DEPARTMENT OF GENERAL PLANNING
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'88 APR 20 A9:54

MM/DGP 4/88-I-483

April 19, 1988

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

Dear Dr. Miura:

Final Environmental Impact Statement (FEIS)
Wailuna IV - The Lusk Company
Tax Map Key 9-8-2: por. 3

We are notifying you that the Final EIS identified above is acceptable under the procedures established in Chapter 343, HRS, and Title 11, Administrative Rules, Department of Health, Chapter 200, Environmental Impact Statement Rules.

A copy of the Acceptance Report is attached, which identifies several unresolved issues having to do with planning and zoning changes, detailed soils and engineering analysis, construction plans and the availability of sewage facilities, schools, water, etc. The report indicates the approximate timing as to when these issues should be addressed.

If you have any questions, please contact Melvin Murakami of my staff at 527-6020.

Sincerely,

Donald Clegg

DONALD A. CLEGG
Chief Planning Officer

Attach.

cc: Fred J. Rodriguez, Environmental Communications, Inc.

DEPARTMENT OF GENERAL PLANNING (DGP)
88/PUC-1

ACCEPTANCE REPORT: WAILUNA IV
CHAPTER 343, HRS
ENVIRONMENTAL IMPACT STATEMENT (EIS)
PEARL CITY, EWA, OAHU
THE LUSK COMPANY
TAX MAP KEY 9-8-02: POR. 3

A. BACKGROUND

The Lusk Company is proposing a 180 unit single-family residential condominium development on approximately 26 acres of State Conservation land situated at the end of Kaahumanu Street in Pearl City. The site is immediately mauka of Increment III of the Lusk Company's Wailuna development. The Lusk Company views the present proposal as Increment IV of their Wailuna development.

The subject site is part of a ridge that is situated at the 600 to 800 foot elevation. It consists of gentle, moderate, and steep slopes. Based on our analysis of the slope map submitted in the EIS, 60% of the site is 20% or less in slope and 40% of the site is more than 20%. 30% of the site exceeds 30% slope.

The Waiau Gulch and Punanani Gulch are situated on the northern and southern sides of the site. There is also an unnamed gulch which is estimated to be about 7 acres in the middle part of the site. These three gulches which were formed by stream flow on the slopes serve as the drainage way for runoff from the subject parcel.

Proposed on-site improvements will include extensive cutting, grading and filling. The applicant intends to grade the high ground and to fill the unnamed gulch. This would moderate existing slopes for housing use. The actual extent of housing uses, however, would be dependant upon changes to the State Land Use classification, Development Plan Land Use Map, Zoning approval, the outcome of detailed soils, engineering and other analysis especially with regard to the on-site gulch area, and adherence to regulatory controls.

There is an existing paved road located along the highest ridge portion on the northern edge of the site. Previous agricultural use consisted of sugar cultivation below the 650-foot elevation. It is estimated that less than 25% of the site was in sugar cultivation.

The soils of the site are as follows:

35% - Manana silty clay loam (MoC) 6 to 12% