percent).

The incidence of households with incomes below the poverty level is significantly higher in Waipahu (14.4 percent) than for all of Oahu (7.5 percent), although Waipahu's median family income of $22,576 in 1980 was only slightly lower than the islandwide median of $23,554.

Labor Force: Labor force statistics indicate that -- after adjusting for armed forces personnel living in Waipahu -- civilian labor participation rates in Waipahu (38 percent) are similar to those for the island as a whole (34 percent). However, the 1980 civilian unemployment rate in Waipahu (5.4 percent) was higher than the islandwide rate (4.6 percent).

Like Eva workers, employed Waipahu residents tend to hold service and manual or mechanical labor positions to a greater degree than all island workers. While relatively fewer Waipahu residents are found in managerial and technical, sales and administrative positions (12.4 percent and 28.6 percent, respectively, compared with 24.7 percent and 33.7 percent islandwide), greater proportions are found in other occupations. In service jobs (20.3 percent, compared with 17.6 percent for the county as a whole), precision, craft, and repair positions (15.2 percent, relative to 11.3 percent), and operators, fabricators and laborers (18.9 percent, compared with 10.9 percent), Waipahu residents hold greater proportions of jobs than the islandwide population of wage earners.

In terms of industry, similarly to those in Eva, Waipahu workers tend to be engaged in agriculture, construction, manufacturing, and retail trade; in all of these industries, employment among Waipahu workers is higher than for the island as a whole. The representation of Waipahu workers is considerably lower in finance, insurance, and real estate (0.5 percent, compared to 8.1 percent islandwide) and health, education, and professional services (11.2 percent, relative to 18.5 percent for all of Oahu).

Housing: Waipahu's housing stock characteristics are similar to those of the entire county as far as tenure of units (renter-occupied units) and availability of plumbing facilities are concerned. However, Waipahu contains a larger than average number of "crowded" dwelling units, where one to 1.51 persons or more per room. The percentage of such units in Waipahu (13.8 percent) was almost twice the islandwide rate of 7.4 percent. More widespread crowding may be related to Waipahu's relatively large household size: average number of persons per household was 4.11 in 1980, compared with 3.15 for Oahu as a whole.

As of 1980, renters in Waipahu were slightly worse off in comparison to all island renters, while Waipahu homeowners were marginally better off than owners on the entire island. Median cash rent was $295 for Waipahu, and represented 15.7 percent of median family income. For Oahu as a whole, median cash rent was $279, representing 14.9 percent of median family income.

The median value of owner-occupied housing in Waipahu ($121,090) was lower than the islandwide median in 1980 ($130,400). However, Waipahu homeowners had lower median monthly mortgage payments ($425) compared to Oahu as a whole ($494). The Waipahu median constituted 22.5 percent of median family income, well below the islandwide average of 25.2 percent.

2.5 COMMUNITY ISSUES AND CONCERNS INDEPENDENT OF PROJECT

This sub-section examines current community goals, values, concerns, and issues which are independent of the project but which may interact with public response to the project. Issues and concerns focusing directly on the proposed West Loch housing project are considered a project "social impact" and are addressed in Section 4.

2.5.1 Public Opinion Surveys

Aloha United Way and the Health and Community Services Council (1987) recently assembled an overview of results of polls about Hawaii or Oahu resident priorities in regard to various public issues. Sources reviewed include a series of polls sponsored by the Honolulu Advertiser, the 1984 State Plan Survey, a 1986 Chamber of Commerce poll, and the "Hawaiian Quarterly Consumer Survey" conducted four times a year since 1983 by SMS Research & Marketing Services.

Collectively, these polls indicate that the major concerns of the 1980's have consisted of five key priorities: jobs, crime, traffic, education, and housing. Some surveys have also found the sixth major concern -- inflation and the high cost of living. Of consistently lower priority have been issues related to environmental protection, social problems, growth and land use, taxes, and specific economic concerns such as tourism or preservation of agricultural land.

For example, the 1984 State Plan Survey (SMS Research, 1984) asked for reaction to the following statement: "We should have more affordable housing for residents even if we lose prime agricultural land." Fifty percent of Oahu residents agreed; 31 percent disagreed; and 12 percent were undecided.

Of the five or six top issues, exact priorities have shifted with question wording and date of survey.

The "Hawaiian Quarterly Consumer Survey" provides perhaps the best overview of true shifts in community priorities, since question wording has been kept uniform. Following is the summary
prepared for the Aloha United Way and Health and Community Services Council, which makes the points that (1) concern over housing seems related to shifts in economic conditions, and (2) public discomfort with traffic conditions has been increasing rapidly in the past few years:

Oahu residents also answered the question: "What do you think are the two or three most important problems facing Hawaii today -- the ones that government should be working on right now?"...

Results from the latest Hawaii Quarterly Consumer Survey show that Oahu residents think traffic is the most important problem facing Hawaii today. Concerns about education, housing, and inflation follow close behind.

Problems that fall into the survey's "transportation" category include major issues like HART and H-3, as well as the basic traffic problems that face people trying to get to and from work. SMS says that the dramatic increase in traffic congestion in this area is due to problems with "traffic" rather than transportation issues.

Concern over traffic problems continues to rise over the last three years as concerns about a former number one problem -- inflation and cost of living -- drop. The survey notes that concern over housing and education also rise as the economy gets better.

The SMS survey suggests that the rise in public concern about traffic problems is different than the other problems ... For housing, the level of concern rose sharply as the economy got better back in 1984. As incomes rose, the real estate market, concern over housing dropped off again ...

With traffic, a rise is expected to accompany better economic conditions, but not to the extent the survey shows. Issues like H-3 do not appear to be drawing greater attention than they did in 1983. Rather, the traffic is not getting any better, and DOT road crews are working on some of Oahu's major thoroughfares.

The survey has been tracking some 20 problems since 1983, and no single issue has shown the kind of public concern that is given to traffic today. (Aloha United Way and Health and Community Services Council, 1987, p. 17)

2.5.1.2 Study Area

There have been few recent published opinion surveys taken in Ewa or Waipahu. The most recent mail-out survey by the Ewa

Neighborhood Board was conducted in August 1984. Caution in interpreting results is suggested by the fact that the return rate was under five percent (452 replies, out of 9,780 questionnaires mailed out).

Results (published in the August 1986 Ewa Neighborhood Board newsletter) include: (1) about 73 percent of respondents favoring major developments such as Ewa Marina and Ko Olina (West Beach), and 57 percent in favor of the then less well-known "Ewa Expandable" housing project; (2) on a list of 11 community objectives, the top priorities included need to control aircraft noise and need for police sub-stations in Ewa and Waialae; (3) on the same list, an item about "coordination of future housing developments with the development of adequate public facilities" was ranked approximately in the middle of the list.

The Waipahu Neighborhood Board sponsored a mail-out survey of residents in December 1985, although a low return rate (under three percent) suggests even greater need for caution in interpreting results. Major issues raised in the Waipahu survey included crime and quality of City street maintenance. Considered next most important were needs to repair public school buildings and complaints about trash and abandoned vehicle dumping on the streets. (NOTE: The Board also conducted a survey in 1987, but results have yet to be tabulated.)

A 1982 Waipahu telephone survey commissioned by Anac (SMS Research, 1982) has been cited with Anac permission in past social impact assessments in the area (Community Resources, 1985). Some of the major conclusions from this survey -- the most recent to be conducted using scientific methods of random selection -- were:

- As of 1982, the "need to keep Oahu Sugar Company in business" and the need for more "housing that families making less than $300,000 can afford" were essentially tied for first place out of a list of 19 community goals.
- The perceived need was definitely for lower-to-middle-income housing, since there was very little concern expressed about need for more "high quality housing."
- While there was some concern at the time over population growth and traffic, a majority of the sample back in 1982 considered traffic "not a problem" -- a perception which may have changed in the intervening years.

The 1982 survey also found that 76 percent of the Waipahu sample agreed with the statement that "many of Waipahu's important problems can be solved by well-planned growth." Only 15 percent chose the alternative statement that "any growth, no matter how well-planned, will just add to Waipahu's problems."
2.5.2 Issues and Concerns of Neighborhood Boards

To provide further information about community issues and concerns, the minutes of major community organizations were examined for the past year (August 1986 through August 1987). Because of the large number of organizations in the area, this analysis was restricted to the two Neighborhood Boards, which are elective in nature and therefore among the most representative of community groups.

It may be noted that:

- The entire project is within the boundaries of the area represented by the Ewa Neighborhood Board, as well as the Ewa Development Plan area.
- Positions taken to date on the West Loch project by each of the two Neighborhood Boards are given in Section 4.4.

2.5.2.1 Ewa Neighborhood Board No. 23

In the past year, the Ewa Board has dealt with few issues which were of a strongly controversial, divisive nature. At the same time, the Board has been reviewing implications of a number of major development proposals. Board members have supported most such proposals.

Because this Board represents a wide variety of communities distributed over a large area (as compared to the Waipahu Board, which represents an essentially contiguous urban area), the Board's concerns are often regional in scope. Many have been related to land use, in the context of planning and building the City's "Secondary Urban Center" in the Ewa area. Such concerns have focused on the cumulative impacts of various planned developments and the adequacy of existing infrastructure and public services to accommodate anticipated growth.

More specifically:

1. Proposed major developments triggered discussion of issues such as water availability and water system development; infrastructure costs and responsibility for funding; housing types and availability; and environmental review processes. The focus of these discussions tended to be on ways that infrastructure could accommodate growth, which Board members are expecting to occur which they simply desire to be well-planned.

2. Housing project proposals raised particular concerns about infrastructure adequacy and also about traffic impacts. The perspective on traffic -- like other infrastructure concerns -- was that it was a serious problem to be planned for and resolved, not a reason for halting growth.

Additionally, Ewa residents and Board members supported efforts to establish community associations to address undesirable activities (e.g., cockfighting, raising livestock, and speeding on streets) in recent area housing projects such as the Ewa Expandable development.

3. Ewa residents have also been strongly concerned about the condition of local schools, issues related to repair and maintenance of dilapidated classrooms, lack of funding for needed improvements, and need for an overall plan to accommodate the community's educational needs in the upcoming period of expected rapid population growth.

4. There have also been calls for general community improvements to parks and ballfields -- e.g., lighting of ball courts; repairs to restrooms, bleachers, and backstops; and special provision of planned new facilities.

5. The Ewa Board has given substantial time in the past year to potential community hazards -- e.g., chemical dumping at Campbell Industrial Park; Hawaiian Electric Company's use of hazardous chemicals in its Kahe plant transformers and plans to begin burning fuel with more sulphur; cane-burning activities of Oahu Sugar Co.; and the civil defense evacuation plan.

6. Ewa residents are eager to participate in the development planning process, and they are willing to try to effect local solutions to many problems. Among such efforts have been establishment of a Neighborhood Watch and various community clean-up efforts.

2.5.2.2 Waipahu Neighborhood Board No. 22

Like the Ewa Board, the Waipahu Board for the past year has been examining community issues and development proposals in a straightforward way, with few emotion-charged controversies. (Just prior to the study period, the Board had expressed concerns over the proposed City Mauiwa Estates housing project, emphasizing that it supported more housing in the area but was concerned about ensuring a balanced mix of housing types.)

Since August 1986, the Board has been focusing on a wide variety of community issues ranging from public services to school improvements to standard review of development proposals. The nature and style of comments from both Board members and residents suggest various themes and values:

1. As reflected by Board minutes, most residents welcome development opportunities for the community and acknowledge Waipahu as a major growth area. This pro-development attitude is qualified by desires for traffic improvements, active citizen input to the decision-making process, and the adequate attention to traffic and other negative side effects of growth. Concern over traffic has been increasing, but in
the sense of a problem to be solved rather than a reason to halt development.

(2) Discussions of "affordable" housing have been characterized as in the case of Waipahu) by a desire for a wellbalanced mix of different types of housing and economic development. There is some fear that Waipahu could become a stagnant community plagued by problems of crime and poverty if such a mix is not achieved.

(3) Perhaps related to the foregoing is a strong concern over the number of care homes, halfway houses, and special treatment centers (STC's) in Waipahu for people with drug, mental illness, or similar problems. Residents believe Waipahu now has a disproportionate share of such facilities on Oahu, and they complain that STC residents create problems by asking for handouts or other behaviors.

(4) The quality of Waipahu schools has been a particularly emotional issue, with regional community leaders worrying that schools cannot improve without a good mix of students from different income levels and residents of some never subdivisions fighting for the right to bus their children to Pearl City.

(5) Residents often feel Waipahu does not receive its fair share of police protection and other public services. Particular concern has been raised about educational and child care facilities; repair and maintenance of roads and recreational facilities; traffic; and provision of drainage and sewer improvements.

(6) At the same time, as in Ewa, Waipahu residents and Board members have themselves taken the initiative to effect local solutions to problems such as littering, abandoned cars, dumping and burning of trash in vacant areas, gang violence and drug-related activities, and provision of more child care.

3.0 CONTEXT FOR IMPACT ASSESSMENT

Specific project impacts are discussed in Section 4. This section provides information on matters considered to constitute important context for the impact assessment: (1) What additional housing is planned for the study area? (2) What additional employment opportunities in the region? (3) What major new infrastructure improvements are planned which may affect the character of the region?

Given the nature of topics examined in this section (particularly employment), the study area under consideration is expanded to encompass all of Ewa and Central Oahu, and not just the West Loch Estates residents may travel to employment in a variety of directions: south to the Ewa Beach/Berrick Point area; west to the Ko Olina/Campbell Industrial/Alapai complex; east to Honolulu; or north to the military and future high-technology park in the Milliken/Veiling area.

3.1 PLANNED AND PROPOSED NEW HOUSING

3.1.1 Housing for All Market Segments

The Ewa Development Plan area is designated as Oahu's "Secondary Urban Center" under the Oahu General Plan. Substantial residential growth is expected, consistent with plans to industrial and commercial growth.

The City and County of Honolulu, Department of General Planning, (1987) to an estimated figure of 130,000 by the year 2005. Additional housing development is also planned in the adjacent Central Oahu Development Plan area.

While a number of major housing projects are being planned, many are not yet part of the City and County of Honolulu's official Development Plans for Ewa and Central Oahu. Therefore, when describing these projects, a distinction will be maintained between "proposed" and "planned" housing. "Proposed" housing includes projects for which Development Plan approval is being sought, while "planned" projects are on the Development Plans.

Table 5 details the number of proposed and planned housing units for Ewa and Central Oahu expected to be built through 1993, when the West Loch project units may be fully absorbed. This table shows that much of the housing planned for this period -- fully 33 percent -- is still in the proposal stage, lacking necessary Development Plan approvals.

The total number of planned units between now and 1993 comes to 11,003 (7,213 in Ewa and 3,789 in Central Oahu, while the additional proposed units total 5,289 (1,500 in Ewa and 3,789 in Central Oahu).
Table 5:

Available New Housing Units, Ewa and Central Oahu, 1987 - 1993

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Planned Housing:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewa</td>
<td>250</td>
<td>483</td>
<td>1050</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>7213</td>
</tr>
<tr>
<td>Central Oahu</td>
<td>1277</td>
<td>340</td>
<td>340</td>
<td>688</td>
<td>495</td>
<td>340</td>
<td>340</td>
<td>3820</td>
</tr>
<tr>
<td>Portions of Planned Housing for &quot;Gap Group&quot; Market:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewa</td>
<td></td>
<td>61</td>
<td>164</td>
<td>164</td>
<td>164</td>
<td>967</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Central Oahu</td>
<td>102</td>
<td>102</td>
<td>102</td>
<td>102</td>
<td>102</td>
<td>762</td>
<td>972</td>
<td>5</td>
</tr>
<tr>
<td>Proposed Housing:</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewa</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1500</td>
</tr>
<tr>
<td>Central Oahu</td>
<td>500</td>
<td>993</td>
<td>1148</td>
<td>1148</td>
<td></td>
<td></td>
<td></td>
<td>3789</td>
</tr>
</tbody>
</table>

Notes:
1. Includes Gentry-Fort Weaver, Makakilo, Kapolei Village, and Gentry-Ewa projects.
2. Includes Mililani, Wailele, and Village Park.
3. Includes 250 gap group units at Gentry-Ewa, for which delivery date is unknown.
4. Includes 350-360 gap group units at Village Park, for which delivery date is unknown.
5. Many proposed projects, in initial announcements, include gap group components, but plans remain speculative at this time.


It should be noted that actual housing construction and sales are highly dependent on interest rates and other market conditions. However, assuming that the schedules suggested in Table 5 can be met, West Loch Estates would increase the inventory of planned housing by 20.8 percent by 1993 for Ewa alone, and by 13.6 percent for the combined Ewa and Central Oahu areas.

If all "proposed" projects counted in Table 5 also win approval, West Loch estates would increase the total inventory by 17.7 percent for Ewa alone, and by 5.2 percent for the combined Ewa and Central Oahu areas.

3.1.2 Housing for the Gap Group

According to the project market analysis prepared by John Child & Co. (1987), much of the planned housing in the study area will be moderately-priced, but relatively little is expected to be priced within reach of gap group families.

Using a unit price of $120,000 as a gap group maximum standard, the following projects are planned between 1987 and 1993:

- About 40 percent of housing units built in the Kapolei Village project by the Hawaii Housing Authority and the City Department of Housing and Community Development would be gap group units. While the delivery dates of the gap group units is not yet known, 717 of the 1,750 planned Kapolei Village units to be built between 1987 and 1993 could be expected to be gap group homes.
- The Gentry-Ewa project will include 250 multi-family gap group units. No delivery date is provided, but for purposes of this analysis it is assumed that they will be built by 1993.
- From 25 to 35 percent of the Ainaac Wailele project in Central Oahu is expected to consist of gap group units. While the delivery dates of these gap group units have not been given, it is assumed that 35 percent of Wailele units in the time period, or 612 units, would be for the gap group.
- The Village Park expansion in Central Oahu, just above Waipahu, contains 30 acres for subsidized housing. This could yield from 150 single-family units to about 360 multi-family units. Again, no delivery date is available for this particular project, but it will be assumed here that these units would be completed by 1993.

Thus, given the foregoing somewhat optimistic assumptions, already-planned housing projects would add just 967 gap group units in Ewa, plus from 762 to 972 units in Central Oahu.
3.2 FUTURE EMPLOYMENT PROSPECTS

3.2.1 Introduction

A major public policy question about future housing development on Oahu is whether residents will have the opportunity to find employment close to their homes, as opposed to commuting to Honolulu. This issue represents the focus of this section. It should be noted, however, that it is at this time difficult if not impossible to address two related questions:

- Will future residents actually be interested in nearby jobs, since most will already have employment elsewhere (as evidenced by their ability to afford a new home)? No studies have been carried out to research the actual extent to which new residents switch to nearby jobs.

- Will the jobs to be developed in the area provide sufficient income to support mortgage payments or rents? Many of the planned future jobs (e.g., resort or technology park employment) would not provide sufficient income to afford housing based on a single paycheck, but most Hawaii families now depend on several paychecks to cover housing costs.

As a preliminary statement, it may be assumed that most West Loch Estates primary wage-earners would already have established jobs (many perhaps already located in Ewa/Central Oahu, but others in Honolulu) which they would be unlikely to drop on short notice for new jobs closer to their new home. At the same time, secondary wage-earners in the home and new labor force entrants from these households would be more likely to apply for new jobs opening up fairly near their homes. However, this assumption is subject to verification as the Ewa area actually develops.

Employment in the general region of the project site is expected to increase significantly in future years. This section presents an overview of potential new job opportunities that may occur due to major projects which are currently planned or proposed in the area. These include projects which have received government approvals, at least at the City Development Plan level, and others which still require Development Plan amendments.

Future job estimates were obtained largely through personal communication with developers of individual projects. Potential employment at the Kapolei Town Center, Ko Olina, and Campbell Industrial Park were interpolated from a recent study prepared for Campbell Estate (Leventhal, 1986). This study presented high-, mid-, and low-range estimates. A recent update evaluation of the study's findings indicates that the original estimates now appear to be conservative. This means the original high-range estimates now are considered to be mid-range estimates, and new high-estimates are being made (personal communication, Michael Warren, Manager, Residential/Resort Properties, Campbell Estate, September 4, 1987). Therefore, estimates for the projects mentioned above will be those from the high-range of the Leventhal study.

Additional employment in the area is estimated in this section for years 1995, 1998, and the ultimate total at final build-out. The year 1993 was selected because it is assumed that most of West Loch's housing units will be occupied by that time, thus providing a key timeframe for evaluating the potential of jobs for residents of the project. The following five-year period, to the year 1998, can be expected to be a period in which residents of the West Loch Estates may seek second jobs; housewives may enter or re-enter the job market; and others may seek new jobs.

3.2.2 Planned Future Projects

Table 6 lists eight projects in the Ewa and Central Oahu areas which have approval from the City and County Department of General Planning (DGP). This signifies they have gone through the Development Plan review process and have received the necessary land use reclassification on the DCP Development Plan maps. Most of the projects have been ongoing for some time and have essentially completed the requirements for governmental review.

Totals from Table 6 show that the eight projects are expected to generate an estimated additional 14,205 direct on-site jobs by 1995; 22,415 jobs by 1998; and an ultimate total exceeding 24,800. In the long term, the Millani Technology Park is projected to be the largest generator of new jobs, producing an estimated 8,000 new jobs by the year 2003 (personal communication, Kent Keith, Project Manager, September 3, 1987). The Ko Olina Resort project and the continued expansion of the Campbell Industrial Park are also expected to create a significant number of jobs in the future. Estimates for these projects were interpolated from figures presented in the Leventhal report. For the purpose of estimating additional future employment, it was assumed that there are 2,000 existing jobs at the Campbell Industrial Park (personal communication, David McCoy, Industrial Real Estate Manager, Campbell Estate, September 11, 1987).

Apano's Waikiki development project has a total of 56 acres for commercial, retail, office, and light industrial activities. Due to the project's location, the most promising uses appear to be retail and office. Ultimately, it is anticipated the site will provide a total of 300,000 square feet of leasable area. The developer estimates this will create approximately 2,000.
Table 6:
Estimated Cumulative Additional Employment in the Study Area
(Direct On-Site Employment)

<table>
<thead>
<tr>
<th>Project</th>
<th>By 1993</th>
<th>by 1998</th>
<th>Ultimate Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned (with Development Plan approval)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ko Olina (West Beach)</td>
<td>2,370</td>
<td>5,130</td>
<td>5,130</td>
</tr>
<tr>
<td>Campbell Industrial Park (includes the Barbera Point Harbor)</td>
<td>1,450</td>
<td>2,900</td>
<td>4,910</td>
</tr>
<tr>
<td>Millilani Technology Park</td>
<td>2,800</td>
<td>5,600</td>
<td>8,800</td>
</tr>
<tr>
<td>Gentry Industrial Park</td>
<td>4,150</td>
<td>4,150</td>
<td>4,150</td>
</tr>
<tr>
<td>Waikiki Retail/Office/Industrial Center</td>
<td>1,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Millilani Town Center</td>
<td>1,200</td>
<td>2,320</td>
<td>2,320</td>
</tr>
<tr>
<td>St. Francis Hospital</td>
<td>250</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>H-POWER</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Subtotal</td>
<td>14,285</td>
<td>22,415</td>
<td>27,875</td>
</tr>
<tr>
<td>Proposed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapolei Town Center (includes the Maka-hilo Shopping Center)</td>
<td>8,230</td>
<td>13,270</td>
<td>19,373</td>
</tr>
<tr>
<td>Awea Town Park</td>
<td>900</td>
<td>1,200</td>
<td>1,200</td>
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<tr>
<td>Waianae Ridge</td>
<td>0</td>
<td>0</td>
<td>3,415</td>
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<tr>
<td>Camp Hanaaula Industrial Area</td>
<td>50</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Subtotal</td>
<td>9,180</td>
<td>14,670</td>
<td>24,088</td>
</tr>
<tr>
<td>TOTAL POTENTIAL NEW JOBS</td>
<td>23,465</td>
<td>36,085</td>
<td>51,963</td>
</tr>
</tbody>
</table>

Jobs on-site, half of which are projected to be generated by 1993 (personal communication, Chris Kanazawa, Vice President, Awea Property Development Corporation, September 2, 1987).

Developer estimates for future jobs were not available for the Gentry Industrial Park or Millilani Town Center projects. However, methods for calculating potential employment were derived through discussions with representatives of each project. At the Gentry Industrial Park, where warehousing is the primary activity, it was suggested that employment could be calculated by assuming two jobs per 1,000 square feet of leasable floor area (personal communication, Charles Pang, Leasing Manager, Gentry Companies, September 4, 1987). Based on a total of 120 acres at the site and a 60 percent lot coverage, a total of 6,200 jobs may be located at the park at build-out. Current estimates indicate the site is presently about one-third completed. Therefore, it is assumed there are currently about 2,050 jobs at Gentry, and an additional 4,150 may be added in the future. Build-out is expected to occur by 1993.

Future job estimates for the Millilani Town Center were made by assuming one job per 250 square feet of floor area. Developer estimates indicate the project will contain a total of 55,000 square feet of floor area at completion. The first phase of the project will open late in 1987 and is projected to be completed within ten years. According to Brad Myers, the Project Manager for the Town Center (personal communication, September 8, 1987), it may reasonably be assumed that 300,000 square feet of leasable space will be available by 1993. This would provide approximately 1,200 jobs by that year, with an ultimate total of 2,320 by 1998.

One final project with current approval in the new St. Francis Hospital which is expected to be completed in 1985 across from the Waikiki Estates project. The initial phase of construction is projected to provide approximately 250 jobs. In the long term, the hospital is expected to double in size, providing a total of about 500 jobs.

3.2.3 Proposed Future Projects

Table 6 also lists four projects which still require full government review and approval, a process which may take several years. During this process, project proposals can be, and often are, substantially changed. However, these potential projects do provide implications for possible employment in the area.

Totals from Table 6 show that these proposed projects could add an additional 9,010 on-site jobs by 1993; 14,570 jobs by 1998; and an ultimate 24,000 at build-out. By far the major producer of jobs could be Campbell Estate's Kapolei Town Center. Long planned to be the secondary urban center on Oahu, the Kapolei project is expected to be a self-contained community providing a full range of job types. In the long term, over 18,000 new jobs are projected to be created in the new town center.
Figures for 1993 and 1998, as shown in the table, are interpolated from figures presented in the Leventhal report.

The proposed development of Waiau Ridge may also provide a significant number of jobs in the future. Actually, the City Council in 1986 gave approval for 30 acres of commercial/industrial activities at Waiau. However, there are no current plans for developing this site by the developer (personal communication, Tosh Hosoda, Planning Director, Gentry Companies, September 9, 1987). The estimated number of 3415 jobs eventually to be created by the project was obtained from the environmental impact statement for the project (Environmental Communications, Inc., 1986).

One final potential project listed on Table 6 is the Camp Haikuole Industrial Area. The developer for this project is currently seeking Development Plan approval from the City. The site, located adjacent to the Barbers Point Harbor, is proposed to provide about 70 acres for warehousing activities for harbor-related uses. A total of about 90 jobs is expected to be created at the site, half of these by the year 1993 (personal communication, Mark Huester, Holber Huester & Eiman Planners, September 8, 1987).

3.2.4 Total Potential Job Opportunities

Table 6 shows that current developer plans and estimates total to an estimated 23,400 additional jobs in the Ewa and Central Oahu areas by the year 1993: almost 37,000 by 1998; and over 51,000 in the long-term.

In addition to these on-site jobs, thousands of construction and indirect and induced jobs could also be created. For example, the UTPP 1980 census data cited in Section 2.3 indicates that, for each 1,000 residents in the existing Ewa/Central Oahu population, there were 100 commercial, neighborhood industrial, and local governmental support jobs. In other words, a substantial suburban or urban development automatically generates jobs required to service and support the population. Some of these types of jobs would be included in the foregoing job figures (particularly at Valley and Kapolei Town). Other ones of these jobs would be located elsewhere--such as in the West Loch Estates commercial area or additional staff for existing Waipahu and Ewa Beach shopping areas.

Care must be taken when using developer estimates for projecting future employment. Problems involved in these estimates include the varying methods by which numbers are calculated; the fact that availability of commercial or industrial acreage does not necessarily imply its use in the future for that purpose; and the ultimate reality that market forces will actually determine the timing and number of jobs eventually created.

Nonetheless, numbers in Table 6, plus other projects which may be unknown at this point, indicate a substantial number of jobs in the area for future residents of the project.

3.3 MAJOR INFRASTRUCTURE IMPROVEMENTS

This brief sub-section will focus on major planned infrastructure improvements expected to substantially affect the character of the region. (NOTE: The question of infrastructure and public service adequacy to support the project will be separately examined in Section 4.3.)

The primary infrastructure improvement which affects the character of an area is new roadway construction. The current Development Plan facilities map indicates two major roadway construction projects in the Ewa area. The first project, which is already underway, is the expansion of the M-1 Freeway from Kunia Road to Makakilo. New lanes are being added to the freeway in both directions. The second project is the future expansion of Ft. Weaver Road (additional lanes in two directions) from the Ewa town area to Ewa Beach. Both these projects are planned for completion within the next six years, according to the Development Plan facilities map.

Other roadway projects, planned for sometime beyond the next six years, include the expansion of Farrington Highway from Ft. Weaver Road to the Kapolei Town Center area; a new road to the west and parallel with Ft. Weaver Road extending from the proposed Ewa Marina project to the M-1 Freeway; and improvements to Renton Road from Ewa town to the West Beach area.

Within the next six years, additional infrastructure or public facility improvements planned for Ewa include the expansion of the Honolulu Sewage Treatment Plant from 25 million gallons per day (mgd) to 37.5 mgd; new fire and police facilities in the West Beach and Kapolei areas; and several new community parks.

A recently formed private corporation, the Ewa Plains Water Development Corporation, will develop extensive water systems throughout Ewa during the coming years. The water systems will provide both potable and non-potable water to the West Beach project, Campbell Industrial Park, the Gentry Ewa housing project, and the proposed Ewa Marina. The water systems will be dedicated to the County once they are operational.
4.0 PROJECT IMPACTS

This section addresses socio-economic impacts of the proposed West Loch Estates housing project. The initial three sub-sections focus on relatively tangible topics -- population, employment, and adequacy of public services and infrastructure. The last three sub-sections deal with more qualitative "social" topics -- community issues and concerns; compatibility with neighboring uses; and displacement.

4.1 POPULATION GROWTH TRENDS AND IMPACTS

This section provides islandwide and study area growth trends, and assesses the project in the context of City policies on population distribution.

4.1.1 Islandwide Growth Trends

Oahu's growth rate has been declining since 1950, although the island's population continues to increase. From 1950 to 1960, island population grew at an annual rate of 3.5 percent; from 1960 to 1970, 2.3 percent; and from 1970 to 1980, 1.9 percent. The provisional population estimate for the City and County of Honolulu, as of July 1, 1986, was 816,700 (Hawaii State Department of Business and Economic Development, Hawaii State Data Center, 1987). This would indicate a 1980-1986 annual growth rate of 1.2 percent.

4.1.2 Oahu General Plan Population Guidelines

The Oahu General Plan indicates guidelines for the distribution of resident population for the year 2005. Table 7 shows these guidelines with (1) estimated 1984 populations for each Development Plan area, (2) year 2005 guidelines for the percentage of total island population to be located in each area, and (3) the range of year 2005 population derived from the percentage ranges.

The Eva Development Plan area is expected to grow from a 1984 population of approximately 36,000 to 83,100 in 2005. Expected growth is based on a model which considers both population capacity for housing developments approved as of 1986 and estimated future housing demand as constrained by land use policies. The expected population of 83,100 is lower than the General Plan guideline range of 85,905 to 95,450.

4.1.3 Study Area Growth Trends

During the 1970's, population in the Eva development plan area grew at an annual average rate of 4.1 percent. This was a slightly lower rate than for the neighboring Central Oahu development plan area (4.3 percent), but considerably higher than the islandwide rate of 1.2 percent.

### Table 7: Development Plan Area Population Guidelines

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Urban Center</td>
<td>436,400</td>
<td>480,000</td>
<td>17.6%</td>
<td>52.5</td>
</tr>
<tr>
<td>Eva</td>
<td>36,000</td>
<td>85,100</td>
<td>9.0%</td>
<td>10.0</td>
</tr>
<tr>
<td>Central Oahu</td>
<td>114,400</td>
<td>139,800</td>
<td>12.8%</td>
<td>14.2</td>
</tr>
<tr>
<td>East Honolulu</td>
<td>45,600</td>
<td>58,500</td>
<td>6.2%</td>
<td>6.8</td>
</tr>
<tr>
<td>Koolaupoko</td>
<td>113,300</td>
<td>124,200</td>
<td>12.4%</td>
<td>13.6</td>
</tr>
<tr>
<td>Koolauloa</td>
<td>12,100</td>
<td>13,800</td>
<td>1.3%</td>
<td>1.5</td>
</tr>
<tr>
<td>North Shore</td>
<td>14,000</td>
<td>15,600</td>
<td>1.6%</td>
<td>1.8</td>
</tr>
<tr>
<td>Waimanu</td>
<td>33,400</td>
<td>39,300</td>
<td>4.2%</td>
<td>4.6</td>
</tr>
<tr>
<td>Total</td>
<td>805,300</td>
<td>954,500</td>
<td>95.0%</td>
<td>105.0</td>
</tr>
</tbody>
</table>

Source: City and County of Honolulu, Department of General Planning, "Residential Development Implications of the Development Plans," 1989.
Virtually all of the 1970 - 1980 growth in Ewa took place in census tracts B3 and B6.01. Census tract B3 includes the community of Ewa Beach, while B6.01 includes Nanakuli. Since 1980, residential growth has continued in Ewa Beach and Nanakuli, and in smaller subdivision projects such as the City's "Ewa Expandable" project.

As noted in Section 2.4, Ewa's population growth in the early 1980's slowed almost to zero, reflecting the high interest rates and lack of new housing starts through 1984.

According to Department of General Planning (DGP) estimates (City and County of Honolulu, Department of General Planning, 1985), Ewa residential development will increase to higher levels through the year 2005. However, housing is not expected to be built at rates sufficient to meet the year 2005 population guideline. Reasons for this shortfall indicated in the DGP analysis include:

- Residential projects committed in Ewa were not projected to begin until 1987, and would not reach the 1,000 units per year level until 1990. Of the projects identified as committed by DGP, the Ewa Marina project delivery has been set back to "indefinite" status.

- A shortage of 19.7 percent in the number of Ewa housing units expected to be built, compared with the number needed to meet the population guideline. This is attributed to a shortage of development plan-approved capacity for new housing.

4.1.4 On-Site Population Feasibility Project

New housing development at the project site will add to the population of the Ewa development plan area. Estimating the size of project population depends upon assumptions about the average household size of future residents.

Household sizes will differ among residents of the elderly and single-family units. Elderly families are assumed to average 1.8 persons per household -- a figure equal to the average household size of elderly families in public housing managed by Hawaii Housing Authority (Hawaii Housing Authority, 1987).

For single-family housing, the Department of General Planning assumes 3.3 persons per unit in assessing population impacts. This figure may be somewhat high, as household sizes in Ewa and Central Oahu, as reported by developers, tend to show smaller families. At Milliman, 3.03 persons per unit were reported for single-family homes priced between $150,000 and $219,000, and 2.93 persons per unit were reported for single-family units priced between $115,000 and $164,000 (John Child & Co., 1987). Therefore, the population impact is calculated using 3.0 persons per unit as the lower range for single-family units and 3.3 persons per unit as the upper range.

Derivation of project population is shown in Table 8. The table indicates that the project will produce an Ewa population higher by from 4,320 to 4,725 persons than in the absence of the project. It is noted earlier in this section that projected population for Ewa would be from 2,805 to 12,350 below the guideline range recommended by the Oahu General Plan.

The Oahu General Plan population guideline for Ewa, coupled with projected population, provides sufficient room for new housing to accommodate the project. Project impacts, then, will principally be to provide new housing at an earlier time than could be completed by other projects, and to cause a greater proportion of Ewa's new population to consist of households in the gap group.

Table 8:

<table>
<thead>
<tr>
<th>Housing type</th>
<th>Units</th>
<th>Household size</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly</td>
<td>150</td>
<td>1.8</td>
<td>270</td>
</tr>
<tr>
<td>Single family</td>
<td>1350</td>
<td>3.0 -- 3.3</td>
<td>4050 -- 4455</td>
</tr>
<tr>
<td>Total</td>
<td>1500</td>
<td>NA</td>
<td>4320 -- 4725</td>
</tr>
</tbody>
</table>

Source: Community Resources, Inc.

4.2 PROJECT EMPLOYMENT IMPACTS

Employment impacts at the project site will result from development of certain non-housing uses at the site. Permanent jobs created will include:

- 22 positions at the public golf course (personal communication, David Hilles, Chief, Golf Courses Branch, Department of Parks and Recreation, September 10, 1987);

- 46 to 51 positions at the elementary school site, if it is accepted by the Department of Education (personal communication, Ed Hanagawa, Business Specialist, Hawaii State Department of Education, September 15, 1987);

- a maximum of 200 retail and service jobs at the commercial center, based on an island-wide average of one
employee per 250 square feet of leasable area and a planned leasable area of 50,000 square feet;

- up to 20 positions at the day care center (personal communication, Lynn Haga, Supervising Principal, NCAA Pre-Schools of Hawaii, September 15, 1987);
- a possible single additional job at the park and ride bus transportation facility (personal communication, Howard Takahara, Chief, Bus Systems Division, Department of Transportation Services, September 3, 1987).

Thus, potential employment at the completed West Loch Estates project totals approximately 290 positions. (See Section 3.2 for a discussion of other possible future job opportunities for project residents.)

4.3 ADEQUACY OF PUBLIC SERVICES

This section reviews the availability of public services to accommodate the West Loch Estates project.

As noted in Section 3, the project site is located in the Ewa area, where residential and employment growth has started and is expected to increase to constitute Oahu’s “Secondary Urban Center” by the year 2005. Public services are generally in place or being developed to accommodate the project.

The following analysis is necessarily limited to the adequacy of public services for the West Loch Estates project alone.

The cumulative impact of all planned and proposed residential growth in Ewa must be separately addressed (outside of individual project EIR’s) by the City and County through comprehensive infrastructure planning processes. Comprehensive infrastructure development has already begun, exemplified by actions such as:

- the creation of a privately-chartered authority to build and operate water facilities for all Ewa development;
- agency planning, as by the Honolulu Fire Department, in identifying new Ewa facilities to be developed as service demand increases;
- identification of land to be dedicated for public uses such as school and park sites, as Ewa projects are submitted for planning approval; and
- formulation of regional service plans, as mandated for the Hawaii State Department of Education by the 1987 State Legislature.

4.3.1 Hospitals and Health Care

Medical service providers have already begun to move the locus of services leeward, in recognition of population growth in Ewa and Central Oahu. Kahi Mohala, a psychiatric treatment facility, located its statewide facility in Ewa, and three new hospitals have been built or are under development between Moanalua and Waipahu.

Kaiser Foundation Health Plan has opened its new central hospital in Moanalua. Kaiser subscribers in the project area can also use services at Waipahu’s Punahou Clinic. The Punahou Clinic is considered adequate to accommodate additional population in the next few years, but Kaiser will consider building another clinic in Ewa in the future (personal communication, Ron Hayashi, Assistant Health Program Manager, Kaiser Foundation Health Plan, September 1, 1987).

A new hospital is being developed on the former Leeward Hospital site near Pearl Ridge Shopping Center. The Pall Moli Medical Center is expected to open in October 1988, with a 116-bed hospital, ambulatory services center, and medical office building. Pall Moli officials expect the medical center to draw most patients from the communities bounded by Kailua Valley and Ewa. These consumers now travel to Honolulu for medical attention (personal communication, Rod Keller, Pacific Region Director of Development, Health Care International, August 31, 1987).

St. Francis Hospital-West is being developed on a 22-acre site near West Loch Estates. The initial phase of the project will include a medical office building, scheduled to open in July, 1989, and a 100-bed hospital/medical center slated to start operations in August, 1989. The hospital will include 30 beds for obstetric patients, an emergency/trauma unit, and fast response services via private helicopter. The ultimate project may result in as much as 100 additional beds, and future plans remain flexible to respond to identified service gaps (personal communication, Eugene Tsvanas, Assistant Administrator, St. Francis Medical Center, September 4, 1987).

4.3.2 Emergency Services

Ambulances stationed at the Waipahu Fire Station would respond to emergencies at the project site. Backup service is provided by the City ambulance at Aiea. Private ambulance service is also planned from the new St. Francis Hospital-West facility located near West Loch Estates.

Ambulance service is considered to be adequate to handle the level of current services (personal communication, Donna Kailua, Acting Chief, Emergency Medical Services Branch, State Department of Health, September 1, 1987). At least 95 percent of calls in the area are answered within 20 minutes. Average response time in the Ewa area is about 15 minutes.
Ambulance service is provided by the City Department of Health under contract with the State Department of Health. Ewa is considered to be of first priority on Oahu for a new ambulance unit, if additional funding is provided.

4.3.3 Fire Protection

Primary fire protection for the project site will come from the Waipahu Fire Station, which consists of one engine company (15 firefighters) and one ladder company (six firefighters). Secondary service is available from the Ewa Beach and Pearl City engine companies. The Honolulu Fire Department can also call upon the U.S. Navy for assistance from the Barber's Point Naval Air Station fire company, under a mutual aid agreement.

Fire protection is considered adequate. Response time from the Waipahu Fire Station is estimated to be four to five minutes (personal communication, Battalion Chief Kenneth Vord, Administrative Services Officer, Honolulu Fire Department, September 1, 1987).

New facilities are planned for the Ewa district which should reduce future response time to the project site. One additional fire station will be built in Ewa, and two new stations are possible. The Fire Department is seeking land to build stations at Tenney Village and at Campbell Industrial Park. These facilities are shown on the Development Plan public facilities map as "site undertaken projects to be built in the "six years and beyond" timeframe. According to the Honolulu Fire Chief, the Tenney Village station is sought for completion by 1989. Letter from Frank K. Kauhounahano, Fire Chief, to Michael H. H. Moon, Director of Housing and Community Development, June 15, 1987.

4.3.4 Sewer Treatment

Development at the project site will be served by the City's Ewa and Waipahu sewer systems. The project's first increment will connect with the Waipahu system, and a 1,200-foot long, 12-inch-wide relief line is planned to extend from the project site to the Kuna Pump Station. The line may be upgraded to 18-inch width if necessary (personal communication, Jay Hamai, Engineer, Wastewater Division, Department of Public Works, September 1, 1987). Waste from the golf course clubhouse and park comfort stations will also be routed to the Waipahu system.

The second increment of the project will connect to Ewa sewers through lines running under Fort Weaver Road to an 84-inch interceptor line at Geiger Road. Waste will be treated at the Honolulu sewage treatment plant. A pump station will be constructed at or near the project site to facilitate flow.

Both sewer systems are to be used have the additional capacity needed, with the identified improvements. Provision has already been made for project load at the Honolulu plant.

4.3.5 Education

The Hawaii State Department of Education (DOE) has estimated that project population would include 240 to 480 elementary school-age children, from 90 to 170 intermediate students, and from 160 to 240 high school children (letter from Charles T. Toguchi, Superintendent of Education, to Mike Moon, Director of Housing and Community Development, June 8, 1987).

Students from West Loch Estates would normally be assigned to Ewa Elementary, Illima Intermediate, and Campbell High School. The Department of Education is currently seeking funds to expand Ewa Elementary's capacity with an eight-classroom building which would accommodate 250 additional students. Capital improvement funds would be sought in the 1989 state budget; the building could then be completed by September, 1991 (personal communication, Tom Nakai, Director, Facilities and Support Services Branch, Office of Business Services, Department of Education, August 31, 1987).

At the request of the State Legislature (H.R. 119, H.D. 1 of 1987), the Department of Education is formulating a comprehensive plan for new school and library facilities in Ewa. The Department testifies that studies identify a need for at least one new high school, one or two intermediate schools and six elementary schools. Most or all of the selected sites will be dedicated to the DOE by project developers. However, the DOE is not certain which sites will be selected.

It is expected that students from the project site will attend Ewa Elementary, Illima Intermediate, and Campbell High School on a temporary basis until new schools are built. Capacities of these schools will depend on the progress of other area residential developers. At the elementary school level, DOE officials have the option of accommodating increased enrollments in portable classrooms or of providing transportation to other schools in the region -- including Kaimilo, Pukaek, and Barber's Point Elementary.

A school site at West Loch Estates has been reserved for DOE in the subdivision plans. The parcel is approximately six acres in size. Acceptance of the site and ultimate development will be decided upon by DOE. If the site is not needed by DOE, it would be returned to the City for other purposes yet to be decided on.

4.3.6 Library Services

West Loch Estates residents will be served by the Ewa Beach Library (affiliated with Ewa Beach Elementary School), a public library at Waipahu, and the Pearl City Regional library. The Pearl City library was recently expanded.

The Office of Library Services of the Hawaii State Department of Education expects to construct new and/or expand existing facilities in leeward Oahu, although the pace of new facilities will be determined by actual development in Ewa.
Library planners feel that existing libraries are adequate to accommodate additional users from West Loch Estates. It should be noted, to the extent that residents travel to Honolulu for work or recreation, Hawaii's statewide library system will make all libraries available to project residents.

4.3.7 Water Supply

Uses at the project site will require a supply of potable and non-potable water. Current plans call for irrigation of the public golf course with non-potable water.

Potable water demand for the project is estimated at approximately 750,000 gallons per day (personal communication, George Hsu, Engineer, Board of Water Supply, September 9, 1987). The Board of Water Supply will make about 800,000 gallons per day available, sufficient to service both project increments. A new well at the Napiol Heights 3 well site will provide the new source, and water will be stored at the Board of Water Supply's "595" reservoir (personal communication, Richard Fuji, Engineer, Planning Branch, Board of Water Supply, August 31, 1987).

Sources of, and methods for conveying, non-potable water are still under study. Land in the general vicinity of the project site is believed to have supported taro and rice cultivation. Thus, engineers believe that spring and other subsurface water is probably not brackish, since brackish water would not have supported these crops.

There does appear to be a plentiful supply of subsurface water in the area planned for a golf course. If the subsurface water tests reveal sufficiently low salinity, an irrigation system could be devised using a combination of sand drains, infiltration galleries, seep collection, and pumping against grade to water hazards when the water would be stored (personal communication, Fuji, September 4, 1987). Existing caprock water or using treated effluent from the Honolulu sewage treatment plant represent possible alternatives.

4.3.8 Parks

Project residents would be served by parks and recreation programs in Ewa and Waipahu. In addition, the project site will include a new district park and a shoreline park.

Current facilities in the general area include two neighborhood parks, Asing Field, and the Ewa Makiko Park. Asing Field has athletic fields and is located on the future project site; it will be redeveloped as part of the project. Ewa Makiko is a new neighborhood park located near the "Ewa Expandable" subdivision.

The nearest Ewa facility with recreation staff is the Ewa Beach Community Park. The area's current district park complex in the Waipahu Recreation Center, which has a swimming pool, gymnasium, athletic fields, playing courts, and a multi-purpose building.

District park staff anticipate that current facilities will be able to adequately serve new residents at the project (personal communication, Don Akizawa, Acting Leonard District Supervisor, Department of Parks and Recreation, September 1, 1987). However, growing area population will make development of new parks necessary in the longer term.

An 18-acre site is being reserved at West Loch Estates for development of a new district park. Under the "City and County Recreation Park and Facility Standards" included in the Department of Parks and Recreation's Long Range Plan (1980), a project of this approximate size should be served by at least one neighborhood park on a four- to six-acre site. Both the district park and the 39-acre shoreline park developments will satisfy recreation facility needs of West Loch Estates residents, as well as increasing opportunities for Ewa and Waipahu residents.

4.3.9 Police Protection

Police services to the project will be provided from the Pearl City substation. The Honolulu Police Department indicates that "Our Pearl City District station...is already operating at near maximum capability...Our ability to provide adequate services for the community will depend primarily on the availability of funding for sufficient personnel, equipment, and communications..." (letter from Douglas G. Gibb, Chief of Police to Mike M.H. Moon, Director of Housing and Community Development, June 2, 1987).

Department officials foresee the need for a new police substation in the Ewa district, with the timing dependent upon the pace of new growth (personal communication, Brandon Stone, Management Analyst, Office of the Chief, Honolulu Police Department, September 8, 1987). A new station is planned in the general vicinity of the new shopping center at Makakilo; it is shown on the "Within Six Years" time frame, with site undetermined, on the Ewa development plan public facilities map.

The Pearl City substation reports no unusual current police problems on the project site. Most police attention to the area relates to traffic congestion on Fort Weaver Road (personal communication, Major Lee Donahoe, Commander of Pearl City Substation, Honolulu Police Department, September 9, 1987).

4.3.10 Public Transportation

Bus service at the project site is provided on the Ewa Beach route, which travels along Fort Weaver Road on the line between Ewa Beach and Ala Moana Center. Bus routes will be adjusted to serve the new population at West Loch Estates, and new buses and routes will be added as population grows (personal communication,
Howard Takara, Chief, Bus Systems Division, Department of Transportation Services, September 3, 1987.

Phase II of the project is planned to include a "park-and-ride" facility for bus service. The park-and-ride facility would function as a terminal for buses, where bus riders could park their automobiles or transfer from local lines to get direct service to Honolulu and other destinations. The park-and-ride facility will provide more convenient and possibly more frequent service to West Loch Estates residents, and it will improve area bus service generally.

Project residents with special transportation needs related to disabilities will be eligible for "Handi-Van" service provided by the City and County of Honolulu. Handi-Van presently serves the Ewa area as part of an islandwide system. Passengers pay $1.50 per ride; must reserve a spot at least 24 hours in advance; and must meet certain eligibility criteria tied to the non-ambulatory nature of their disability and inability to ride regular buses.

4.3.11 Solid Waste Disposal

City trash collection at the project site will be provided from an existing base pole at Pearl City. Refuse collected at West Loch Estates will be taken to the landfill at Waimanalo Gulch, and would be deposited at the K-POWER plant at Campbell Industrial Park when that plant is completed.

A total of three new routes will have to be created to service the project site. This may have personnel and equipment implications, depending on the timing of new growth elsewhere in the district (personal communication, Frank Boyle, Chief, Refuse Division, Department of Public Works, September 4 and 9, 1987).

4.3.12 Utilities (Electricity and Telephone)

Telephone service to the project will be provided by Hawaiian Telephone Company, and electricity will be provided by Hawaiian Electric Company. Identification of specific service requirements by each utility will require review of specific subdivision plans, which have not yet been completed.

Project electric demand has been estimated at about five million watts per day. Two sets of electric lines about the project. An existing pole line runs along Fl. Weaver Road, containing one 46-KV circuit. Another electrical line with two 46-KV circuits runs along the Oahu Railway and Land Co. former railroad right-of-way and then along the West Loch shoreline. Power to the site will come from either the Koko or Waiau generating plants. Hawaiian Electric Co. (HECO) is considering the need to build a new transformer station or near the project site (personal communication, Gary Funasaki, Engineer, Ronald We & Associates, West Loch Estates utilities consultant, September 10, 1987).

4.4 Community Issues and Concerns

This sub-section identifies preliminary issues and concerns related to the West Loch project. Two sets of issues -- compatibility with nearby uses and displacement of current uses or residents -- will be given separate and more expanded treatment in the following, final sub-sections of the report.

4.4.1 Introduction

4.4.1.1 Information Sources for This Section

To provide community input to the West Loch Estates planning process, the City established an ad hoc advisory group consisting of representatives of major Ewa and Waipahu groups (Section 4.4.1.2).

Also, in the course of preparing this social impact assessment, informal interviews were held with approximately 25 people from the community (Table 9) to identify preliminary community issues related to the proposed West Loch project.
### Table 9:
List of People Interviewed

(Continued)

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Paul Kekona</td>
<td>President, Ho'omaluhia Point Community Association</td>
</tr>
<tr>
<td>Tamae Kekona</td>
<td>Secretary, Ho'omaluhia Point Community Association</td>
</tr>
<tr>
<td>Emogene Martin</td>
<td>Chair, Ewa Neighborhood Board Community Advisory Committee of the Ewa Secondary Urban Center</td>
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<tr>
<td>Francis Oishi</td>
<td>Biologist, Division of Aquatic Resources, State Department of Land and Natural Resources</td>
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<tr>
<td>Paul Ohira</td>
<td>Representative, Hawaii State Legislature</td>
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<tr>
<td>Dave Parsons</td>
<td>Ewa Beach Community Association Community Advisory Committee of the Ewa Secondary Urban Center</td>
</tr>
<tr>
<td>Theodore Redoble</td>
<td>Resident west of Old Fort Weaver Road</td>
</tr>
<tr>
<td>Mike Shire</td>
<td>Chief Engineer, Chevron USA</td>
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<tr>
<td>Loreen Stern</td>
<td>Secretary, Waipahu Community Association</td>
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<tr>
<td>Kay Sunada</td>
<td>Former president, Honolulu Dushi Kai</td>
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<tr>
<td>Peter Tagalog</td>
<td>President, Ota Camp Hakihaka Association, Inc., Waipahu Community Association</td>
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<tr>
<td>Ronald Tongg</td>
<td>President, Tongg Ranch, Inc.</td>
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<tr>
<td>Sharon Walsh</td>
<td>Resident west of Old Fort Weaver Road</td>
</tr>
<tr>
<td>Howard Wilson</td>
<td>Part-time fisher in area</td>
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</tbody>
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(Note: Those interviewed provided their comments as individuals and not as representatives of their organizations. Organizational affiliations are provided only to provide some indication of the interests and networks of those interviewed.)
Note that those interviewed provided their comments as individuals and not as representatives of their organizations. Organizational affiliations are provided only to indicate some of the networks and interests of those interviewed.

In the course of the interviews, people who may represent three community perspectives were contacted:

- Those who may not live in the immediate vicinity, but could provide indications of regional impacts on the Ewa and Waipahu regions;
- Those who live near the project site, and may have more long-range and direct contact with the proposed community -- including residents of Ewa, Honolulu and the area designated for relocated Ota Camp residents; and
- Those who live, work, or hold property on the project site, and would be directly impacted if the proposed project were implemented.

Each person was informed that the information they provided would be summarized in the EIS and that individual conversations would remain confidential. The basic piece of information used to explain the project to informants was the "Environmental Impact Statement Preparation Notice for the West Loch Subdivision, Ewa, Oahu, Hawaii," prepared in July 1987. The interviews were either one-to-one meetings or telephone interviews.

The sources for organizational positions on this project included minutes of Neighborhood Board meetings and published letters and testimony.

### 4.4.1.2 Positions Taken on the Project by Study Area Groups

Organizational positions or testimony on West Loch have been presented by the following groups, all of which currently participate in an ad hoc advisory committee which meets with the City to review plans and make recommendations:

- Ewa Neighborhood Board No. 23,
- Ewa Beach Community Association,
- Waipahu Neighborhood Board No. 22,
- Waipahu Cultural Garden Park,
- Waipahu 2000 Community Council, and
- Waipahu Business Association.

West Loch lies within the area of the Ewa Neighborhood Board, and is contiguous to the boundary of the Waipahu Neighborhood Board.

Except for the Ewa Neighborhood Board, all of these organizations support the West Loch project. The primary reason is the provision of housing. Waipahu organizations also stressed the need for the shoreline park and the positive impacts of the new community on existing businesses (based on review of "Meeting of the Planning Commission Minutes," July 30, 1987).

At its June 18, 1987 meeting, the Ewa Neighborhood Board voted to submit a number of comments as initial concerns: "...we reserve the right to submit additional items of concern to be addressed in the Environmental Assessment." (Ewa Neighborhood Board No. 23, minutes of regular meeting, June 18, 1987).

The list of 13 concerns focused on the City's role as a developer and financial feasibility; the adequacy of roadways; and public services and facilities; the water supply and tsunami precautions letter from the Ewa Neighborhood Board No. 23 to the Department of Housing and Community Development, dated June 18, 1987.

### 4.4.2 General Overview of Community Issues and Concerns Related to the West Loch Project

This section provides an indication of community reactions at a given point in time (mid-August to mid-September, 1987), based on the interview process previously described. The interviews and review of published organizational positions provide information very early in the overall EIS process. Only some of those interviewed were aware of all of the project's components; their input was therefore based on their initial reactions to information presented to them during the interviews. Changes in attitude and issues may occur in time, given changes in the project and other events or influences in the community.

Because the interviews were conducted for issue identification only, no attempt was made to quantify the responses, or to assess the extent of project support or opposition.

In general, the project's concept was well received by almost all interviewed. The regional leaders, in particular, liked the proposed land uses because these were appropriate to the current needs of the community.

The project's concept was less important, however, to those who would be more directly impacted. Those who live near the project site tended to be more specific about their concerns about property values, impacts, infrastructure, and public services.

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On-site informants understandably placed more importance on their potential displacement than on regional benefits. Both nearby residents and on-site informants tended to express a dissatisfaction with their access to project information.

The housing component was the aspect of the project which the community tended to view most favorably. Regardless of one's opinion of specific project components, almost everyone acknowledged the need for housing.

Regional community leaders and organizations tended to appreciate the proposed "60/40 housing mix", in which 60 percent of the proposed units would be tailored to the income levels of gap group families and the remaining would be offered at market value. Recommendations for effective management and design controls were seen as possible ways to ensure a quality, planned development.

West Loch's recreational component was also seen by many as an asset to the community. Again, some made recommendations intended to retain the overall quality and family-oriented characteristics in recreational areas, including the golf course. Potential displacements did not appreciate the proposed recreational uses, however, mostly because, at the time of the interviews, such uses would occur on their present sites.

Traffic headed the list of concerns related to infrastructure, followed by drainage (a concern expressed primarily by nearby residential). People also asked about the preparedness of public schools to meet the demands of this and other Elva proposals.

An issue raised mostly by nearby and on-site residents is a lack of information about the project. Potential displacements were especially critical of receiving no project information prior to notices of potential site entries and preliminary relocation schedules.

A few regional leaders expressed concern about the City's ability to implement the West Loch Estates plan as proposed.

4.4.3 Housing

4.4.3.1 Community Reactions to the Housing Component

The project's housing component appears to be the most positive aspect of the project from the community perspective. The following summarizes viewpoints expressed in informant interviews:

- The need for housing was acknowledged by almost all, and many people cited examples they knew of personally in which there are "doubling up" and crowding situations because of high housing costs.

- Many people, particularly the regional leaders, stressed that they support the project, as long as the housing mix and concept remain intact. The 60/40 housing mix was seen as an asset by both Elva and Waipahu leaders because both wanted to see a mix of family incomes and housing types in any further development in the area.

- Both Elva and Waipahu leaders wanted to minimize any form of subsidized housing. Modular housing units were highly discouraged, as well as ohana units.

- People were generally positive about the proposed elderly housing.

- To maintain the project's intent of a planned community, the regional leaders stressed the need for a well-managed community association. It was suggested that the City be active in the formation of a homeowners association which will set and monitor design and maintenance standards for the entire project area.

- A few people were concerned that the intent of the gap group housing might be lost if the new homeowner re-sells the property at market rate to make a profit.

4.4.3.2 Analysis and Recommended Mitigations

The predominantly favorable reaction to the housing component reflects the region's general attitude toward growth in the area. Both the Elva and Waipahu communities have been exposed repeatedly over the past few years to proposals of large developments. They have since formulated community goals which strive for the encouragement and promotion of projects which will allow planned growth which is sensitive to the physical and social environments.

Having articulated these goals, these communities are generally receptive to the large-scale growth anticipated for Elva. Their concerns typically focus less on the magnitude of a proposal than on qualitative aspects such as the exact types and mix, as well as other measures which would assure "quality" development.

City representatives have indicated to community groups that they are exploring existing planned communities and their covenants to see which controls might be most effective for the West Loch community. They have also indicated that they will assist the West Loch residents in forming a community association.

It is recommended that, in addition to establishing design controls and management controls, the City also consider maintaining an active and ongoing role with West Loch in some voting or advisory capacity. This could be similar to the phased retention of representation by private developers in planned communities such as Village Park and The Gentry at Waipio.
It is noted that, regarding the re-sale of gap group units, the City will retain the first option to purchase the unit at a price prescribed by law. This will help in retaining the balanced mix of housing by minimizing the introduction of housing intended for gap group incomes to the more expensive market.

4.4.4 Recreation

4.4.4.1 Existing Conditions

The Navy controls the waters of West Loch and generally any civilian use must be approved by the Navy. On nearby Kaea peninsula, between Makalena Golf Course and the project area, shoreline usage requires formal permission and identification. Navy security guards regularly patrol the roads and evict anyone without proper permits.

The waters off the project area shoreline are also off-limits to the general public. Navy patrol boats make runs through the area and illegal boaters and fishers are asked to leave. Further, signs are posted on the shore which warn against trespassing and the use of water.

By Presidential Executive Order 8143 of May 26, 1939, all waters up to the high water mark within Pearl Harbor are owned by the Navy. Furthermore, by Civil Actions 298, 299, 252, and 256, all fishing rights in Pearl Harbor were acquired by the Navy (Department of Navy response letter to the 1987 Development Plan annual assessment review package, April 1987).

Due to sensitive activities and other operational requirements at Pearl Harbor, recreational use of Navy waters -- particularly those of West Loch -- is prohibited without the consent of the Navy. The particular sensitivity of West Loch is due to the location of the Navy ammunition storage facility in the area (see Section 4.5.2).

Nevertheless, the area is sometimes illegally used by people in the following manner:

- **Crabbing** -- Catches include Samoan crabs, blue pincher crabs and "gangster" crabs (believed to be a cross-breed between Samoan and blue pincher crabs). Small boats are often used to set out and recovering crab nets in the inlet. Because the water is shallow along much of the shoreline, people are also observed walking and laying their nets.

- **Fishing** -- Catches include gobies, mullet, tilapia, and occasional runs of jig and halibut. At one time, the area was known for its plentiful schools of mullet, and occasionally schools are still seen offshore.

- **Digging for clams and oysters** -- Even though there is currently a statewide ban on this activity, people are occasionally seen doing this in several inlets along the shore.

At present, there are a number of old and dilapidated piers in the area.

The proposed park extending along the coastline of the West Loch Estates project does not include boat ramps or any other type of structures that would promote in-water activities. Current designs call for repair of and/or improvements to a number of the existing fishing piers, largely on Hoaese Point. Such improvements to existing piers or construction of additional piers would require approval from the Navy, which would likely be granted because such use would be on-shore rather than in-water recreational activity (personal communication, Bill Liu, Assistant Naval Base Civil Engineer, September 2, 1987).

In addition to the water usage are the polo and rodeo activities related to the equestrian facilities on lands leased by the Estate to Tonga Ranch and another lessee. The Tonga Ranch has equestrian facilities which include pastures and paddocks, two polo fields and a riding area. Recreational activities associated with these facilities include polo games, private polo lessons, and the training and exercising of polo ponies.

The Asing Park is another recreational site within the project boundaries. This field park is used occasionally for ball games, although only the few in the area indicated that this park was well-used before facilities were built in Eva Beach.

4.4.4.2 Community Reactions to the Recreation Component

The project's objectives of providing a shoreline park, a district park, and a golf course were generally viewed as beneficial to the regional and West Loch residents. The following summarizes community reactions to the recreation component:

- The proposed shoreline park was favorably received by almost all informants, particularly the Waipahu residents.

- Regional leaders tended to encourage measures which would retain the intended family-orientation and general attractiveness of the park. These measures included (1) prohibiting vehicular parking and traffic on the Hoaese Peninsula, and (2) monitoring the shoreline park for littering and vandalism.

- There were a few inquiries about water recreation, but almost all of those interviewed felt that water sports would not be appropriate. Some did not feel that the waters were clean; others felt that, because this was not
a beachfront development, people do not expect active water use. Some felt that pole fishing might be appropriate. A few of those interviewed had used the West Loch waters for crabbing and digging for clams in the past, and a few people were observed fishing and crabbing in the area during site visits.

- The golf course was generally preferred over the existing agricultural uses. People saw the golf course as:
  - providing permanent open space;
  - cutting down on dust, pests, and stray animals (e.g., dislocated rats or stray cats and dogs) which coincide with cane burning; and
  - possibly increasing nearby property values.

- Some questioned the need for another golf course, however, since there were others being planned for Ewa. This was especially important to current on-site users who felt the golf course was not worth their displacement.

4.4.4.3 Potential Recreational Opportunities and Constraints

The project's water recreation potential is limited by the following:

- Navy operational restrictions and geographical boundaries;
- limited water circulation in the inner loch areas which may cause stagnant conditions leading to higher bacterial counts and greater accumulations of pesticides, herbicides, and other toxic substances transported by streams and runoff.

Increased shoreline access will nevertheless be a recreational asset and it is recommended that the current activities of fishing and crabbing be enhanced. Appropriately-placed fishing piers would allow people to reach the deeper waters of the loch without having to use a boat or other water craft. Existing structures, such as the fishing piers in Ahukini and Waiwa on the Island of Oahu, are well-used and popular. It is further recommended that lay and throw nets be prohibited.

The project's impacts on current water recreation activities are anticipated to be beneficial in that current users will no longer need the privacy for illegal water entries. They may find that increased water usage may decrease their catch, however.

Although the 3.7-acre Asing Park will be displaced, the general land-based recreational opportunities will be increased. The proposed 30-acre shoreline park and 18-acre district park will result in more recreational facilities available to the community.

Further, these facilities are consistent with the desires expressed by the community informants and representatives. The Waipahu community has long since been exploring ways to obtain a passing park, and this project is seen as meeting this goal. The Ewa community leaders also expressed a desire for more passive park areas.

It is recommended that community suggestions of stringent security and limited parking be considered on this program. Because of the large land areas of these parks, user safety and attractiveness should be given much attention.

This project will displace the polo activities. While the operation has an alternate site in Pali, their relocation will entail site work and relocation (based on letter from Tongg Ranch to the City Department of Planning dated June 25, 1987).

4.4.5 Physical Infrastructure and Public Services

4.4.5.1 Community Reactions

The following is a summary of such concerns:

- Traffic was a major concern for many of those interviewed. The most frequently-raised location of this traffic is the H-1 on-ramp off Kuli Road. It was felt that this area already is backed up with the completion of the Fort Weaver Road, and that traffic would be exacerbated by this and any other new development. The most frequent solution was the proposed "North-South Road," which would be located further west and be a direct H-1 linkage for Ewa Beach residents.

- Drainage was a concern for people in Honolulu. Because a portion of the area is low in elevation, people were concerned about the effect of increased runoff due to golf course landscaping.

- The adequacy of the water supply was raised by a few people.

- Many people were concerned about the preparedness of police, fire, and educational services to deal with the growth from this project, as well as other new developments in the area.

4.4.5.2 Analysis and Recommended Mitigations

Generally, these types of questions are asked of all proposed developments in the area, and community leaders do not seem
to require the individual developments to solve the regional problems.

Although concerns related to infrastructure and public services were frequently expressed, there was no feeling that the project should be halted until all of these problems are solved.

As discussed in Section 4.4.3.2, the Ewa and Waipahu communities are generally prepared for relatively large developments. Their questions pertaining to roadway adequacy and the capacity of police and other public services are directed more towards the responsible agency, rather than the specific developer. They would like to make sure that these projects are accommodated, as long as regional goals and objectives can be met.

4.4.6 Informal Needs and City’s Role as Developer

4.4.6.1 Community Issues Concerning Informal Needs and City’s Developer Role

Some of those interviewed, particularly the nearby and on-site residents, complained that they did not have any information about the project until very recently. They felt that if they would be the most directly impacted, they should have been informed earlier in the process.

Some of them indicated that they did not know anything about the project except for letters from the City Department of Housing and Community Development informing them that project consultants may be entering their areas for land tests. The Hoaalea Point residents (see following Section 4.5) claimed that their first awareness of the project was when they were approached by City relocation officers. Since they come under Estate leases, residential renters reportedly were not notified about the project, unless their landlord or the original lessee had informed them.

Most of the on-site and nearby community organizations had not received formal presentations by City representatives of this writing (mid-September 1987). Further, many were unfamiliar with the formal mechanisms of Neighborhood Board representation and they were dissatisfied with these representatives for not notifying them.

Regarding the City’s role as developer, there was some skepticism from a few people that the project could be implemented as currently proposed. Questions of financial feasibility and overall ability of a public entity to implement a “quality” development were raised, and it was suggested that such development be left in the hands of the private sector.

4.4.6.2 Analysis and Recommended Mitigations

Both the foregoing issues are related to credibility.

In the first instance, the first impression of the on-site and nearby residents was negative because it was tied to displacement and land acquisition. Consequently, rumors heightened apprehensions and fears. These people will probably continue to question the integrity of the project until they are satisfied that they will receive fair and equitable treatment.

Note, however, that, prior to these interviews, City presentations were made to some community organizations, including the Ewa and Waipahu Neighborhood Boards. Further, representatives from these organizations participate in an ad hoc advisory committee which meets with the City to review plans and make recommendations. In a sense, then, some of the information gaps are also due to the lack of networking of these representatives, although it should also be noted that the July 1987 Ewa Neighborhood Board newsletter did contain a small article about the West Loch Estates project.

The solution to this situation is an information program whereby the appropriate organizations are given presentations about the project. Recognize, however, that any information program targeting these people will need to acknowledge that this effort is being made months after the regional organizations learned about the project. Further, the presentations should be tailored to address the different interests of these organizations. As further discussed in the remainder of this report, these different interests would include: displacement for the Hoaalea Point Community Association; land acquisition and infrastructure impacts for the Honolulu Doshi Kai; residential contiguity for the "new Ota Camp" residents; and infrastructure and other impacts for the Ewa Community Association.

In the developer-related issues, some people simply do not believe the City -- or any other public entity -- can, or should, implement this type of project. Continued informational programs can address this issue, although successful execution of the project is probably the only real solution to this issue.

4.5 Compatibility with Surrounding Uses

The following discussion will be divided into two parts: civilian and military uses. The discussion of civilian uses will be, like the foregoing sub-section, primarily based on interviews with community informants. The discussion of compatibility with the U.S. Naval operations will be based on direct contacts with Naval personnel. It may be noted that the question of compatibility with Naval operations did not emerge as an issue in the interviews with community residents and leaders.
4.5.1 Civilian Uses

4.5.1.1 Existing Characteristics

As indicated in Figure 4, immediately surrounding uses include:

- Relocated Ota Camp residents, to the north of Residential Increment 1;
- Farrington Highway and two medical facilities near currently under construction, to the north of the western section of golf course;
- The small community of Honolulu, a mixture of residential uses, and a support commercial establishments, small-scale agricultural operations, and vacant land west of the portion of golf course west of Fort Weaver Road;
- A cattle slaughterhouse immediately south of the golf course; and
- Further south, the Ewa community across Fort Weaver Road west of Residential Increment 2.

Kahi Mohala, a Brown School psychiatric hospital, is located across the Old Fort Weaver Road, north of the western section of proposed golf course. Currently under construction, the St. Francis Medical Hospital is adjacent to the northeast corner of the western section of the golf course.

The three residential communities have distinct identities:

Honolulu is sandwiched between the Old Fort Weaver Road and the proposed golf course. It is a community of mostly single-family dwellings on lands owned by individual owners. Two convenience stores, one gas station, and two beauty salons front the Old Fort Weaver Road.

Approximately 100 to 120 housing units are in this area (Real Estate Data, Inc., 1986). Based on an average of 3.5 persons per household, it is estimated that 350 to 420 people may live in this area. Many residents are Japanese or Filipino.

It was stressed by current and former Honolulu residents that this community has always retained an identity separate from the plantations, even though many of them initially worked there. They claim community cohesiveness, which is primarily embodied in their community association called Honolulu Blossom Kai, roughly translated into the "Honolulu Helping Each Other" (personal communication with Ray Komada, former president, Honolulu Blossom Kai, September 9, 1987).
This organization has a membership of over 100, although many members no longer live here. Their common bond is past and current residence in Honolulu, and they have frequent socials and support activities (personal communication with Shirley Road, President, Honolulu Bush Kei, September 5, 1981).

The relocated Ota Camp residents live in Waipahu, on the northern boundary of the project site. These residents formerly lived in 25 houses in the original Ota Camp which was located further east in Waipahu. In the early 1970's, they were asked to move. In asking for relocation assistance, they had four conditions -- simultaneous relocation, single-family dwellings, a Waipahu location, and community-based control.

In the mid-1970's, they were relocated in 31 homes on their present site. The homes are mostly three-bedroom, two-bath units. Initially rentals, these units are now leased with options to buy at a future date.

This is a close, mostly Filipino, community. Relocation and related lawsuits often required much of their energy and time, as reflected in their organization's name -- the Ota Camp Hakaiha ('network') Association (personal communication with Petie Tadlock, President, Ota Camp Hakaiha Association, September 3, 1987).

The Ewa community is a series of former, but distinct, plantation villages located west of Fort Weaver Road, perpendicular to the proposed Residential Increment 2.

Over the past few years, the concerns of this community have primarily focused on coordinating, funding and building new and improved houses. To facilitate this effort, the Ewa Housing Foundation, Inc. was formed as an umbrella organization for these former plantation towns (personal communication with Tony Bliss, President, Ewa Housing Foundation, Inc., September 3, 1987).

More recently, another organization was formed to address more regional concerns, and issues other than housing ones. This is the Ewa Community Association and the move for a more regional perspective is underway (personal communication with Ed Castanos, President, Ewa Community Association, September 5, 1987).

Adjacent to the southern corner of the western section of the Ewa site is the Kaua Meat Company, Inc., which is a cattle processing operation. This is one of the island's two slaughterhouses serving the cattle ranches.

4.5.1.2 Reactions of Nearby Residents

Summary: The project's relationship to the surrounding communities was seen from two perspectives. On one hand, the nearby Honolulu and independent Ota Camp residents have distinct Ota Camp and independent community identities. Some nearby residents were wary that their status quo would be disturbed by a new community and that existing small businesses might have difficulty competing with the proposed town center.

Nearby residents also anticipated some changes which may benefit them, however. Increased property values, access to new shopping and recreational facilities, more customers for existing businesses, elimination of some incompatible agricultural uses (such as those related to cane burning) -- these were seen as potential benefits, providing these nearby communities could retain a separate identity.

Specifics: Reactions of Honolulu, the "new Ota Camp," and Ewa residents are summarized as follows:

- Because of social ties with on-site residents, initial reactions generally focused on residential displacement. It is noted, however, that on-site residents do not belong to any of the four community organizations mentioned in Section 4.5.1.1.
- Honolulu informants were particularly concerned about the acquisition of land owned by Honolulu residents. The lands of three families are currently intended for acquisition if the project is implemented, and Honolulu informants wanted assurances of equitable and fair settlements.
- The Honolulu and "new Ota Camp" informants basically wanted to retain identities separate from the new community.
- These informants also saw potential for community benefits, however, primarily in the form of terminating incompatible agricultural activities (mostly cane burning) increased land values for properties fronting the golf course, and access to proposed recreational, commercial, and public facilities.
- Honolulu informants were apprehensive about the impacts of proposed commercial establishments on the small Honolulu establishments, although increased patronage was also seen as a plus.
- Honolulu informants expressed concern about further development impacts because of reported increased runoff due to the construction of the nearby hospital.
- All, including the Ewa informants, were concerned about traffic increases.

Further, regional Waipahu leaders discussed systemic relationships with the proposed West Loch community. They felt that the traffic generated would have more impact on the Waipahu road system rather than Ewa's. On the other hand, it was also...
felt that until the regional Eva development is well underway, the new West Loch residents will utilize the closer Kaiapu shops, restaurants and service establishments.

4.5.1.3 Analysis and Recommended Mitigations

The compatibility of West Loch with existing surrounding uses depends on a number of factors, some of which include:

- the general acceptance of existing communities of the concept behind the proposed project;
- similarities between the social and economic characteristics of the existing communities and new residents; and
- potential conflicts between residential and non-residential uses.

Acceptance of the concept behind West Loch, though not necessarily the project itself, would be based on an acknowledgement of a major housing need and some awareness of how this project would address this need. Many of the regional community leaders were keenly aware of the island's housing crisis and had some knowledge that a project is pending. They generally approved of the goals and concept on which West Loch is based.

Informants living in Konsullul, the "new Ota Camp," and Eva, however, were mostly unaware of the proposed project. Further, by the time of the interviews, they were already aware of sensitivities and emotionalism surrounding the displacement of on-site residents and acquisition of small parcels of land. Consequently, there is some resistance to the idea of having any development on the site which might displace these people or cause others to lose their land through City acquisition.

As was discussed in Section 4.4.6, much of this initial apprehension and criticism by nearby and on-site residents is due to access to project information. This impact can therefore be alleviated through effective and ongoing information programs.

The social and economic characteristics of the existing communities and new residents will likely be different.

The existing communities are relatively homogeneous, they share common backgrounds as described in Section 4.5.1.1, and have actively worked together on common community objectives.

There is a mixture of housing types. Some appear to be only a few years old; others are original houses from the old plantation camps. In some areas, recent improvements are evident in new stone walls and paving. In other areas, the structures are deteriorated and in need of repair.

The new residents will originate from various parts of the island and state. Based on the target housing mix, there will also be a more representative cross-section of the general community in West Loch.

While they may not share identical backgrounds, however, social compatibility is still possible because of a common Hawaiian identity. The common areas - such as schools, parks, and shopping areas - will allow for social interactions which can lead to further appreciation of the diversities and complexities of local culture.

A sense of economic disparity could occur because of the "newness" of the planned community. The lower house would generally have more value and, if strict design controls are enforced, the entire development could maintain an overall attractiveness.

Achieving this overall attractiveness would be more difficult for the existing communities, mostly because of the size differentials in the structures and the lack of centralized management controls. An example of where there appears to be economic disparity is the Centen at Waipio and the older adjacent Seaview and Crestview developments.

Appearances of economic disparities can be alleviated, however, through landscaped buffers and beautification program in the existing communities. It is highly possible that the project will motivate some of the nearby residents to initiate cleanup and beautification programs.

Potential conflicts between residential and non-residential uses need to be minimized through buffers and locating residences away from uses which might be incompatible. The psychiatric and medical hospitals will probably not have problems with West Loch Estates, since these facilities would be closer to the golf course anyway. Further, the medical facility would be conveniently located for West Loch residents.

The project needs to address potential problems with cattle processing plant, however. The visual, olfactory, and noise factors associated with the slaughtering of animals may be offensive to the new residents and other site users.

The operation will probably not present much problem for the adjacent golfers because they will only be in the area for a short while. The activities on the eastern section of West Loch will be separated by Fort Weaver Road. Nevertheless, facilities directly across Fort Weaver Road should probably accommodate incidental and temporary uses, such as a shopping area, rather than permanent residences.
4.5.2 U.S. Naval Uses

Naval use of the West Loch waters was discussed in Section 4.4.4. This section will focus on proximity to the 640-acre parcel on which the Naval Magazine (HANYMAG), Ewa, West Loch Branch, is located. This is an ammunition storage facility. For reasons of national security, the U.S. Navy will not reveal the nature or quantity of ammunition stored at the site.

4.5.2.1 Current Situation and Naval Policies

There are two aspects to the question of compatibility: public safety and potential for conflict along border areas. It is beyond the scope of a socio-economic report to conduct a comprehensive assessment of public safety issues, particularly when relevant data are classified. However, following is a summary of the Naval position contained in the Department of the Navy's April 1987 response to the 1987 Development annual amendment review package, which contained the West Loch Estates housing proposal:

- The project site is outside the facility's "Explosive Safety Quantity Distance," or blast zone (Figure 3). (NOTE: The U.S. Geological Quadrangle maps suggest the blast zone, which appears to be about 7,500 feet in radius, may include the very top of Hooulu Point, which is planned for shoreline park purposes.)
- However, such zones are established at practical limits and do not guarantee absolute safety outside the zone.
- As previously stated in other hearings before the State Land Use Commission, the Navy's position is in regard to residential developments "is that the land bordering ammunition storage areas be left in agriculture."
- If the proposed housing development does occur, consideration should be given to establishing a buffer zone such as an open space, golf course, or roadway, or a parking lot along any portion of this development bordering the station."

There are only about 500 feet of West Loch Estates property actually bordering federal property; this border area is located at the southeastern part of the project site, just west of the Wildlife Reserve. However, it should also be noted that the Navy recently condemned some 781 acres of Campbell Estate farm south of the project and west of the HANYMAG facility (on either side of the Ewa-West Loch Access Road) into the ammunition storage facility, and none of this property is separated from the West Loch Estates land by only a few hundred feet or less of sugarcane. The condemned property, like the adjacent land, is under cultivation by Oahu Sugar Company, and the Navy has no plans to terminate either the lease to Oahu Sugar or the agricultural activity (personal communication, Bill Liu, Assistant Naval Base Civil Engineer, September 14, 1987).

At the closest point, proposed housing sites within the West Loch Estates property are about 8,000 feet from the main docking facility at HANYMAG. At the present time, there are no security fences or military patrols along this area, although unauthorized persons entering on foot would be intercepted and warned off if they penetrated further into federal property.

The Navy has no immediate reason to anticipate difficulties in terms of West Loch Estates residents wandering on foot into the federal area. The wildlife refuge along the shore provides one natural barrier, and there is little in a sugarcane field to attract curious explorers on a nature hike. However, if problems do occur with increasing numbers of people approaching the HANYMAG facility, the Navy might erect fences and signs, and/or increase patrols (personal communication, ibid., September 14, 1987).

4.5.2.2 Recommended Mitigations

The Navy has made its recommendation that portions of the project bordering the facility be kept in extremely low-density use.

The major additional recommendation would be for increased communication between the City and the Navy in further project planning. The Navy has requested consulted party status for this EIS.

4.6 DISPLACEMENT

As indicated in Section 4.4.6, one emerging community issue has to do with communication between the City and those people whose land would be acquired and/or whose homes or businesses could be displaced.

In any public project requiring condemnation of property and/or displacement of people, there is the potential for controversy. The negative impacts of displacement must be weighed by decision makers against the benefits of housing provision and other public purposes served by the project.

Legal procedures established for condemnation and possible relocation assistance will result in official determinations of individual displacement impacts. The purpose of this sub-section is to disclose general impacts. The major focus will be on describing the uses and approximate numbers of residents and businesses to be displaced.

4.6.1 Overview of Land Tenure

All but nine acres of the approximately 500-acre site are owned by the Estate of James Campbell. Based on a map generated
by the Estate (dated January 10, 1986) and interviews with various people knowledgeable of the site. It is estimated that the Estate has approximately 25 leases on the site. Over half of these (14) are for residential purposes on Hosea Point.

The remaining leases allow for agricultural and industrial uses throughout the rest of the project site. Uses currently occurring under these leases include the following:

- equipment storage,
- sugar cane cultivation,
- a used auto parts and towing operation,
- pasture and equestrian activities, and
- headquarters for a ranch.

At least two of these agriculture-related leases have subleased a portion of their leased land or have established landlord-tenant agreements. Oahu Sugar Co. has approximately six sub-leases which lie within the project boundaries. No residential uses are permitted on these lands, and current uses are related to raising chickens and livestock, equipment storage, and equestrian activities (personal communications with Bill Defent, Field Engineer and Land Manager, Oahu Sugar Company, September 3 and 9, 1987).

Tonga Ranch, Inc. has landlord-tenant agreements for at least 13 residential structures on lands leased from Campbell Estate (personal communication with Ronald Tonga, President of Tonga Ranch, Inc., September 9, 1987).

Approximately nine acres within the project site are currently owned by seven landlords other than Campbell Estate and are intended for acquisition if the project is implemented (personal communication with Howard Hural, City Department of Housing and Community Development, various dates from August 31 through September 11, 1987).

Of these nine acres, approximately six — owned by three landowners — are located on the west end of Fort Weaver Road. These lots appear to be used primarily for an used auto parts and towing operation, and for transportation purposes.

The remaining three acres are distributed among four separately-owned parcels and are located west of Fort Weaver Road. One of these parcels is occupied by renters; the other two have no residential uses, but may have small-scale agricultural activities for personal use.

4.6.2 Overview of Existing On-Site Uses

This section is based on information provided by on-site users and others knowledgeable about the project site, as well as on field observations and on the aforementioned map generated by the Estate. The project area is predominantly in agricultural or related uses: residential and commercial/industrial activities also occur on the site. Major uses are indicated in Figure 5.

The project site can be divided into two sections defined by Fort Weaver Road. The "eastern section" of the site is sandwiched between Fort Weaver Road and the waters of Pearl Harbor. The "western section" lies between Fort Weaver Road and the Honolulu community.

The eastern portion of the project area has residential uses, agricultural activities, and commercial/industrial operations. The residential uses on this part of the project site are generally in two clusters. One cluster of about 25 units is situated on the Hosea peninsula. Further south, the other cluster of about 15 houses fronts Fort Weaver Road, near its junction with the Old Fort Weaver Road. Real estate data based on tax maps suggests there may be another nine units in other parts of the eastern project site.

Agricultural uses on the eastern portion of the site include a ranch headquarters, equestrian activities, and support facilities, as well as sugar cane cultivation on parts of the site.

This portion of the project area also has industrial uses. There is a used auto parts and towing operation, as well as storage of equipment and vehicles. Along the length of the shoreline there is a petroleum— energy corridor.

There is less activity on the western part of the project site, across the highway. Almost all of this portion is used for agriculture. Most of this is in sugar cane cultivation, and there is some land used for cattle grazing and raising chickens. There are about three residential units on the northern portion of this site.

4.6.3 Agricultural and Pastoral Uses

Agricultural and pastoral uses are found throughout the site. Leases of the Estate conduct agricultural activities which include:

- sugar cane cultivation,
- a rodeo roping ring and support facilities,
- raising of cattle, and
- headquarters for a ranch.

65
The 35-acre portion leased to Tongg Ranch comprises the
central headquarters for the ranch which otherwise consists of a
total 8,000 acres of pasture land in Kunia and Palahua. Ranch
facilities on the West Loch project site include storage facilities
for equipment, marketing, cattle stockyards, pastures,
paddock area, two polo fields, and equestrian riding areas, as
well as residential units which were discussed in the previous
section. Four full-time employees and seven part-time volunteers
serve this site (based on letter from Tongg Ranch to the City
Department of Planning dated June 22, 1967, and on personal
communication with Ronald Tongg, President, Tongg Ranch, Inc.,
September 5, 1967).

Oahu Sugar Company leases these lands primarily for sugar
cane cultivation. As more houses were built in Honolulu,
however, some of the agricultural activities became incompatible
with nearby residents. Those lands closest to the residential
areas were followed and sub-leased to others.

In the project site, Oahu Sugar Company sub-leases approxi-
mately five parcels, none of which are permitted residential
uses. Uses on these parcels include -- on the eastern portion of
the site -- raising goats and cattle; the storing of agricultural
equipment and facilities for equestrian activities; and -- on the
western portion of the site -- raising chickens (personal com-
unication with Bill Defent, Field Engineer and Land Manager,
Oahu Sugar Company, September 3 and 4, 1967).

4.6.4 Residential Uses of the Site

There are several types of residential uses on the project
site, as follows:

Lessees of the Estate of James Campbell: House Point is
divided into 15 lots of sizes ranging from 0.4 acres to 1.6
acres. Most of these are less than an acre. Beginning in 1947,
Campbell Estate granted 30-year leases which ended in the late
1970s. Since then, the occupants are on a month-to-month lease.

These lots are leased by 14 families, each of which belongs
to the House Point Community Association. With non-profit
status, the association owns the well, line serving their homes
and funds the maintenance of the road leading to their homes.
The individual lessees are responsible for erecting and improving
their own structures, as well as for home insurance and property
taxes. One of the House Point parcels is vacant, and another is
occupied by renters only. There are 22 units on these parcels, 12
of which are occupied by month-to-month lessees. Monthly rent is
$100 per structure (personal communication with three officers of
the House Point Community Association, August 20, 1967).

Renters or Sub-Lessees: Ten of the House Point houses are
rented, or occupied by family members of the lessees.
It was estimated that around 50 people live on the peninsula, and that most of these are renters and/or related to the lessees. It was felt that the population has been relatively stable in numbers over the years (personal communication with three officers of the Honolulu Point Community Association, August 26, 1987).

The Tongue Ranch has nine quintet suites, two duplexes, and three houses on the eastern portion of the project site. Four units are occupied by people who provide services to the Ranch. The remaining 12 are rented to the general public. Monthly rents range from $475.00 to $575.00. Standard landlord-tenant agreements exist between the ranch and its renters. It was estimated that approximately 50 people live in these units (based on letter from Tongue Ranch to the City Department of Planning dated June 22, 1987, and on personal communication with Ronald Tongue, President, Tongue Ranch, Inc., September 9, 1987).

In addition, three on-site rental units are located on the western section of the site. These units -- and the land on which they sit -- are owned by an entity other than the Estate. Approximately 12 people live in these units under a month-to-month rental agreement (personal communication with Sharon Walsh, relative of landowner, September 8, 1987).

Possible Owner-Occupants: There are a number of parcels owned in fee by parties other than Campbell Estate. Based on property tax information collected by a private vendor (Real Estate Data, Inc., 1988), there may be nine dwelling structures on these properties. However, it was not possible to verify this through field observation or interviews. Some of these units may be occupied by owners, and others by renters or lessees.

It is possible that these units may have around ten to twenty people, based on household sizes of one to two persons, to reflect current uncertainties about the actual existence of these units.

Residential Totals: In total, approximately 170 to 190 people live on the project site in up to 48 units. Most of these people occupy their units under rental agreements.

4.6.5 Commercial, Industrial, and Other On-Site Uses

Commercial and industrial uses also occur on the eastern section of the project site. At Honolulu Point, residential lessees reportedly also operate a tour bus company, an auto repair shop, a woodworking service, and a party rental supplies business.

Also on the eastern section is a used auto parts and towing operation on land leased from three landowners, one of whom is the Estate. Another parcel is leased from the Estate for the storage of vehicles and equipment.

Along the length of the shoreline is a petroleum pipeline and access corridor which will not be displaced by the proposed project.

The other existing use is Aeolian Park, a 3.7-acre park for with a basketball court, ball field, and a comfort station.

4.6.6 Notification

As of this writing (September 15, 1987), no formal notification of displacement had yet been transmitted, although planning for notification was underway. Contact had been established between City representatives and some potential displaces, and a presentation was made to the Honolulu Point Community Association on September 9, 1987.

Also, the City and County of Honolulu had made initial offers of acquisitions to owners of land comprising the project site.

4.6.7 Relocation and Other Potential Mitigations

Condemnation procedures require reimbursement of landowners, lessees, and tenants for the fair market value of property acquired by the City. Additionally, relocation assistance measures described below provide further cash and in-kind measures to displaced, including renters.

At the same time, it may be expected that some displaced businesses as well as residents -- may have expectations or needs beyond those which are covered by law governing relocation assistance. This has yet to be determined in any definitive way. As previously recommended in Section 4.4.6.2, communication between City agencies and affected residents or property holders needs to be augmented, in order to match the strong efforts being made on the regional level.

Following is a summary of applicable provisions for persons displaced by public projects:

4.6.7.1 Basis of Relocation and Displacement Provisions

Relocation assistance to displaced individuals and businesses is in accordance with State statutes and administrative rules. The applicable State statute is Hawaii Revised Statutes, Chapter 133. The applicable administrative rule is Hawaii Housing Authority, Title 17, Chapter 502. The following discussion is taken directly from documents provided by the Department of Housing and Community Development.
4.6.7.2 Relocation Assistance to Displaced Tenants

Individuals who rent housing, either through leases or sub-leases, on land to be acquired for the West Loch project, are entitled to relocation assistance. This assistance consists of payments for moving expenses, rental assistance, and aid in finding replacement housing.

Moving assistance may be either a fixed payment for a self-mover or reimbursement for expenses at the tenant's discretion. If the tenant elects a fixed payment, he/she would be entitled to payment according to a graduated scale based on the number of rooms of furniture and belongings to be moved. The amount ranges from $125 to $200. If the tenant decides on reimbursement, the tenant need only submit receipts for expenses. The tenant is entitled to either the fixed payment or the reimbursement, whichever is higher.

Mover may also be eligible for rental assistance if they have lived in their homes for at least 30 days prior to the City's formal notification of intent to acquire. Tenants will be entitled to the difference between their present rent and the rent of the their new home, for a period of two years up to a maximum payment of $1,500.

Tenants are also eligible for assistance in locating a new home. Such assistance will be given by the Department of Housing and Community Development.

4.6.7.3 Relocation Assistance to Displaced Homeowners

Homeowners who are displaced are entitled to money payments as well as assistance in finding a new home. If the homeowner buys and moves into a replacement home, he/she will be entitled to the difference in cost between the price paid for their present home and the new home, up to a maximum of $5,000. If the homeowner decides to rent instead of buying a new home, he/she will be entitled to the difference in cost between 24 months of rent and 12 percent of the price paid for the present house, up to a maximum of $5,000.

4.6.7.4 Relocation Assistance to Displaced Businesses, Farmers, and Non-Profit Organizations

Businesses, farmers, and non-profit organizations are entitled to choose between either a moving expense payment or a fixed relocation payment. The moving expense payment will reimburse actual expenses up to a maximum of $5,000. If the business does not move, it must submit two estimates provided from bona fide moving firms to receive payment. The business may elect to receive a fixed relocation payment instead of the moving expense payment. In this case the payment will equal the average net earnings of the business up to a maximum of $5,000.

REFERENCES


City and County of Honolulu, Department of Parks and Recreation, Long Range Plan, Honolulu, Hawaii: 1980.


City and County of Honolulu, Neighborhood Board Commission, Ewa Neighborhood Board, No. 23 Newsletter, Honolulu, Hawaii: June 1986 and July 1987.


East-West Population Institute (East-West Center) and Operation Honolulu (University of Hawaii at Honolulu) Villagers' Aspirations in Hawaii: A Profile of Recent Arrivals. Publication by authors. Honolulu, Hawaii: July 1985.


APPENDIX H

Market Assessments For
West Loch Estates
A Proposed Residential Development
Ewa, Hawaii

by

JOHN CHILD & COMPANY, INC.

September 1987
Report to
R.M. Towill Corporation
Covering
Market Assessments for
WEST LOCH ESTATES
a Proposed Residential Development
Ewa, Hawaii

September 1987
As an integral part of the planning and design, you require market assessments for the 1,350 proposed single-family residential units. In this regard, you have asked us to assist you by preparing market assessments for proposed single-family residential development at West Loch Estates.

STUDY OBJECTIVE

The objective of our assistance is to estimate the current and projected market support for the proposed 1,350 single-family residential units in terms of:

1. Property characteristics and amenities
2. Typical market sales prices
3. Projected annual absorption

The analysis is conducted in two parts. One analysis addresses the 600 market priced single-family units and the other addresses the 750 gap group units. The analyses include the 150 multi-family units for elderly housing. Section I of the accompanying report summarizes our methodology and findings for the 600 market priced units. Section II of the report summarizes the analysis covering the 750 gap group single-family units.

LIMITING CONDITIONS AND UNDERLYING ASSUMPTIONS

This report is subject to the limiting conditions and underlying assumptions presented in Adenda A.

ESTIMATED MARKET SUPPORT FOR HOUSING DEVELOPMENT IN EWA AND CENTRAL OAHU

Market Priced Units

The projected residential housing requirements were compared to the projected available inventory in Ewa and Central Oahu. Currently housing supply exceeds demand; however, within one or two years, the existing and planned inventory would be insufficient, and an additional 900 to 1,000 units would be required. However, assuming Makahiki, Hiliwai, and Ewa by Gentry receive necessary land use and zoning approvals and development proceeds as proposed, the total available inventory would exceed demand from 1990 through about 2000.

As a result, major projects would be expected to delay or decrease the proposed phasing to minimize the surplus inventory. By 2001, housing requirements would be expected to exceed available inventory. Major residential projects would be expected to accelerate development. About 5,600 units in Ewa Marina and Pualoa Estates would be expected to be developed between 2001 and 2005. In addition several thousand residential units could also be developed in Ewa Town Center.

Gap Group Units

The current demand for gap group housing units on Oahu is estimated to be about 10,000 units. Public and private developments which have been oriented to the gap group over the recent past have enjoyed overwhelming market response. However, there have not been a sufficient number of gap group units marketed over recent years to significantly reduce overall demand.

A consequence of this imbalance of supply and demand for gap group housing is a very strong demand for all single-family gap group housing projects which are located within reasonable travel times to employment. The relatively few proposed single-family projects on Oahu which will be oriented to the gap group market would not significantly change this supply/demand relationship over the foreseeable future.

MARKET ASSESSMENTS FOR WEST LOCH ESTATES

Market Priced Units

The market outlook for West Loch Estates supports development of the 600 units over the next three years. The projected housing requirement is expected to remain relatively strong. The most competitive available inventory would be:

- Ewa by Gentry
- Kapolei Village
- Village Park.

Although Makahiki would be in a position to offer competitively priced units, their new inventory is most likely to be priced higher than West Loch Estates. Hiliwai is also expected to be priced higher and would not be directly competitive.
Selling Prices

Based on the current and projected sales prices of competitive developments, average sales prices of about $140,000 to $150,000 for the West Loch Estates single-family units would be reasonable.

Absorption

Considering the projected housing requirements and available inventory, the 680 market priced housing units would be expected to sell in about three years. The actual sales performance would depend on the timing, pricing and qualifying requirements and subsidies, if any, offered at Ewa by City, Kapolei Village and Village Park.

Gap Group Units

The outlook for the 750 gap group housing units in West Loch Estates is more optimistic. The island-wide market demand for gap group housing is expected to remain very strong over the foreseeable future. While most residential developments in the Central Oahu/Ewa area will have small portions of their inventory oriented to the gap group market, sufficient demand would exist to accommodate all anticipated supply. Currently, the major competing gap group project would be Kailani, a proposed 292-unit single-family project in Whitmore Village.

Selling Prices

Based on current income qualification levels, mortgage interest rates, and sales prices in competitive gap group projects, the typical sales prices of West Loch Estates gap group single-family units would range between $100,000 and $120,000.

Absorption

Comparable single-family developments oriented to the gap group market have experienced very rapid absorptions. A one- to two-month sell-out is possible for the 750-unit development; however, the West Loch Estates gap group units would be expected to sell within two years.

INTEGRATION OF MARKET
AND GAP GROUP UNITS

The units oriented to the gap group should be designed to blend with the market priced units. While the market priced units would logically be located on all lots which benefit from views or adjoining open spaces, and may be clustered to some extent, it is probable that gap group units will be located on adjoining lots. It is recommended that attention be paid to the design of exterior facades, roof lines, architectural detailing, landscaping, and streetscapes be used to create an overall community in which the market and gap group units are not visibly distinguishable.

We appreciate having the opportunity to assist you. Please call us if you have any questions.

Very truly yours,

JOHN CHILD & COMPANY, INC.

Karen Char, MAI
Executive Vice President

Uson Y. Sato, ASA
Appraiser
I - MARKET ASSESSMENT - MARKET PRICED HOUSING

This section summarizes the study approach and market assessments for market priced units in West Loch Estates.

STUDY APPROACH

The study approach to complete the market assessments included:

- Review of current and projected demand for housing units on Oahu and especially in Ewa and Central Oahu.
- Review of sales absorption rates, sales prices, buyer profiles, and unit characteristics of comparable projects.
- Inventory of competitive under-construction, planned and proposed inventory in all major residential development in Ewa and Central Oahu.
- Review of the competitive strategies of major residential developments in Ewa and Central Oahu.
- Estimate the unit sizes and average sales prices appropriate for West Loch.
- Estimate of average annual absorption of the West Loch single-family units.

REGIONAL BACKGROUND

Trends in Hawaii, Oahu and Ewa were reviewed in terms of population, personal income, employment and economic activity. Significant trends are outlined as follows:

- Resident population of Hawaii is projected to reach 1.3 million by 1990 and 1.5 million by 2005.
- Personal income in Hawaii has increased 8% to 12% annually since 1965 and compares to National levels.
- Employment continues to grow in government, service and retail trades; Hawaii's current unemployment rate of 3.3% compares favorably to National averages.
- Economy of the State is expected to remain strong.
- Resident population of Oahu is expected to reach 954,500 by 2005.

- Most dramatic growth in the past 10 to 15 years occurred in Central Oahu; however, in the next 10 to 20 years growth is expected in Ewa.
- Current population distribution on Oahu includes about 3.0% in Ewa and 5.6% in Central Oahu.

CURRENT HOUSING DEMAND

The historical and current demand for housing on Oahu was reviewed. Significant trends are outlined as follows:

- Since 1981, between 2,500 and 4,000 new housing units have been added annually on Oahu.
- At the same time vacancies have remained relatively low, ranging from 3.1% to 4.7%.
- About 41% of Hawaii's housing inventory is owner-occupied.
- Over the past 15 years, the strongest growth in new housing units has been concentrated in Central Oahu. From 1970 to 1980 occupied housing units in Central Oahu increased from 1,300 to 9,400 and represented 3.7% of Oahu's occupied inventory.
- At the same time occupied housing units in Ewa doubled from 3,600 to 6,200 and represented 2.2% of Oahu's occupied inventory.
- Since 1980, over 23,000 new housing units have been added on Oahu. About 9,400 are single-family units.
- Annual new sales in major projects in Ewa and Central Oahu are averaged as follows:
  - Millenial: 300-600
  - Maunaloa: 100-200
  - Gentry-Malio: 300-400
  - Village Park: 250-300
- Overall, an estimated annual average of 800 to 1,200 units have sold in Ewa and Central Oahu.
- From 1981 to 1985, average sales prices for residential properties on Oahu have remained relatively stable. Since 1986, prices have increased significantly.
- In comparison, average sales prices in Ewa have increased about 5% annually since 1985.

- Average sales prices for single-family residential properties ranged as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>$191,907</td>
</tr>
<tr>
<td>1982</td>
<td>186,227</td>
</tr>
<tr>
<td>1983</td>
<td>186,242</td>
</tr>
<tr>
<td>1984</td>
<td>187,270</td>
</tr>
<tr>
<td>1985</td>
<td>188,920</td>
</tr>
<tr>
<td>1986</td>
<td>190,600</td>
</tr>
<tr>
<td>June 1987</td>
<td>261,900</td>
</tr>
</tbody>
</table>

EXISTING AND PROJECTED HOUSING INVENTORY

Demand for housing on Oahu is expected to continue to remain strong as population, employment and household incomes continue to increase. Significant trends in projected housing demand are outlined as follows:

- Department of Planning and Economic Development (DPED) projects Oahu's population to increase to 1,054,000 persons by 2000. The increase in population by 2000 would represent an additional demand for at least 43,200 housing units, assuming an average household size of 2.4 persons on Oahu.

- On Oahu, the primary new demand for housing would be in Ewa and Central Oahu because of new employment opportunities created by:
  - West Beach Resort
  - Expansion of Campbell Industrial Park
  - Barber's Point Harbor
  - Ewa Town Center

- According to DPED, the population of Ewa is expected to double to 83,000 by 2000. However, DPED's estimates of the population in Ewa may be conservative because:
  - Oahu's overall demand for new households could represent at least 48,200 new units.
  - Ewa and Central Oahu would be expected to represent a significant portion of the new demand because of:
    - New job opportunities in Central Oahu.

- Availability of competitively priced residential properties.

- As a result, historical absorption levels of 800 to 1,200 units would be expected to double to 1,500 to 2,500 units over the next 20 years.

- Overall new housing demand in Ewa and Central Oahu is estimated to be about 42,000 units by 2005. However, considering an average vacancy rate of about 5%, the actual new housing units required would be about 44,200 units by 2005.

EXISTING AND PROJECTED HOUSING INVENTORY

Major residential developments in Ewa and Central Oahu were evaluated in terms of development status. The existing and projected housing inventory is summarized as follows:

- Current unsold inventory in major projects:

<table>
<thead>
<tr>
<th>Project</th>
<th>Single-Family</th>
<th>Multi-Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millilani</td>
<td>506</td>
<td>330</td>
</tr>
<tr>
<td>Village Park</td>
<td>231</td>
<td>--</td>
</tr>
<tr>
<td>Makalii</td>
<td>98</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>833</td>
<td>404</td>
</tr>
</tbody>
</table>

- Typical sales prices of the unsold inventory:

<table>
<thead>
<tr>
<th>Project</th>
<th>Sales Price Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millilani</td>
<td>$115,000-316,000</td>
</tr>
<tr>
<td>Village Park</td>
<td>135,000-144,000</td>
</tr>
<tr>
<td>Makalii</td>
<td>140,000-223,000</td>
</tr>
</tbody>
</table>

- Unsold Inventory
• Over 52,000 additional units are proposed as follows:

<table>
<thead>
<tr>
<th>Project</th>
<th>Potential new units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva</td>
<td></td>
</tr>
<tr>
<td>West Loch Estates</td>
<td>1,500</td>
</tr>
<tr>
<td>Soda Creek</td>
<td>413</td>
</tr>
<tr>
<td>Makakilo</td>
<td>3,000</td>
</tr>
<tr>
<td>Kapolei Village</td>
<td>4,000</td>
</tr>
<tr>
<td>Poipu Estates</td>
<td>300-310</td>
</tr>
<tr>
<td>Ewa Marina</td>
<td>4,852</td>
</tr>
<tr>
<td>West Beach</td>
<td>9,300 (1)</td>
</tr>
<tr>
<td>Ewa by Gentry</td>
<td>7,000-8,000</td>
</tr>
<tr>
<td>Ewa Town Center</td>
<td>N.A.</td>
</tr>
<tr>
<td>Central Oahu</td>
<td></td>
</tr>
<tr>
<td>Millenani Mauka</td>
<td>6,640</td>
</tr>
<tr>
<td>Waikiki</td>
<td>2,700</td>
</tr>
<tr>
<td>Village Park</td>
<td>3,480</td>
</tr>
<tr>
<td>Waimanalo Ridge</td>
<td>8,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51,083-52,113</strong></td>
</tr>
</tbody>
</table>

• State land use and County zoning approvals are required to develop the proposed projects. Current approvals permit development as follows:

<table>
<thead>
<tr>
<th>Development approvals obtained</th>
<th>Potential new units</th>
</tr>
</thead>
<tbody>
<tr>
<td>State land use approved</td>
<td>3,928</td>
</tr>
<tr>
<td>State and County approvals required</td>
<td>3,265-3,925</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43,880-44,880</strong></td>
</tr>
</tbody>
</table>

• However, approvals are expected for a significant number of new units. Excluding Ewa Marina, Ewa Town Center, and West Beach, 413 under-construction, 14,666 planned and about 37,000 proposed units exist in Ewa and Central Oahu.

• The annual additions could range from about 800 to 3,300 units based on the current schedule. However, new units would be delayed when supply exceeds demand, and 3,300 units are unlikely to be built if the demand were not sufficient to support sales.

[1] Luxury multi-family residential units.

---

• The proposed price ranges of competitive projects are as follows:

<table>
<thead>
<tr>
<th>Project</th>
<th>Units</th>
<th>Sales price range</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Beach</td>
<td>9,200</td>
<td>N.A.</td>
</tr>
<tr>
<td>Millenani Mauka</td>
<td>5,630</td>
<td>$115,000-200,000</td>
</tr>
<tr>
<td>Waikiki</td>
<td>6,000</td>
<td>130,000-200,000</td>
</tr>
<tr>
<td>Village Park (expansion)</td>
<td>3,180</td>
<td>120,000-195,000</td>
</tr>
<tr>
<td>Makakilo</td>
<td>3,000</td>
<td>119,000-150,000</td>
</tr>
<tr>
<td>Waimanalo Ridge</td>
<td>9,000</td>
<td>135,000-140,000</td>
</tr>
<tr>
<td>Ewa by Gentry</td>
<td>7,000-8,000</td>
<td>135,000 (average)</td>
</tr>
<tr>
<td>Kapolei Village</td>
<td>4,000</td>
<td>130,000-150,000</td>
</tr>
</tbody>
</table>

**ESTIMATED MARKET SUPPORT FOR HOUSING DEVELOPMENT**

The projected housing requirements were compared to the projected available inventory. Currently housing supply exceeds demand; however, within one or two years, the existing and planned inventory would be insufficent, and an additional 900 to 1,000 units would be required. However, assuming Mililani Mauka and Ewa by Gentry receive necessary land use and zoning approvals and development proceeds as proposed, the total available inventory would exceed demand from 1990 through about 2000.

As a result, major projects would be expected to delay or decrease the proposed phasing to minimize the surplus inventory. By 2001, housing requirements would be expected to exceed available inventory. Major residential projects would be expected to accelerate development. About 5,000 units in Ewa Marina and Poipu Estates would be expected to be developed between 2001 and 2009. In addition several thousand residential units could also be developed in Ewa Town Center.

**MARKET ASSESSMENT FOR WEST LOCH MARKET UNITS**

The market outlook for market priced units in West Loch Estates supports development of the 400 units over the next three or more years. The projected housing requirement is expected to remain relatively strong. The most competitive available inventory would be:

• Ewa by Gentry
• Kapolei Village
• Village Park.
Although Takakilo would be in a position to offer competitively priced units, their new inventory is most likely to be priced higher than West Loch Estates. Hillside is also expected to be priced higher and would not be directly competitive.

Unit Sizes and Prices

Average sales prices for West Loch Estates single-family units in the $48,000 to $50,000 range would be reasonable based on the current and projected sales prices of competitive developments.

Unit prices would vary based upon unit design and size and lot topography, location and size. The sale prices would range from about $130,000 to $180,000 for large (1,600 sq ft) three or four-bedroom, 2 bath units on larger view lots.

Absorption

A review of recent absorption rates experienced in comparable residential developments reflect annual sales volumes of 100 to 200 units annually. The absorption rates experienced in Millilani, Village Park and Kapolei over the past year ranged from 100 to 200 units per year.

Considering the projected housing requirements and available inventory, the 600 market priced units would be expected to sell in about three years. The actual sales performance would depend on the timing, pricing and marketing efforts, and competitive inventory availability.

Unit Mix

If possible and economically viable, presales prior to construction would allow the buyer to select specific unit types to be built. As a result, the unit mix would reflect current market demand. However, if the unit mix must be predetermined, a mix of about 10% two-bedroom, 10% three-bedroom, and 20% four-bedroom units would be recommended based on current market trends.

Design Considerations

Market purchasers are primarily interested in the interior layout of the house. The question that the purchasers must answer is “Can we live in this house?” Therefore, layout would be the most important, followed by size of the unit and exterior appearance. Two-story units are as desirable as single level units as long as the interior layout is functional and minimizes wasted spaces.

Developers listed the following items in response to a survey covering the elements of a good floor plan:
- Space should be well utilised;
- Kitchen should be well designed and laid out;
- Master bedroom should be roomy;
- Ample cabinet space;
- Efficient traffic pattern within the home;
- Interior layout should be attractive.

Options

The most popular, most widely offered options available to the purchaser includes the following items:
- Exterior:
  - Lanai
  - Garage upgrade
  - Roofing upgrade
- Interior:
  - Carpet and floor upgrades
  - Major appliances
  - Window coverings upgrades
  - Light fixtures.

The most popular exterior option is the expansion or roofing of the lanai. Once a lanai has been expanded and roofed many families will enclose the area and expand their living area. The second most popular exterior option would be to enclose the carport and have a garage.

The interior home options most often selected are the flooring and carpeting upgrades.

Project/Development Amenities

The project amenities offered in the development are promoted as part of the sales presentation. Amenities such as open space, recreational facilities, and convenience shopping facilities are important and increase the desirability of the project but are not the major factor in the purchase decision.
II - MARKET ASSESSMENT - GAP GROUP HOUSING

This section summarizes the study approach and market assessments for gap group units at West Loch Estates.

STUDY APPROACH

The study approach to complete the gap group market assessments included:

- Review of recent publications covering affordable housing. The articles included:
  - Oahu’s Affordable Housing Crisis, Department of Housing and Community Development (DHED), City & County of Honolulu, dated March 16, 1987.
  - Affordable Housing Issue Paper, Department of Planning and Economic Development (DPED), Hawaii, dated December 1981 - Daly & Associates, Inc.

- Interviews with DHED and Housing Finance and Development Corporation (HFDC), formerly Hawaii Housing Authority, representatives to evaluate household income levels and housing prices which would qualify as "gap group" based on current definitions.

- Review of absorption rates, sales price range, buyer profile and unit characteristics of comparable projects oriented to the gap group.

- Identification and evaluation of current and proposed competitive residential developments on Oahu sponsored by HFDC, DHED, or private developers.

- Assessment of the competitiveness of the proposed West Loch Estates project in relation to the current and proposed residential projects on Oahu.

GAP GROUP HOUSING BACKGROUND

Trends in the gap group housing market were reviewed in terms of household incomes, population, and supply and demand relationships on Oahu. Significant trends relating to the gap group market on an island-wide basis are outlined as follows:

- Specific needs of the gap group desiring to become homeowners include: smaller, lower cost "starter homes", and/or reduced initial cost to enable them to qualify to purchase.

- Affordability will remain the primary housing problem on Oahu for the foreseeable future.

- Estimated gap group households on Oahu in 1980 totaled 39,366 households, of which 27,292 were renting.

- Sales prices of homes have risen faster than increases in household income. This has resulted in an increase in the number of gap group households since 1980.

- The number of gap group units developed by the public and private sector has not been sufficient to significantly reduce the overall demand for gap group housing units.

- The problem of housing affordability shows no sign of dissipation in the near future; factors influencing both supply and demand are expected to continue pushing the cost of housing further out of reach of the average household.

- Demand for affordable housing will increase because of increasing numbers of household formations which increase the competition and push prices further upward.

- The outlook from the production (supply) side is not encouraging: rising material costs, coupled with the increasing cost and limited supply of suitable land, can be expected to continue pushing the costs of producing housing units higher.

CURRENT HOUSING DEMAND

The historical and current demand for gap group housing on Oahu was reviewed. Significant trends and findings are outlined as follows:
There is currently demand for about 30,000 gap group housing units on Oahu.

The gap group market is an island-wide market. Projects located in reasonable proximity to employment, schools and shopping would effectively compete for the gap group buyer.

Relatively few gap group projects have been marketed over the recent past. Those which have been marketed over the recent past were generally single-family detached units in a reasonable location, attracting more qualified buyers than units available for sale, and consequently, experienced short marketing periods.

The gap group household is defined in relation to median household income. The DHCD definition is a maximum of 120% of the median household income estimate provided by HUD for metropolitan areas of Hawaii.

The maximum income levels for typical household sizes under the current DHCD guidelines are as follows:

<table>
<thead>
<tr>
<th>Number persons in household</th>
<th>Maximum household income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$32,000</td>
</tr>
<tr>
<td>3</td>
<td>$40,000</td>
</tr>
<tr>
<td>4</td>
<td>$41,000</td>
</tr>
<tr>
<td>5</td>
<td>$43,000</td>
</tr>
</tbody>
</table>

The maximum purchase prices a gap group household could afford, based on household size, income, 10% down payment, and financing at adjustable rates (8.0% interest) and conventional rates (10.0% interest), are summarized as follows:

<table>
<thead>
<tr>
<th>Number persons in household</th>
<th>Adjustable mortgage</th>
<th>Conventional mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$93,000</td>
<td>$73,000</td>
</tr>
<tr>
<td>3</td>
<td>$101,000</td>
<td>$81,000</td>
</tr>
<tr>
<td>4</td>
<td>$111,000</td>
<td>$90,000</td>
</tr>
<tr>
<td>5</td>
<td>$111,000</td>
<td>$100,000</td>
</tr>
</tbody>
</table>

EXISTING AND PROJECTED HOUSING INVENTORY

While gap group housing developments are generally stand-alone projects, many large residential developments orient a portion of the project inventory to the gap group. A review of major housing projects which are currently being developed or are proposed for development and contain competitive gap group units indicates the following:

- The projects represent 26,940 proposed residential units. About 37% (7,705 units) are estimated as gap group units.
- About 50% (3,928 units) of the gap group units are projected to be single-family units, and 39% (2,850 units) are projected to be multi-family units. The remaining units are either rentals or unspecified at this time.
- About 400 of the 3,600 single-family gap group units have already been marketed and are awaiting building completion.
- The majority of the remaining single-family gap group projects have projected delivery dates in 1980 or beyond.
- About 1,376 gap group units are proposed to be marketed from 1977 to 1980.
- About 468 or 632 of the units are single-family units.
- Townhouse units offer a degree of competition, but market patterns have shown that the single-family dwelling is much more desirable to the gap group households which can afford them.

ESTIMATED MARKET SUPPORT FOR GAP GROUP HOUSING

Over 30,000 households on Oahu are in the gap group market. Large numbers of prospective gap group purchasers from a wide geographic area have been attracted to affordable priced units. As a result, the location of the housing units is expected to continue to be a significant factor within the gap group market, so the right housing product can be offered at an affordable price and the project is not in a very remote or adverse location.

MARKET ASSESSMENT FOR WEST LOCH GAP GROUP UNITS

The projected demand for the 750 gap group housing units in West Loch Estates is very positive. The island-wide market demand for gap group housing is expected to remain very strong over the foreseeable future. While most residential developments in the
Central Oahu/Ewa area will have small portions of their inventory oriented to the gap group market, a sufficient demand would exist to accommodate all anticipated supply. Currently, the major competing gap group project would be Kailani, a proposed 320 unit single-family project in Whitmore Village.

**Unit Sizing and Price**

A range of unit sizes in terms of bedroom and bathroom count should be offered. Recommended gap group unit sizes and price ranges are summarized as follows:

<table>
<thead>
<tr>
<th>Bedroom/bath count</th>
<th>Net living area excluding carport/garage (sq ft)</th>
<th>Estimated selling price ($)</th>
</tr>
</thead>
</table>
| 2/1-11             | 800-950                                      | $100,000-
| 3/2                | 950-1100                                     | 120,000-130,000             |
| 4/2                | 1,050-1,200                                  | 160,000-170,000             |

**Gap Group Mix**

If possible and economically viable, presales prior to construction would allow the buyer to select specific unit types to be built. As a result, the unit mix would reflect current market demand. However, if the unit mix must be predetermined, a mix of about 20% two-bedroom, 60% three-bedroom, and 20% four-bedroom units would be recommended based on current market trends.

**Absorption**

Comparable single-family development oriented to the gap group market have experienced very rapid absorption rates. The sales experiences of gap group projects reflect the following absorption data:

- Single-family units generally have much faster absorption rates than other types of projects.
- The average monthly absorption rate for the four single-family projects is 79.2 units.
- The average monthly absorption rate for the four multi-family projects is 32.8 units.
- The absorption rates for single-family units ranges from a low of 32.3 units per month in Makaha to a high of 42 units a month for Kaloa in Kaneohe.

- The range of absorption rates for multi-family dwelling units ranged from a low of 3.5 units a month for Kupano in Waipio to a high of 76 units per month for the Keholu Meadows townhomes.

**Design Consideration**

The overriding factor for gap group housing is the size of the house and its interior layout. Storage space is also an important factor for the gap group buyer. Options are generally very limited in comparable projects, and if offered, were very basic, for example, patio for expansion, garage upgrade, or appliance package. Community amenities are typically not important in the purchase decision. Buyers do not want to incur more monthly obligations for maintenance of common areas/recreational facilities. Buyers are very concerned about maximizing their purchasing dollar and meeting monthly debt service obligations. The project should minimize monthly expenses which would be deducted from the maximum loan payments for which purchasers could qualify.
CERTIFICATION

We certify, to the best of our knowledge and belief:

1. Statements of fact in this report are true and correct.

2. Reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions and are our unbiased professional analyses, opinions and conclusions.

3. We have no present or prospective interest in the property which is the subject of this report, and we have no personal interest or bias with respect to the parties involved or the subject matter of this report.

4. Our compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in or the use of this report.

5. Our analyses, opinions and conclusions were developed and this report conforms with the requirements of the Code of Professional Ethics and Standards of Professional Practice of the American Institute of Real Estate Appraisers (Appraisal Institute), International Society of Real Estate Appraisers (ISREA), and American Society of Appraisers (ASA), and the use of this report is subject to the requirements of these professional organizations.

6. The Appraisal Institute has a voluntary continuing education program. Karen Char, MAI is currently certified under this program.

7. Uson Y. Evarist made a personal inspection of the property which is the subject of this report.

8. No one other than the undersigned prepared the analysis, opinions and conclusions in this report.

JOHN CHILD & COMPANY, INC.

Karen Char, MAI
Executive Vice President

Uson Y. Evarist, ASA
Appraiser

LIMITING CONDITIONS AND UNDERLYING ASSUMPTIONS

This report is subject to the following limiting conditions and underlying assumptions.

Report Format

At the request of the client this report is prepared in summary format. The detailed analysis and supporting documentation are in the files of John Child & Company, Inc.

Property Description

A complete legal description was not reviewed by the appraisers. The appraisers reviewed maps, aerial photographs, site plans, and other descriptive material covering the existing site and proposed development site plans. Conclusions relating to the physical character of the site and its adaptability for residential development is based upon information developed by the various consultants to the City & County of Honolulu and onsite inspections.

Basis of Analysis, Opinions, and Conclusions

The absorption rate conclusions assume the project is marketed as fee simple house-and-lot packages, and reflect the size, characteristics, and price ranges as appropriate in the analysis.
Our analysis, opinions, and conclusions assume:

1. No hidden adverse surface or subsurface, drainage, subsurface, ground water, or geological structure or conditions exist.

2. The client has provided us with all significant, relevant information covering the subject of this report.

No responsibility is assumed for matters legal in character nor for the title which is assumed to be good and marketable.

Any drawings, maps, photographs, and similar exhibits accompanying this report are included to assist the reader in visualizing the property. No responsibility is assumed for the accuracy of these exhibits.

All applicable public and private zoning codes and regulations, building and health codes, and other factors which affect the utility and value of the property were considered.

Terms of Assignment

Our assistance is limited to preparing this report to be used for your internal information. As a result, in accepting this report, the client specifically agrees that our findings and conclusions are solely for internal decision-making and that our report will not be referred to or presented to any other party for obtaining financing or any other purpose.

We have no obligation to update our report because of events and transactions occurring subsequent to the date of the report.

Neither our fees nor payment were contingent upon the results of the report.

Use of Report

This report may not be reproduced or published without the prior written consent of John Child & Company, Inc., and then only with proper qualification.

This report is valid only if presented in whole, with original photographs and exhibits, if any, and the official seal of John Child & Company, Inc. endorsed on the letter of transmittal and certification.
QUALIFICATIONS OF JOHN CHILD & COMPANY, INC.

John Child & Company, Inc. (John Child) is a professional real estate service corporation which specializes in real estate appraisal and consulting. Founded in 1937, John Child is one of the largest and oldest real estate appraisal and consulting companies in Hawaii. The Company enjoys an established reputation for quality work and professional service. Our reputation is based on our ability to identify and use appropriate and current valuation techniques, our knowledge and analysis of local market conditions and trends, and the extensive training, education and experience of our professional staff.

PROFESSIONAL STAFF

The Company's professional staff has a wide range of real estate experience gained through a range of fields, experiences, professional accomplishments, training and education. As a result, staff members hold designations earned from the major professional organizations.

Our staff members have earned their reputation for quality work and professional service. They are experts in real estate appraisal and consulting, and are well known for their expertise and professional accomplishments.

Our clients represent a variety of interests, including:

- Arbitration
- Litigation support.

Our clients cover a variety of real estate interests including fees simple, leasehold, leased fee and other partial interest or rights. Our extensive experience includes a variety of properties such as:

- Industrial properties
- Residential rental apartments
- Single-Family subdivisions
- Special-purpose properties.

SELECTED CLIENTS

Our clients represent a variety of interests, including:

- Amfac, Inc.
- Amfac Property Development Co.
- Bank of Hawaii
- Bank of America
- Bank of Hawaii
- B.P. Bishop Estate
- Caddell, Schutte, Fleming & Wright
- Case & Lynch
- Castle & Cooke, Inc.
- Chaminade College
- 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
- GEZ Financial
- Goodrich, Anderson, Quinn & Stifel
- Hawaiian Electric
- Hawaiian Telephone
- Honolulu Federal Savings and Loan Association
- Kaiser Development Company
- Kamalani Motors Co., Ltd.
- Mutual Trust & Banking Co., Ltd.
- Nature Conservancy
- Pacific Construction Co., Ltd.
- Peat Marwick Main & Co.
- Realty Mortgage Investors of the Pacific (RMI)
- Security Pacific Mortgage Corp.
- Seven Pacific Inc.
- Stark Development Company, Ltd.
- State of Hawaii
- U.S. Army
- U.S. Navy
- U.S. Department of the Interior

SOURCES 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
- Economic and fiscal impact assessments
BARRY CHAI, MAI, ASA
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 (MAI designation).
- Vice Chairman, National Bylaws Committee (1986-1987).
- Member, National Bylaws Committee (1985).
- Responsible for establishing grading criteria for business reports submitted for demonstration report credit and reviewing falling business reports.
- President (1986), Vice President (1987-1990), Secretary (1991-1993), Honolulu Chapter No. 15.
- Grader, National Board of Examiners (1989-1993) - Responsible for grading business reports and demonstrating appraisal reports submitted for credit towards MAI designation.
- Admissions Chairman, Southwest Region (1983).

Senior Member, American Society of Appraisers, (ASA designation, specializing in business valuation).

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 and businesses 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. MAI and MA designation recipients who meet the minimum standards of this program are awarded periodic educational certification. Barry Chai, MAI is certified under this program.

UCHI Y. SAWAI, ASA
Appraiser

Education

Bachelor of Architecture, Cornell University, 1972
Punahou School, 1967

Certificate in Advanced Real Estate, University of Hawaii Small Business Management Program.

Courses, workshops, seminars, and examinations including:

- AIREA, Exam IA-1 Real Estate Appraisal Principles
- AIREA, Exam IA-1 Real Estate Appraisal Principles
- AIREA, Standards of Professional Practice
- AIREA, Capitalization Update Seminar
- AIREA, Capitalization Theory and Techniques, Parts A and B
- AIREA, Case Studies in Real Estate Valuation
- AIREA, Review of MAI and the Recommitting Standards of the AIREA, 1987
- SRRA, Construction Costs Estimating Workshop

Professional Associations

Senior Member, American Society of Appraisers in the Real Property Discipline (ASA designation).
- Vice President, Honolulu Chapter No. 15
- Past Secretary, Honolulu Chapter No. 15

Candidate, American Institute of Real Estate Appraisers (candidate for MAI designation).

Professional Experience


Court Testimony

Qualified as an expert witness in the valuation of real property in the Courts of the State of Hawaii and the Federal District Court in Massachusetts.
APPENDIX I

Preliminary Geotechnical Engineering Reconnaissance
West Loch Estates Development
Honolulu, Oahu, Hawaii

by

C.W. ASSOCIATES, INC.
dba GEOLABS-HAWAII

August 1987
CW ASSOCIATES, INC. dba
GEOLABS-HAWAII
Geology Soils and Foundation Engineering

August 3, 1987
W.O. 1892-00
(RK. No. 35)

R.M. Towill Corporation
677 Ala Moana Blvd., Suite 1016
Honolulu, Hawaii 96813
Attention: Mr. Bruce Tsuchida

Gentlemen:

Submitted herewith is our report entitled "Preliminary Geotechnical Engineering Reconnaissance, West Loch Estates Development, Honolulu, Oahu, Hawaii."

Our work was performed in general accordance with the scope of services outlined in our proposal of July 9, 1987.

Detailed discussions and recommendations are contained in the body of the report. If there is any point that is not clear, please feel free to contact us.

Very truly yours,

C.W. ASSOCIATES INC.
dba GEOLABS-HAWAII

Clayton S. Ornina
Clayton, Hawaii, P.E.
Vice-President

PRELIMINARY GEOTECHNICAL ENGINEERING RECONNAISSANCE
WEST LOCH ESTATES DEVELOPMENT
HONOLULU, OAHU, HAWAII

W.O. 1892-00 AUGUST 3, 1987

PREPARED FOR
R.M. TOWILL CORPORATION

C.W. ASSOCIATES INC.
dba GEOLABS-HAWAII
2006 KALUA STREET
HONOLULU, HAWAII 96813

Tel: 743-7326 FAX: 743-1786 • Phone (808)441-5064
SUMMARY OF RECOMMENDATIONS

Based on our boring, probing and laboratory test data, the preliminary findings indicate that the proposed golf course areas and the lower northeastern portion of the Increment 2 housing area consist primarily of medium stiff to very soft clayey silt. Artesian groundwater conditions may also exist in the lower flood plain areas.

Most of the Increment 1 and 2 housing areas consist primarily of low to moderately expansive silty clay to clay. Colluvial deposits were encountered at shallow depths in the southeastern quarter of the Increment 2 housing area and may provide a good source of low-expansive structural fill.

A more detailed geotechnical engineering evaluation should be conducted at the site to provide design criteria for house foundation and pavement, and pertinent subsurface soil data for site grading, drainage channel design and utility excavation considerations.

The intent of this report should be referred to for detailed and special design recommendations.

INTRODUCTION

This report presents the results of a preliminary geotechnical reconnaissance performed for the subject project.

The purpose of the preliminary geotechnical exploration was to provide general soil data in the area to aid in the master planning of the development. Of particular concern would be:

a. to identify the general occurrence of expansive soils, if any, the thickness and characteristics of soft compressible deposits, and hard material that may be difficult to excavate as these would affect the development costs;

b. to evaluate the potential of subsurface capillary rise of brackish water to aid in golf course landscape design;

c. to provide soil data for golf course irrigation and water percolation considerations.

The scope of our reconnaissance included:

1. Review of available soil data from previous investigations in other adjacent developments.

2. Compilation of general information from soil and geologic maps in the general project area.

3. Field reconnaissance including sampling by 15 hand-auger probes to depths of approximately 5.0 to 5 feet below the existing ground surface, and the observation of exposed geologic materials in the project area.

4. Drilling and sampling of 14 borings to depths of 10.0 to 47 feet below the existing ground surface. Continuous penetration tests in lieu of drilling was utilized for the lower portion of the deep borings in soft formation.

5. Laboratory testing of selected samples obtained.

6. Engineering evaluation of the field and laboratory data.

7. Development of a general engineering geologic soil map and general anticipated geotechnical properties of the geologic materials at the proposed residential, golf course and park areas.

GEOLABS-HAWAII
PROJECT DESCRIPTION

The proposed project site is located south of Waipahu, northeast of Ewa, and on the western flank of West Loch (Plate 1).

The proposed West Loch Estates may consist of 157 acres of golf course, 31 acres of park area, and 211 acres of residential development (Plate 2).

It is our understanding that the residential development will be carried out in two increments. Increment 1 (northern portion) consists of 65.8 acres of land, and Increment 2 (southern portion) consists of 156.8 acres of land.

Preliminary grading plans were not available at the time of our study.

SITE DESCRIPTION

The project area is located in the Hauula District of Oahu, and is located between Waipahu and the Ewa Community (Plate 1).

Increment 1 of the proposed residential development occupies the northern portion of the site, and is bounded by Fort Weaver Road on the west, Waipahu, and part of the proposed park development and West Loch on the east. In this area, the topography is gently sloping down to the southeast towards the ocean (West Loch). The ground elevations generally vary from about 45 feet near the Farrington Highway/Fort Weaver Road intersection to about 25 feet near the southeastern edge of the project site. In general, most of the area is an abandoned cane field with unmaintained dirt roads and drainage ditches.

Increment 2 of the proposed residential development occupies the southeastern portion of the site, and is bounded by Fort Weaver Road on the west, the old Oahu Railway route on the southeast and the

GEOLABS-HAWAII

Honolulu Stream flood plain on the north. In general, the topography in this area is undulating, sloping eastward towards the ocean. West-east and north-south trending remnants of old sea cliffs (approximately 30 feet high) separate the northern lima (elevations 14 to 26 feet) one-third of the site from the remaining Increment 2 project area. Most of the area is used for growing sugarcane with many haul roads, drainage ditches, and irrigation ditches extending throughout the site.

The proposed golf course area is mainly located in the Honolulu Stream flood plain, and separates the proposed Increment 1 and 2 project sites. Fort Weaver Road subdivides the proposed golf course into two main portions. The Honolulu Stream meanders approximately along the center of the flood plain, which is mainly occupied by single family residences, grass lands, swamps and water ponds. Presently, uncontrolled placement of fill and gristle is under progress on the northern portion of the Fort Weaver Road, approximately 400 to 500 feet northeast of the Honolulu Stream bridge crossing and the stream. The ground elevations generally vary from about 35 feet near the northern end of the maile golf course area to 2 feet near the mouth of the Honolulu Stream.

RESULTS OF GEOTECHNICAL RECONNAISSANCE

Field Reconnaissance

The preliminary field reconnaissance consisted of surface geologic observation, logging of existing slope cuts and trench exposures, fifteen (15) auger probes to depths of 0.5 to 6 feet below the existing ground surface and drilling of fourteen (14) borings to 10.0 to 47.0 feet depths at the approximate locations shown on the Site Plan, Plate 2.

Detailed descriptions of the soils encountered in the borings and borings are shown on the boring and Paddling Logs in Appendix A.

Soil Conditions

Based on the preliminary field reconnaissance, the geologic soil types in the project site may be generalized into three distinct groups as follows and as shown on Plate 2.

GEOLABS-HAWAII
Recent Alluvium

Recent alluvial deposits were encountered mainly in lower areas at the Hoomaluhia Stream flood plain and near the coast, generally in the golf course, park, and the lower northern portion of the Increment 2 housing area. The recent alluvium encountered consisted primarily of medium stiff to very soft, brown to dark gray clayey silt. At higher elevations (approximately 40 feet, at B-13 location) dense silty sand and loamy deposits were encountered at shallow depths (approximately 6 feet below existing ground surface).

Older Alluvium

Older alluvial deposits were encountered mainly in the Increment 1 and 2 housing areas and a small central portion of the entire golf course area. The alluvium mainly consisted of medium stiff to hard, brown silty clay to clay.

In general, most of the clays can be classified as low to moderately expansive. In some boring locations (e.g., B-5 and B-10), clays with higher shrink-swell potential were encountered near the ground surface, and at 10 to 15 feet depth. Localized soft areas in the clayey deposit were encountered beneath drainage ditches and in areas where water leaked from irrigation hoses.

Coral Formation

Cemented to unweathered coralline sand and gravel were exposed along portions of the land road cut slopes and drainage trench excavation at the southern portion of the Increment 2 housing area. In the same general area, Boring B-7 encountered dense to hard coralline deposit at about 12 feet below existing ground surface. Therefore, it appears that coralline deposits may occur at relatively shallow depths (9 to over 12 feet) in the southeastern portion of the Increment 2 housing area.

GEOLABS-HAWAII

Groundwater was encountered in Boring Nos. 3, 9, 10, 11, 12 and 14 at about 1.5 to 8.2 feet below the existing ground level. Artesian conditions may exist at the lower areas at and near the flood plain. Rise in groundwater levels are anticipated during and after periods of heavy rainfall.

CONCLUSION AND RECOMMENDATION

Based on the preliminary borings, probing and laboratory tests performed, and from a soil engineering point of view, the site is, in general, suitable for the proposed residential and golf course development. However, because of the presence of soft ground, high groundwater levels and low to moderately expansive soils in various parts of the project site, special design criteria for house foundation, golf course, drainage channel and utility excavation may be required.

In the general vicinity of the flood plain, some very soft soils and high water levels (1.5 to 8.2 feet below existing ground) were noted in the golf course and the lower portion of the Increment 2 housing areas. Generally, site filling could cause settlement due to compression of the soft subsoils, therefore, special considerations and design procedures could be required for golf course site grading, drainage channel location, and single family housing foundation.

The preliminary borings encountered variable soil and groundwater conditions at the proposed golf course areas. Additional subsurface data is required in order to provide soil data for golf course irrigation considerations and to evaluate the potential of subsurface capillary rise of brackish water in the proposed golf course areas.

The near surface soils over most of the proposed Increment 1 and 2 housing areas mainly consist of hard silty clay to clay having low to moderate swelling potential. Easy excavation and conventional site grading procedures are anticipated for earthwork in these areas. Some of these soils may be moderately to highly expansive and could require special procedures for the house foundation design, such as deep footings, subgrade saturation or capping with non-expansive soil.

GEOLABS-HAWAII
Coralline deposit was encountered at shallow depths (4 to over 12 feet) in the southeastern quarter of the Increment 2 housing area. The coral may be hard and may require moderately hard ripping for excavation. The excavated coral material can provide a good source of low-expensive structural fill. Cavities of varying sizes are often found in coral formation. If encountered, backfilling of the cavities with grout or compacted fill may be required.

A more detailed geotechnical engineering evaluation should be conducted at the development site to:

a. better delineate areas of highly expansive clays;

b. better delineate the extent of soft ground at and near the Honouliuli Stream flood plain and the shoreline, particularly in the northern quarter of the Increment 2 housing area;

c. provide recommendations for single family foundation design and utility excavations in the proposed housing areas;

d. provide design recommendations for site area grading and slope stability evaluation of future slope cut, and/or embankment fill, if required, for both the proposed golf course and housing developments;

e. provide fill placement and exchange recommendations in soft ground areas within the project site;

f. evaluate the feasibility and provide preliminary design recommendations for drainage channels and utility excavations in the golf course areas. Location of the channels is not known at this time, and will be dependent upon the encountered ground condition; and

GEOLABS-HAWAII

y. carry out visual observation of the existing uncontrolled filling area near Fort Weaver Road and Honouliuli Stream Bridge, and to provide comments on disposal of existing fill and rubble materials, or evaluation of their re-use potential.

LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted soil and foundation engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The analysis and recommendations submitted in this report are based on our site reconnaissance, soil information from the test pits and laboratory test data obtained for this study.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soils samples. Unforeseen conditions, such as expansive soil and soft spots, may occur in localized areas and require additional probing or corrections in the field. Therefore, additional expenditures may be needed during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible costs.

This report has been prepared in order to assist the engineer and architect in the preparation of the master plan of this project.

The following plates are attached and complete this report:

Appendix A - Field Exploration
Plates A-1 thru A-27
Appendix B - Laboratory Testing
Plates B-1 thru B-7

GEOLABS-HAWAII
APPENDIX A

Field Exploration

The subsurface conditions at the site were explored by drilling fourteen (14) borings to depths of 10 to 47 feet below the existing ground surface at the approximate locations shown on the Site Plan, Plate 2. Two truck-mounted rigs were used to drill the borings.

Fifteen (15) auger probes were hand-driven to depths of 0.5 to 5 feet below the existing ground surface at the approximate locations shown on the Site Plan, Plate 2.

The soils encountered in the borings and probes were classified by visual and textural examination in the field by our engineer and continuously monitored by visual observation and testing in the laboratory. All soils were classified in general according to the unified Soil Classification System. A summary of the materials encountered are presented on the boring and probing logs, Plates A-1-1 through A-17.

Soil samples were obtained from the borings by driving a 2-inch standard split-spoon sampler or a 2-inch I.D. split-barrel sampler with a 140-pound hammer free falling 30 inches. The blow counts to drive the sampler the last 12 inches are shown on the boring logs at the approximate sample depths.

Three (3) standpipe piezometers were installed in 2 boreholes (B-9, B-9 and B-10) to allow monitoring of groundwater levels. Each piezometer generally consisted of a three-fourths of an inch PVC pipe backfilled around and below the slotted section of 10 to 15 feet from the bottom of the pipe. Gravel was placed and then cement backfill was applied.

W.O. 1899-00 AUGUST 1987

(OK. No. 35)
BORING 1

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Surface elevation 3'2&quot;</th>
<th>Soil Description</th>
<th>U.S.G</th>
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<td>CL</td>
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<tr>
<td>5</td>
<td>BROWN SILTY CLAY WITH TRACES OF SAND, VERY HARD, DRY</td>
<td>CL</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BROWN SILTY CLAY WITH TRACES OF SAND, HARD, DRY</td>
<td>CL</td>
<td></td>
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GRADES TO MOST

BORING TERMINATED AT 10.0 FEET ON JULY 17, 1987
GROUNDWATER NOT ENCOUNTERED

ELEVATIONS ESTIMATED FROM TOPOGRAPHIC SURVEY MAP (UNDATED) BY R.M. TOWNLEY CORPORATION RECEIVED ON AUGUST 5, 1987

LEGEND
I 2.0" O.D. split-spoon sample
II Undisturbed ring sample
III Disturbed ring sample
IV Core sample
V Shady tube sample
P Sampler pushed

LOG OF BORING

BORING 2

<table>
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<th>Surface elevation 4'6&quot;</th>
<th>Soil Description</th>
<th>U.S.G</th>
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<tr>
<td>65</td>
<td>CORAL GRAVEL AND SAND, MEDIUM DENSE, DRY (ROAD FILL)</td>
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<td>10</td>
<td>BROWN CLAY WITH TRACES OF SAND, HARD, MOST</td>
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BORING TERMINATED AT 15.5 FEET ON JULY 17, 1987
GROUNDWATER NOT ENCOUNTERED

LEGEND
I 2.0" O.D. split-spoon sample
II Undisturbed ring sample
III Disturbed ring sample
IV Core sample
V Shady tube sample
F FV Field Vane Shear (psf)
P Sampler pushed

LOG OF BORING

PLATE A-1.1
BORING 14

SOIL DESCRIPTION

BROWN SILTY CLAY WITH SOME
SAND, HARD, MOIST

MOTTLED BROWN SILTY CLAY,
VERY STIFF, WET

PROBE LOG
Proposed West Ich Estate
Honolulu, Oahu, Hawaii
W.O. 1899-00
August 1957

BORING TERMINATED AT 11.0 FEET
ON JULY 20, 1987

GROUNDWATER LEVEL AT:
DEPTH: 4.5 FT
HOURS: 1431
DATE: 07/20/87

LEGEND

LOG OF BORING

2.0' O.D. split-spoon sample
1.0' Undisturbed ring sample
1.0' Disturbed ring sample
Core samples
Dalton tube samples
P Sampled pulled

Depth (feet)  Surface elevation 6'

Sample type
Surface
Graph

Moisture content
Dry density (pcf)

50 40 30 20 10 0

P-1
0-1.0
Brown Silty Clay, dry
(Moisture Content = 21%)

1.0-3.0
Dark Brown Silty Clay
Medium stiff to stiff, moist
(Moisture Content = 23%)

P-2
0-6.0
Brown Silty Clay, dry
(Moisture Content = 16%)

6.0-10.0
Brown Silty Clay with Gravel
and Cobble, Pliable, dry
(Moisture Content = 19%)

P-3
0.0-0.6
Brown Silty Clay, soft, wet
(Moisture Content = 24%)

0.6-1.5
White Weathered Coral, medium
Hard (road fill)

P-4
0.0-1.0
Dark Brown Silty Clay
with some Coral Fragments,
Soft, wet
(Moisture Content = 21%)

1.0
Coral Gravel, dense, refusal
to hand-auger penetration

P-5
0.0-1.0
Dark Brown Clay, medium stiff,
Moist
(Moisture Content = 27%)

1.0-2.0
Dark Brown Clay, stiff, moist
(Moisture Content = 24%)

2.0
Very stiff, refusal to
hand-auger penetration

PLATE A-15

GEOLABS-HAWAII
## Probing Logs (Continued)

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<th>Probe No.</th>
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<td>Brown Silty Clay, medium stiff, dry</td>
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<td></td>
<td>0.5-3.0</td>
<td>Dark Brown Silty Clay, medium stiff, moist (Moisture Content = 28%)</td>
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<tr>
<td>P-7</td>
<td>0.0-3.0</td>
<td>Dark Brown Silty Clay, soft, wet (Moisture Content = 31%)</td>
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<td>P-8</td>
<td>0.0-0.5</td>
<td>Brown Organic Clayey Silt, very soft, wet</td>
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<td></td>
<td>0.5-3.0</td>
<td>Dark Gray Clayey Silt, very soft, wet (Moisture Content = 37%)</td>
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<td>3.0-6.0</td>
<td>Dark Gray Clayey Silt with some organic, soft, wet (Moisture Content = 41%)</td>
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<td>P-9</td>
<td>0.0-0.5</td>
<td>Brown Sandy Clayey Silt, dry</td>
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<td>0.5-1.0</td>
<td>Brown Sandy Clayey Silt, hard, difficult to penetrate with hand-auger (Moisture Content = 21%)</td>
</tr>
<tr>
<td>P-10</td>
<td>0.0-1.5</td>
<td>Brown Clayey Silt with Shells, dry (Moisture Content = 21%)</td>
</tr>
<tr>
<td>P-11</td>
<td>0.0-10.0</td>
<td>Brown Silty Clay to Clayey Silt, hard (Moisture Content = 24%)</td>
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<tr>
<td></td>
<td>0.0-1.5</td>
<td>Brown to Dark Brown Silty Clay, stiff, moist (Moisture Content = 31%)</td>
</tr>
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(Plate A-16)

(Plate A-17)
APPENDIX D
Laboratory Testing

Moisture content and unit weight determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The results of these tests are presented on the boring logs at the appropriate sample depths.

Five (5) Atterberg Limit tests were performed to aid in the classification of the soils. The test results are summarized on Plate B-1.

Four (4) California Bearing Ratio (CBR) tests were performed on samples of the near-surface soils to evaluate their suitability for road subgrade support. The test results are summarized on Plates B-2 and B-3.

Five (5) Proctor tests were performed to determine the moisture content versus dry density relationship of the compacted soil. The test results are summarized on Plates B-2 and B-3.

Three (3) sieve analysis tests were performed on selected samples of the soils to evaluate their grain size distribution. The test results are presented on Plate B-2.

Thirty-eight (38) one-inch ring shear tests were performed on undisturbed and remolded samples to evaluate the shear strength of the soils both natural and compacted conditions. The test results are summarized on Plates B-4 through B-7.

W.O. 1889-00 AXRECT 1987

(Cut. No. 23)

GEOLABS-HAWAII

TABLE 1 - SUMMARY OF LABORATORY TEST RESULTS

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<th>LOCATION</th>
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<th>B-3</th>
<th>B-4</th>
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GRADING ANALYSIS
(1 Passing)

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UNIFIED SOIL CLASSIFICATION

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SPECIFIC GRAVITY

EXPANSION AND CBR TESTS

(Surcharge - 51 P.S.F.)

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COMPACTION TEST

(Test Designation)

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<td>Dry to Wet or Wet to Dry</td>
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REMARKS

W.O. # 1889-00 DATE AXRECT 1987 PLATE B-1
**TABLE 2 - SUMMARY OF LABORATORY TEST RESULTS**

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**TABLE 3 - SUMMARY OF LABORATORY TEST RESULTS**

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<td>Unified Soil Classification</td>
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<td>Specific Gravity</td>
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**TWO-DIMENSIONAL TESTS**

Expansion and CBR Tests
- (Surcharge - 51 P.S.F.)
  - Molding Moisture Content (%): 10.2
  - Molding Dry Density, P.C.F.: 100.2
  - Swell Upon Saturation, %: 100
  - CBR at 0.1" Penetration: 2.0

Contraction Test
- (Test Designation) ASTM D-2557
  - Dry to Wet or Wet to Dry
    - Optimum Moisture (%): 22.0
    - Moisture Content at Optimum: 18.0
    - Maximum Density (%): 107.0
  - Dry to Wet
    - Moisture Content at Optimum: 18.0
    - Maximum Density (%): 107.0
  - Wet to Dry
    - Moisture Content at Optimum: 18.0
    - Maximum Density (%): 107.0

**REMARKS**

W.O. # 1889-00 DATE AUGUST 1987 PLATE B-2
### SUMMARY OF ONE-INCH RING SURL TESTS

Proposed West Loch Estate  
Hewitt, Hau, Oahu, Hawaii

<table>
<thead>
<tr>
<th>Location</th>
<th>Depth (Feet)</th>
<th>Soil Description</th>
<th>Dry Density (pcf)</th>
<th>Initial Moisture Content (%)</th>
<th>Air-Dried Moisture Content (%)</th>
<th>Final Moisture Content (%)</th>
<th>Ring Surl (f)</th>
</tr>
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<tbody>
<tr>
<td>P-1</td>
<td>2.5-3.0</td>
<td>Dark Brown Silty Clay (Remolded)</td>
<td>100.0</td>
<td>29</td>
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<td>30</td>
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<tr>
<td>P-2</td>
<td>9.0-10.0</td>
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<td>102</td>
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<tr>
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<td>Dark Brown Clay (Remolded)</td>
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<tr>
<td>P-7</td>
<td>1.0-1.5</td>
<td>Dark Brown Silty Clay (Remolded)</td>
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<tr>
<td>P-8</td>
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<td>30.1</td>
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<td>P-9</td>
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<td>Brown Sandy Clayey Silt (Remolded)</td>
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<tr>
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<td>86</td>
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W.O. 1889-00  AKZEST 1997  
PLATE B-4

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### Summary of One-Inch Ring Surl Tests (Cont'd)

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<tr>
<th>Location</th>
<th>Depth (Feet)</th>
<th>Soil Description</th>
<th>Dry Density (pcf)</th>
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<td>P-15</td>
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<td>Brown Silty Clay (Remolded)</td>
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<tr>
<td>B-1</td>
<td>0.0-0.5</td>
<td>Brown Silty Clayey (Remolded)</td>
<td>100</td>
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<td>B-1</td>
<td>4.0-4.9</td>
<td>Brown Silty Clayey With Trace of Sand (Remolded)</td>
<td>89</td>
<td>22</td>
<td>19.0</td>
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<td>B-1</td>
<td>1.5-11.0</td>
<td>Brown Clayey With Trace of Sand (Remolded)</td>
<td>94</td>
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<td>B-2</td>
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<td>24</td>
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<tr>
<td>B-2</td>
<td>9.5-11.0</td>
<td>Brown Silty Clayey (Remolded)</td>
<td>86</td>
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<td>Brown Clayey With Trace of Sand (Remolded)</td>
<td>90</td>
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W.O. 1889-00  AKZEST 1997  
PLATE B-5
Summary of One-Inch Ring Swell Tests (Cont'd)

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<tr>
<th>Location</th>
<th>Depth (Feet)</th>
<th>Soil Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture Content Initial</th>
<th>Moisture Content Air-Dried</th>
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<td>B-3</td>
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<td>B-3</td>
<td>5.5-6.0</td>
<td>Wetted Brown 92 Clay (Natural)</td>
<td>35</td>
<td>27</td>
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<td>1.2</td>
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<tr>
<td>B-3</td>
<td>9.5-11.0</td>
<td>Wetted Brown 65 Clay (Remolded)</td>
<td>42</td>
<td>34</td>
<td>41</td>
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<tr>
<td>B-4</td>
<td>0.0-0.5</td>
<td>Brown Silty Clay (Remolded)</td>
<td>106</td>
<td>25</td>
<td>19</td>
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<tr>
<td>B-4</td>
<td>1.5-3.0</td>
<td>Brown Silty Clay (Natural)</td>
<td>110</td>
<td>21</td>
<td>18</td>
<td>24</td>
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<td>B-4</td>
<td>5.0-6.5</td>
<td>Brown Silty Clay (Remolded)</td>
<td>107</td>
<td>24.0</td>
<td>17</td>
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<td>B-5</td>
<td>1.0-2.5</td>
<td>Brown Clay (Natural)</td>
<td>98</td>
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<tr>
<td>B-5</td>
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<td>Wetted Light Brown Silty Clay (Remolded)</td>
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<td>B-6</td>
<td>1.5-3.0</td>
<td>Wetted Brown 110 Silty Clay W/ Decomposed gravel (Natural)</td>
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<tr>
<td>B-6</td>
<td>5.0-6.5</td>
<td>Brown Clay W/ Gravel (Remolded)</td>
<td>118</td>
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<td>B-7</td>
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<td>Brown Clay With Gravel (Natural)</td>
<td>85</td>
<td>36</td>
<td>27</td>
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</tbody>
</table>

Note: Samples tested were either undisturbed or remolded in 1.4-inch diameter by one-inch high rings. They were air-dried overnight then saturated for 24 hours under a surcharge load of 50 P.s.f.

W.O. 1889-00    AUGUST 1987

PLATE B-6

GEOLABS-HAWAI"
APPENDIX J

Proposed West Loch Estates
Impact on Agriculture

by

Decision Analysts Hawaii

September 1987
CONTENTS

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<td>IMPACT ON DIVERSIFIED AGRICULTURE</td>
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<td>Demand for Prime Agricultural Land</td>
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<td>Supply of Prime Agricultural Land</td>
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<td>Availability of Land to Small Farmers</td>
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<td>CONSISTENCY WITH STATE AND COUNTY PLANS</td>
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<td>REFERENCES</td>
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The development of West Loch Estates would result in the urbanization of approximately 200 acres of sugarcane lands which are currently under cultivation by Oahu Sugar Company, Ltd. (OSCco). However, the West Loch Estates—individually or in combination with other major projects planned and proposed for Ewa and Central Oahu—would not adversely affect the economic viability of OSCC, nor would it require layoffs of sugar workers. This assumes the continuation of historic development rates for housing projects—rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage with little or no lost in production. Reductions in employment would occur through retirement and voluntary movement to other jobs. Over the long term, OSCC could accommodate a major reduction in acreage and maintain economies of scale by operating just one mill, rather than two in parallel.

If OSCC were to cease operations for whatever reason (most likely because of low sugar prices), the loss of jobs would be less than 4000 direct jobs and 5000 indirect jobs. This would be the equivalent of the loss of a hotel about half the size of the Hyatt Regency in Waikiki. Immediately following the mill closing, significant economic loss and social disruption would occur. But over the long term, the economic loss would be absorbed easily by expanding economic opportunities in the Ewa/Central-Oahu area.

The development of West Loch Estates on sugarcane acreage would eliminate the possibility of using these lands for diversified agriculture (including aquaculture). However, it is extremely doubtful that this would adversely affect the growth of diversified agriculture in Hawaii. There are four reasons for this assessment: (1) an extensive amount of prime-agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some—if not most or even all—of the sugar operations will make their lands available for profitable replacement.
crop to the extent that such crops are available; and (4) compared to the available supply, a very small amount of land and water is required to grow proven and pro-

isting crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports. The increasing availability of prime agricultural land in Hawaii is part of very long-term and accelerating trends occurring throughout most developed and developing market economies. Productivity and yields have been increasing faster than population growth, and genetic engineering and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases require that labor, land, and other resources be withdrawn from agriculture in order to restore balanced markets and to increase farm income for those who remain.

Since the West Loch Estates would not adversely affect the economic viability of OISC, and would not limit the growth of diversified agriculture, the project is consistent with the major thrust of the agricultural portion of the Hawaii State Plan and the State Agriculture Functional Plan, which is to preserve the economic viability of plantation agriculture and to promote the growth of diversified agriculture. Also, the project would provide a positive benefit (i.e., affordable housing) which would override the proposed "important agricultural lands" designation of the Land and Evaluation Site Assessment (LESA) Commission. Furthermore, the project would not adversely affect cultivation of adjacent sugarcane acreage and, therefore, complies with the Hawaii Right-to-Farm Act.

The project is also consistent with County policies of directing population growth to Ewa, which by definition must occur at the expense of sugarcane acreage.

PROPOSED WEST LOCH ESTATES:
IMPACT ON AGRICULTURE

The proposed West Loch Estates will involve the urbanization of about 325 acres of sugarcane lands of Oahu Sugar Company, Ltd (OISC),. The impact of this loss on OISC's operations, as well as on the potential growth of diversified agriculture (including aquaculture), is summarized in this report.

SOIL QUALITY OF AFFECTED SUGARCANE ACREAGE

The affected sugarcane acreage consists primarily of two soil types: Hanamulii clay, 0 to 1 percent slope (HAA), and Hoomaluhia clay, 1 to 6 percent slope (HAA) (USDA Soil Conservation Service). These soils can be used for sugarcane, truck crops, and pasture.

The soils within the petition area have been rated in terms of four classifications commonly used in Hawaii:

-Land Capability Classification by the United States Department of Agriculture Soil Conservation Service (SCS).

This classification rates soils according to eight levels, ranging from the highest classification level 1 to the lowest level VIII. If irrigated, HAA has a capability classification I, which indicates that the soil has few limitations which restrict its use. Soil type HAA is in Subclass B1 if irrigated, which indicates that the soil has a moderate limitation which reduces the choice of plants or which requires moderate conservation practices; the problem is that this soil is subject to moderate erosion if cultivated and not protected.

-Agricultural Land of Importance in the State of Hawaii (ALISH), by the SCS, University of Hawaii College of Tropical Agriculture and Human Resources, and the State of Hawaii Department of Agriculture.

This system classifies lands into three categories: (1) prime agricultural land which is land that is best suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (2) unique agricultural land
PROPOSED WEST LOCH ESTATES: IMPACT ON AGRICULTURE

which is non-prime agricultural land that is currently used for the production of specific high-value crops; and (3) other prime agricultural land which is non-prime and non-unique agricultural land that is of importance to the production of crops. Most of the petition lands now planted in sugarcane are rated as "prime" agricultural lands.

Overall Productivity Rating, by the Land Study Bureau (LSB) of the University of Hawaii.

This classification rates soils according to five levels, with "A" representing the class of highest productivity and "E" the lowest. Most of the petition lands now planted in sugarcane is rated B, although some lands are rated C, D, or E.


Based on soil quality, locational attributes, improvements, nearby activities, and land-use plans, this proposed system would designate a sufficient amount of the better agricultural lands so as to meet projected agricultural goals. The designated lands would be termed important agricultural lands (IAL) and, based on the proposed maps, would include the lands in the petition area now under cultivation. However, the identification would be subject to change based on a change in nearby activities and a change in County land-use plans. Also, the designation could be changed if there is an overriding public benefit.

IMPACT ON OSCO

Background Information

Amfann OSCO first milled sugar in 1899, and is now the fourth largest sugar operation in the State. It cultivates about 12,654 acres of sugarcane land, and produces about 90,000 to 95,000 tons of raw sugar, or nearly 10 percent of Hawaii's total sugar production. Its lands cover portions of Central Oahu on each side of Kualoa Road above Pearl Harbor, and portions of the Ewa Plain to the west of Pearl Harbor. The Ewa lands were taken over from Ewa Sugar Co. in 1970.

Another 4,860 acres of OSCO lands were in production in 1961, the bulk of which are now fallow, while a few hundred acres have been urbanized. These lands are mostly mauka lands with high pumping costs, and lands close to the ocean.

PROPOSED WEST LOCH ESTATES: IMPACT ON AGRICULTURE

where soils tend to be inferior, yields low, and hauling costs high because of the distance to the mill.

Nearly all of the land which OSCO cultivates is leased, principally from Campbell Estate with a lease expiration date of 1993, and from Kulikona Estate with a lease expiration date of 1996. The lease rents on these lands are among the highest in the State for sugarcane acreage, and are adjusted as a function of the revenues from sugar operations. Both leases allow partial withdrawal of lands for urbanization. The Campbell Estate lands above H-1 Freeway and west of Kualoa Road have been dedicated to agricultural use in order to obtain special property tax assessments.

OSCO is one of the major water users on Oahu, pumping up to 92.5 million gallons per day (MGD) of groundwater, and diverting in normal-reinfall years 25 to 30 MGD from the Windward side via Waiahole Ditch. Per-acre usage by OSCO can exceed 9,000 gallons per day. For comparison, per-capita usage by the Board of Water Supply averages about 140 MGD, and per-acre usage for single-family homes is 5 units per acre averages about 2,130 gallons per day.

Flood, mud, and management employment at OSCO is approximately 490 workers. Indirect employment dependent upon OSCO is estimated to be 550 jobs (multiplier of 1.13, based on the State Economic Model). For comparison, OSCO's economic contribution to Hawaii's economy is less than half that of the Hyatt Regency Hotel in Waikiki.

Because of favorable growing conditions, good farming practices, and drip irrigation, sugar yields at OSCO are very high, about 14.5 to 15.5 tons per acre, versus a 1970 Statewide average of 13.5 tons per acre (USDA "Hawaii Sugar News," March 30, 1970). In fact, OSCO holds the world record sugar yield at 21.63 tons per acre set in April 1965 (USDA, "Hawaii Sugar News," June 26, 1965). The current average yield is about 33 percent higher than the 1970 yield of 13.5 tons per acre.

But even with high yields and very efficient operation, OSCO is only marginally profitable—the principal problem being low sugar prices. The marginal profitability is measured before accounting for new capital investment needed to replace equipment.

Outlook for Sugar Prices

In the long term, the survival of OSCO will depend primarily on the price of sugar, for which the outlook is pessimistic. In the world market, the average price of sugar is expected to remain well below the production costs for all countries. This is
because most sugar is traded in controlled and/or subsidised markets, with surplus sugar dumped onto the world market for sale at a loss. Dramatic price increases have occurred, however, following a 6- to 9-year cycle, with prices increasing whenever world production falls short of consumption. But, there have been a number of fundamental developments in sugar and related industries in the past 10 years which appear to have altered the pattern of sugar prices, reducing peak prices and extending the periods of low prices. These changes include the decline or stagnation of sugar consumption in most developed countries; broadsides made by the liquid sweetener high-fructose corn syrup (HFCS); the availability of substantial sugar reserves in the form of sugar cane now devoted to ethanol production; major gains in sugar beet productivity in several European countries which were traditionally cane sugar importers; and the appearance of the European Economic Community (EEC) as a major exporter of refined sugar (Brown).

In the United States, Federal legislation protects sugar from the low world prices by import quotas, tariffs, and import fees. However, U.S. sugar prices are managed so that they are fairly low in order to prevent accelerating the growth of competing sweeteners, and to maintain public support. Under the U.S. Farm Bill, which runs to 1991, the target price for sugar is 15 cents per pound, with no adjustments for inflation.

The competing sweetener of major concern has been HFCS. It is as sweet or sweeter than regular sugar, costs less to produce, sells for less, is more profitable, is very similar to liquid sugar, can be substituted readily in many applications, and is easier and cheaper to handle. It has experienced rapid growth in sales at the expense of regular sugar sales. However, HFCS has captured nearly all of the liquid sweetener market so that continued growth will depend on the market acceptance of Crysta-m, the crystalline version of HFCS. In addition, the new low-calorie sweetener aspartame, sold under the brand name "Equal," is capturing market share and putting additional downward pressure on U.S. sugar prices.

Regarding the long-term outlook for sugar legislation, it should be noted that, because of HFCS, many corn states have joined the sugar and sweetener coalition, making it larger and stronger than in the past, even though a number of sugar companies have closed in recent years. Also, the Farm Act is generally supported by those countries which receive a sugar quota, since they benefit from a high price for, a major portion of their sugar. The considered expectation among sugar experts and lobbyists is that sugar will continue to be included in the U.S. Farm Act, but that the price-support level may be relatively low and may increase at a rate that is some-

what slower than inflation. Even though this is expected, there is a risk that efforts by sugar users and consumer groups to exclude sugar from the Farm Act or to reduce the support price will be successful.

OSCO Plan

In 1985, Amfac developed a Master Agricultural Plan which included a Survival Plan for OSCO. This plan, which has been fully implemented, was developed in response to an operating loss of nearly $10 million in 1981 and an outlook for low sugar prices. In recognition of the fact that sugar plantations are in place with substantial improvements, but suitable replacement crops have yet to be identified, the plan amounts to a holding action to gain time to find as many replacement crops as possible before OSCO may be forced by outside economic factors to cease operations.

Key components of the plan are:

-continue to improve the economic efficiency of OSCO by increasing sugar yields and reducing production costs (both of which have been improved substantially in the last few years);
-urbanize Waihiki (the only OSCO land owned by Amfac) in order to derive revenues to help support and justify continued sugar operations; and
-experiment with a variety of crops (papaya, sweet corn, potatoes, forage and feed crops, coffee, etc.) in order to find profitable replacements to sugar.

An important component of OSCO's cost reduction is a continued decline in the labor force over the last year, employment decreased by about 50 jobs, or about 10 percent. The employment decrease is accomplished by attrition—that is, employees who retire or leave OSCO for other voluntary reasons generally are not replaced.

Continued success of the OSCO Survival Plan will depend on (1) continued Federal price supports for sugar sufficiently high to justify continued operations, (2) union support to reduce costs, (3) an adequate allocation of water from the Pearl Harbor aquifer, and (4) retaining fields which are economical to farm and which provide sufficient yields to operate the mill at a marginal level. After the major leases expire with Campell Estate and Robinson Estate in 1995 and 1996, respectively, continued sugar operations also will depend on success in negotiating favorable lease terms.

An additional stipulation which has been under consideration by OSCO is to contract operations by running a single mill rather than two mills in parallel as is currently the case. With a single mill, OSCO could reduce production from its current level of
Proposed West Loch Estates: Impact on Agriculture

About 80,000 to 90,000 tons per year to about 60,000 to 70,000 tons without losing its economies of scale. Based on a yield of 15 tons per acre, land requirements could be as little as 8,600 acres, versus the current 13,549 acres. Of significance, Anaca's Kekaha Sugar Company, Inc., which has climate conditions similar to those of OSCO and a similar yield potential, historically has been one of the most profitable sugar operations in the State. Yet this plantation has only about 9,000 acres under cultivation, and produces only about 55,000 tons of sugar per year.

Of interest, the combination of cost containment, contraction of operations, and a search for alternative crops is the strategy being pursued by nearly all sugarcane operations throughout the world (Brown).

Urbanization Pressures on OSCO

The gradual growth westward of urban Honolulu has consumed a large amount of former sugarcane land as evidenced by the fact that the eastern boundary of OSCO lands has moved westward by 9 miles from Koolau Valley to past Waikele Stream. Since the 1940s, four rivers west of Waiawa have been urbanized. But because of new plantings in the foothills of the Waiawa mountains and on former pasture lands, sufficient acreage was cultivated to maintain economies of scale. The westward urbanization pressures of Honolulu continue, but plantings of new lands to compensate for lost fields is no longer feasible.

The economic forces which create urbanization pressures on OSCO include:
- Returns from urban land uses far in excess of those for agricultural uses.
- Proximity to the new or growing employment centers of West Oahu, Barbers Point Harbor, Campbell Industrial Park, and downtown Honolulu.
- Reasonable travel times to these employment centers because of the H-1 Freeway.
- Availability of water if freed from sugar production.
- Proximity to the Honolulu waste treatment facility.
- Low construction costs compared to areas that require extensive grading or removal of structures.

In contrast, redevelopment of downtown suffers from the high expense and displacement problems required to remove existing structures, the high expense and inconvenience of redeveloping inadequate infrastructure, less desirable high-rise housing compared to single-family homes, and strong community opposition on occasion. Hawaii Kai suffers from a lack of employment growth centers, relatively little land available for further single-family housing, severe transportation problems, and community opposition to further development. Similarly, the Windward side suffers from a lack of growing employment centers, transportation problems, and community opposition to further development.

In view of these factors, the City and County of Honolulu has designated the Ewa area as a "Secondary Urban Center" which will be developed to accommodate a major portion of Honolulu's future growth. Major developments approved and proposed for the Ewa/Central-Oahu area which would affect OSCO acreage includes:

<table>
<thead>
<tr>
<th>Sugarbe Acreage</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Loch Estates</td>
<td>205</td>
</tr>
<tr>
<td>Ko Olina (approved)</td>
<td>280</td>
</tr>
<tr>
<td>Ewa by Century (570 acres approved)</td>
<td>1,072</td>
</tr>
<tr>
<td>Ewa Marina (approved)</td>
<td>140</td>
</tr>
<tr>
<td>Village Park (147.5 acres approved by the State)</td>
<td>580</td>
</tr>
<tr>
<td>Kapolei</td>
<td>725</td>
</tr>
<tr>
<td>Kapolei Town Center</td>
<td>700</td>
</tr>
<tr>
<td>Kualoa Golf Course</td>
<td>195</td>
</tr>
<tr>
<td>Golf Course (K. Myers)</td>
<td>216</td>
</tr>
<tr>
<td>Total</td>
<td>4,940</td>
</tr>
</tbody>
</table>

Assuming a 10-year development period for the housing developments, Ko Olina, and Kapolei Town Center, and approval of all proposed developments, then the above translates into a loss of about 1,996 acres of sugarcane land by 1985 when the lease with Campbell Estate expires.

Long-Term Outlook for OSCO

Assuming sufficiently high sugar prices to justify continued sugar operations, an important question is whether the West Loch Estates, combined with the other projects, would eventually reduce sugarcane acreage and economies of scale sufficiently to force the closing of OSCO.

According to Anaca, over at least the next decade (to the end of the major leases), and assuming continuation of historic development rates for housing projects, no combination of the major projects planned and proposed for the Ewa/Central-Oahu area, and resulting loss in sugarcane acreage, will require layoffs of sugar workers. This is because of the expectation for relatively gradual reduction in sugarcane acreage, partial or complete compensation of this acreage loss by increasing
yields, and rapid employment loss by attrition. Gradual yield increases are likely to be accomplished through the introduction of new varieties, improved farming practices, chemical ripeners, more efficient harvesters, genetic engineering, etc.

An average yield of about 16 tons per acre, which is slightly above the current average yield of 14.5 to 15.5 tons per acre, would allow production at the current level of about 92,500 tons per year with only 11,550 acres of land, or about 1,950 fewer acres than currently. Such an acreage reduction is likely to be sufficient to accommodate all approved and proposed projects to the year 1990 when the lease with Campbell Estate expires. Increasing yields by about 23 percent to 21.3 tons per year, which may be achievable within the next two decades, would allow a reduction by 4,840 acres to 8,700 acres, while maintaining the same level of production. Such an acreage reduction would be sufficient to accommodate all approved and proposed projects at full development.

If OSCo is changed from a two-mill to a single-mill operation and produces 67,500 tons per year, then all approved and proposed projects can be accommodated with a yield of 15.5 tons per acre, which is within the range of current average yields. A change to a single mill and an increase in yields would free sufficient land to accommodate even more projects than the approved and proposed ones.

In summary, West Loch Estates, in combination with other approved and proposed projects, will not threaten the economic health of OSCo, nor require layoffs of sugar workers. Reinforcing this finding is the fact that OSCo plans to follow about 80 acres in the petition area because of its isolated location, regardless of whether or not the project proceeds.

Economic Impact of Closing OSCo

If OSCo were to cease operations for whatever reason (most likely because of low sugar prices), the loss of jobs would be less than 691 direct jobs and 559 indirect jobs, with the actual number dependent upon the reduced employment made possible by continuing productivity increases. This would be the equivalent of the loss of a hotel about half the size of the Hyatt Regency in Waikiki. Immediately following the mill closing, there would be a significant economic loss and social disruption. But over the long term, the economic loss would be absorbed easily by expanding economic opportunities in the Ewa/Central-Oahu area. For example, the new hotels at Ko Olina will be the equivalent of over eight OSCos in terms of direct plus indirect jobs and when high income and all indirect jobs are considered—will provide higher average wages (based on analysis with the State Economic Model). Other new jobs in

the Ewa area will be provided by Barbers Point Harbor, expansion of Campbell Industrial Park, development of Kapolei Town Center, growth of diversified agriculture made possible by lands freed from sugar (growth which is likely to be at the expense of Neighbor Island farmers), and other economic activities which may attract to the area or which may spontaneously occur because of increased availability of land and water, and lower urban land costs than would otherwise be the case. Therefore, most if not all sugar employees can be expected to find other employment if this should be required. However, some unskilled sugar workers and those having non-transferable skills may receive reduced pay when and if they are forced to find non-sugar jobs.

Assuming a policy favoring rapid urbanization of lands freed by the closing of sugar operations—a policy which presumably would be designed to increase the supply of land for housing and various economic opportunities, and increase competition among landowners and developers, with the objective of decreasing housing costs and increasing economic opportunities—three to four decades, or even longer, would be required to absorb the land. During this period, a huge supply of land and water would remain available for diversified agriculture and other economic activities. Even at full urbanization, over 3,000 acres would remain available for agriculture in the blast zone surrounding the Navy's magazine storage area located at West Loch, Pearl Harbor.

IMPACT ON DIVERSIFIED AGRICULTURE

The development of West Loch Estates is an irreplaceable commitment of agricultural land to urban use. This commitment raises the question of whether the West Loch Estates will affect adversely the development of diversified agriculture (including aquaculture), either immediately or in the long term. Before addressing this question, the demand for and the supply of prime agricultural land for diversified agriculture is clarified. For the purposes of this discussion, prime agricultural land is loosely defined as any high-quality agricultural land capable of providing high yields for a variety of crops, and would include the lands currently cultivated in the petition area.

Demand for Prime Agricultural Land

As part of its analysis to identify IIAI (see page 21), the LSEA Commission adopted projections of the amount of agricultural land required to increase food and animal-feed self-sufficiency given resident plus visitor population growth, and
increase crop exports. The projections for the State and Oahu are shown in Tables 1 and 2, respectively. As indicated, an estimated 92,844 additional acres will be required statewide to accommodate the 1983-1993 increase in production. The corresponding figure for Oahu is 7,979 acres. As shown, the crops and acreage requirements are categorized according to those which generally do not require prime agricultural land (although some crops may be grown profitably on prime agricultural land), those crops which generally do require prime agricultural land, plus a contingency of 10 percent of all acreage other than for beef and cattle.

It should be noted that the LESA projections and the corresponding Illustrative Generalized IAL Maps contain, or appear to contain, a number of major flaws which have led to a gross overestimation of the amount of agricultural land required:

- Based on a thorough, in-depth, and widely reviewed analysis of the market potential for crops grown on Molokai (Flach and Garrod), and analysis of previous projections distributed by the State of Hawaii Department of Agriculture, the LESA projection for diversified agriculture appears to be excessively optimistic. Apparently, 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. Verification of the extent of these flaws is hampered by the fact that the assumptions and analysis which underlie the LESA projections have not been made available for public inspection.

- Some of the acreage estimates are for harvested acreage, which leads to an overestimate of the land requirements for those crops which are harvested more than once a year (e.g., a crop harvested twice a year should have its acreage requirement halved).

- The LESA contingency of 92,844 acres is excessive, especially since LESA projects a requirement for less than 9,000 additional acres of prime agricultural land. The contingency is largely because the LESA methodology implicitly allows for expansion of sugar operations—a grossly unrealistic 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 planted in pasture or some other low-profit operation will stay in those uses. This is very unrealistic in that these are holding operations for land until profitable crops can be identified.

The relevant figures from Tables 1 and 2 are not the total figures, but the increase in the amount of prime agricultural land required to accommodate diversified agriculture: the increase is 8,558 for the State, and 2,314 acres for Oahu. As discussed above, these figures are excessive; a more realistic estimate for the State is probably closer to 1,700 acres (Flach and Garrod). Nevertheless, even using the excessive LESA estimate, the amount of additional prime agricultural land that would be required to accommodate diversified agriculture, and provide the hope (but not the realistic expectation) of profitable operations, is surprisingly small.

If diversified agriculture is to require a large amount of prime agricultural land, then additional crops will have to be grown for the export market rather than the small Hawaii market. However, the extreme difficulty of developing large export markets should be noted. Numerous and extensive crop searches and experiments for over a century by many people and organizations has led to surprisingly few major long-term successes in Hawaii, thereby indicating the extreme difficulty of identifying new export crops and developing them into new and profitable industries. Furthermore, the difficulty in developing export markets is increasing because of increasing competition from other sugarcane-growing areas. As noted previously, low sugar prices have led nearly all sugarcane operators throughout the world to search for profitable replacement crops, particularly crops which can maintain export earnings.

Supply of Prime Agricultural Land

Regarding the supply of land, an enormous and growing supply of prime agricultural land is available for other uses. Since 1970, about 82,000 acres of Hawaii's prime agricultural land has been freed from sugarcane production: about 47,000 acres of land freed from sugarcane production (about 9,000 acres on Oahu and 38,000 on the Neighbor Islands), and over 40,000 acres freed from pineapple production (about 13,000 acres on Oahu and over 27,000 on the Neighbor Islands) (Flach, Hawaii Sugar Industry, HIRA, Hawaii Agricultural Reporting Service). Some of the land freed from sugarcane and pineapple production has or will be converted to urban,
Table 1.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
STATE OF HAWAII: 1983 AND 1995
(continued)

<table>
<thead>
<tr>
<th>Crop or Activity</th>
<th>1983</th>
<th>1995</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crops and Activities which Generally Do Not Require Prime Agricultural Lands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef/cattle</td>
<td>585,450</td>
<td>365,000</td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>1,000</td>
<td>1,123</td>
<td>123</td>
</tr>
<tr>
<td>Eggs/Poultry</td>
<td>293</td>
<td>315</td>
<td>22</td>
</tr>
<tr>
<td>Swine</td>
<td>650</td>
<td>1,050</td>
<td>400</td>
</tr>
<tr>
<td><strong>Subtotal for Livestock</strong></td>
<td>1,998</td>
<td>2,557</td>
<td>559</td>
</tr>
<tr>
<td><strong>Unique Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquaculture</td>
<td>500</td>
<td>4,500</td>
<td>4,000</td>
</tr>
<tr>
<td>Coffee</td>
<td>3,000</td>
<td>5,700</td>
<td>2,700</td>
</tr>
<tr>
<td>Flowers/Nursery</td>
<td>1,786</td>
<td>5,040</td>
<td>3,254</td>
</tr>
<tr>
<td>Papea</td>
<td>2,120</td>
<td>11,000</td>
<td>8,880</td>
</tr>
<tr>
<td>Taro/Watercress</td>
<td>400</td>
<td>372</td>
<td>-28</td>
</tr>
<tr>
<td><strong>Subtotal for Unique Crops</strong></td>
<td>6,556</td>
<td>25,617</td>
<td>19,061</td>
</tr>
<tr>
<td>Macadamia Nuts</td>
<td>15,400</td>
<td>97,000</td>
<td>81,600</td>
</tr>
<tr>
<td><strong>Crops and Activities which Generally Do Require Prime Agricultural Lands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugarcane</td>
<td>194,300</td>
<td>177,700</td>
<td>-16,600</td>
</tr>
<tr>
<td>Pineapple</td>
<td>39,000</td>
<td>36,049</td>
<td>-2,951</td>
</tr>
<tr>
<td><strong>Subtotal for Plantation</strong></td>
<td>233,300</td>
<td>213,749</td>
<td>-19,551</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guava</td>
<td>955</td>
<td>1,450</td>
<td>495</td>
</tr>
<tr>
<td>Seed Corn</td>
<td>730</td>
<td>1,060</td>
<td>330</td>
</tr>
<tr>
<td>Bananas</td>
<td>1,100</td>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>Feed/Forage</td>
<td>1,705</td>
<td>2,495</td>
<td>790</td>
</tr>
<tr>
<td>Fruits</td>
<td>855</td>
<td>1,150</td>
<td>295</td>
</tr>
<tr>
<td>Vegetables/Rotation$^5$</td>
<td>1,450</td>
<td>17,700</td>
<td>16,250</td>
</tr>
<tr>
<td><strong>Subtotal for Other Crops</strong></td>
<td>37,940</td>
<td>29,150</td>
<td>-8,790</td>
</tr>
<tr>
<td><strong>Contingency$^5$</strong></td>
<td></td>
<td>29,500</td>
<td>29,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1,954,713</td>
<td>688,938</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL, Excluding Beef/Cattle</strong></td>
<td>271,960</td>
<td>321,446</td>
<td>49,486</td>
</tr>
</tbody>
</table>

1 Includes marginal grazing and pasture lands. The 1983 figure includes arid zones and other areas having low carrying capacity, while the 1995 figure does not.
2 Often includes land in a holding operation awaiting discovery of profitable uses.
3 The decline in acreage primarily reflects the loss of Puna Sugar Co.
4 Includes some pasture and 8,000 of guinea grass from Hilo\'s.
5 Overstated in that the acreage figures are for harvested acres, not the amount of land required.
6 Based on 10% of all acreage other than that for beef/cattle. Adding a contingency amounts to double counting in that the projections are optimistic to begin with. Also, the contingency figure includes 17,700 acres for expansion of sugarcane, even though the sugar industry is expected to decline, not expand.
PROPOSED WEST LOCH ESTATES: IMPACT ON AGRICULTURE

Table 1.—LEIA AGRICULTURAL ACREAGE REQUIREMENTS,
CITY AND COUNTY OF HONOLULU: 1983 AND 1995
(continued)

<table>
<thead>
<tr>
<th>Crop or Activity</th>
<th>1983</th>
<th>1995</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops and Activities which Generally Don't Require Prime Agricultural Lands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef/cattle</td>
<td>10,000</td>
<td>10,000</td>
<td>—</td>
</tr>
<tr>
<td>Livestock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td>240</td>
<td>605</td>
<td>365</td>
</tr>
<tr>
<td>Eggs/Poultry</td>
<td>250</td>
<td>390</td>
<td>140</td>
</tr>
<tr>
<td>Swine</td>
<td>425</td>
<td>200</td>
<td>225</td>
</tr>
<tr>
<td>Subtotal for Livestock</td>
<td>725</td>
<td>325</td>
<td>400</td>
</tr>
<tr>
<td>Unique Crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquaculture</td>
<td>300</td>
<td>2,400</td>
<td>2,100</td>
</tr>
<tr>
<td>Flowers/Nursery</td>
<td>480</td>
<td>500</td>
<td>20</td>
</tr>
<tr>
<td>Papaya</td>
<td>70</td>
<td>170</td>
<td>100</td>
</tr>
<tr>
<td>Taro/Watercress</td>
<td>80</td>
<td>85</td>
<td>5</td>
</tr>
<tr>
<td>Subtotal for Unique Crops</td>
<td>950</td>
<td>3,255</td>
<td>2,305</td>
</tr>
<tr>
<td>Crops and Activities which Generally Require Prime Agricultural Lands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantations</td>
<td>27,300</td>
<td>25,300</td>
<td>—1,000</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>3,300</td>
<td>2,000</td>
<td>—1,300</td>
</tr>
<tr>
<td>Pineapple</td>
<td>1,000</td>
<td>1,000</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal for Plantation</td>
<td>31,600</td>
<td>28,300</td>
<td>—3,300</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guava</td>
<td></td>
<td>245</td>
<td>245</td>
</tr>
<tr>
<td>Sweet Corn</td>
<td>125</td>
<td>120</td>
<td>—5</td>
</tr>
<tr>
<td>Bananas</td>
<td>540</td>
<td>835</td>
<td>295</td>
</tr>
<tr>
<td>Feed/Forage</td>
<td>1,761</td>
<td>2,112</td>
<td>351</td>
</tr>
<tr>
<td>Fruits</td>
<td>80</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Vegetables/Malos</td>
<td>5,850</td>
<td>5,850</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal for Other Crops</td>
<td>5,931</td>
<td>5,931</td>
<td>0</td>
</tr>
<tr>
<td>Contingency</td>
<td></td>
<td>4,750</td>
<td>4,750</td>
</tr>
<tr>
<td>TOTAL</td>
<td>68,850</td>
<td>65,408</td>
<td>—3,442</td>
</tr>
<tr>
<td>TOTAL, Excluding Beef/Cattle</td>
<td>44,330</td>
<td>52,718</td>
<td>8,388</td>
</tr>
</tbody>
</table>

1Includes marginal grazing and pasture lands. The 1983 figure includes arid zones and other areas having low carrying capacity, while the 1995 figure does not.
2Includes land in a holding operation awaiting discovery of profitable uses.
3Includes some pasture.
4Overstated in that the acreage figures are for harvested acres, not the amount of land required.
5Based on 10% of all acreage other than that for beef/cattle. Adding a contingency amounts to double counting in that the projections are optimistic to begin with. Also, the contingency figure includes 5,520 acres for expansion of sugarcane, even though the sugar industry is expected to decline, not expand.
diversified agriculture, and aquaculture uses. Also, some of the land freed from pineapple use on Oahu was converted to sugarcane production. Making allowances for the various conversions, uncommitted acreage which remains available to diversified agriculture and aquaculture amounts to only a few thousands of acres, with a large share of this on Oahu. Much of this land is fallow, in pasture, or some other low-value land-holding operation.

This supply of prime agricultural land probably will increase given the very real possibility of future sugar-mill closings. As discussed above, the outlook for sugar prices is unfavorable, and some unprofitable mills are in operation today only because they have leases and/or energy contracts which make closing too expensive. However, these contracts eventually will end.

Furthermore, much of the sugarcane lands are in holding awaiting the discovery of profitable replacement activities, so is part of the supply of prime agricultural land available to profitable diversified agriculture crops. For example, one of the components of the OSCo Survival Plan is to experiment with a variety of crops in order to find profitable replacements to sugar.

Many of the lands freed, to be freed, or which can be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for a variety of crops. Also, water is available for most of these lands, especially lands freed from sugar production. However, some of the lands freed from sugar are at higher elevations where pumping costs are relatively high.

Additional lands which have been made available for diversified agriculture are in government-sponsored agricultural parks throughout the State. Lands for agricultural activities which do not require prime agricultural land include pasture land, land for livestock operations, and unique lands. Unique lands are not prime agricultural lands, but are important lands for certain crops; the principal examples are the coffee lands in Kona, and certain lava lands in Puunene that are well-suited for growing papayas. The supply of unique lands is quite large and distinct from the supply of prime agricultural land.

Availability of Land to Small Farmers

Even though considerable agricultural land is available, it should be noted that in many areas of the State small agricultural parcels are not available to small-scale farmers under long-term leases. The reason for the unavailability is that land-use regulations and the political environment make it unprofitable and too risky to lease small farm parcels. Unprofitable because agriculture is generally a low-value use of land which can afford only relatively low lease rents. While County subdivision regulations designed for rural estates require expensive electrical power, paved rather than gravel roads, and buried rather than surface water lines. The combination of low rents and expensive subdivision requirements makes it unprofitable to subdivide land for small farms. For example, rather than develop the State agricultural park in Kauai, it would have been cheaper for the State to give each farmer $100,000. In addition, there is the risk that when the lease expires, the farmer will turn to the legislature to try and prevent an extension of the lease rent, or to prevent eviction by the landowner in favor of a higher and more profitable use this is often the case for long-term leases for land on which the farmer has built a home.

Such an economic environment favors leases to large-scale operators (including cooperatives consisting of many small farmers), short-term and illegal leases of unsubdivided land, subdivision of the land into rural estates for sale to buyers who can afford the costs of the subdivision requirements, or leaving the land fallow.

The unavailability of small parcels of land to farmers is a serious problem, but does not invalidate the fact that there is a vast supply of prime agricultural land available for profitable diversified agricultural activities. However, the activities must be large scale, or the subdivision requirements circumvented.

Outlook for Diversified Agriculture

Based on the above analysis, ample prime agricultural land will be available to easily accommodate prime-agricultural land requirements of diversified agriculture. This conclusion derives from the fact that there is a vast amount of prime agricultural land and water that has been freed from sugar and pineapple production in recent years, the very real possibility that additional sugarcane acreage and water will be freed given the outlook for low sugar prices, the fact that some if not most or even all of the sugar operations would make their lands available for profitable replacement crops, and the surprisingly modest land requirements for diversified agriculture. In other words, the limiting factor will be the market, not the land supply. West Loch Estates, combined with other major housing developments in the Ewa/Central-Oahu area and elsewhere, involves far too little land to affect this conclusion. Therefore, West Loch Estates will not affect adversely the growth of diversified agriculture.

Consistency with Overseas Long-Term Trends

Hawaii's increased availability of prime agricultural land compared to that of prior decades is part of some very long-term and accelerating trends occurring
PROPOSED WEST LOCH ESTATES: IMPACT ON AGRICULTURE

throughout most developed and developing market economies. For example, an excess of about 45 million acres of agricultural land exists in the United States (Drevski). Productivity and yields have been increasing faster than population growth and genetic engineering—which gives promise of developing crops having higher yields, increased resistance to diseases and pests, and increased tolerance to climatic variations—and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases lead to overproduction, market gluts, low agricultural prices, low farm income, bankruptcies, and a need to withdraw labor, land, and other resources from agriculture in order to restore balanced markets and increase farm income to those who remain. The major agricultural problem facing the United States and many other economies is how to make this withdrawal an orderly one so as to minimize social problems. This is a problem associated with tremendous success in agriculture, and contrasts sharply with and invalidates the 100-year old prediction of Thomas Malthus that population will increase faster than the food supply, resulting in massive starvation.

CONSISTENCY WITH STATE AND COUNTY PLANS

The thrust of the Hawaii State Plan and the State Agriculture Functional Plan is to preserve the economic viability of plantation agriculture and to promote the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these two plans is to preserve prime agricultural lands for the sake of preservation—preservation is to occur only if there is a potential agricultural need for these lands.

Regarding housing, the West Loch Estates is clearly in support of the Hawaii State Plan, particularly those policies, objectives, and priority directions which encourage development of reasonably priced, safe, sanitary, liveable homes in suitable environments. Nevertheless, certain priority guidelines (not objectives or policies) dealing with population growth and distribution do call for encouraging urban growth primarily to existing urban areas and marginal agricultural lands, and away from important agricultural lands. While this is desirable, it is unrealistic in terms of the supply of lands suitable for building reasonably-priced housing, and unrealistic as to the agricultural market which could use the vast supply of prime agricultural lands profitably.

Since the West Loch Estates will not adversely affect the economic viability of OSCs, will not limit the growth of diversified agriculture, but will contribute to a healthier housing market, the project is consistent with the major thrust of the

Hawaii State Plan and the State Agriculture Functional Plan. Also, the project would provide a public benefit which would override the proposed IAL designation of the LEIA Commission. Furthermore, the project would not adversely affect cultivation of adjacent sugarcane acreage and, therefore, complies with the Hawaii Right-to-Farm Act.

The project is also consistent with County policies of directing population growth to Ewa, which by definition must occur at the expense of sugarcane acreage.
REFERENCES


Hawaiian Sugar Planters' Association (HSPA), "Hawaii Sugar News," Honolulu, Hawaii.


CERTIFICATION

I HEREBY CERTIFY THAT THE MICROPHOTOGRAPH APPEARING IN THIS REEL OF FILM ARE TRUE COPIES OF THE ORIGINAL DOCUMENTS.

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DATE                                SIGNATURE OF OPERATOR
2006                                Lapiz Carlo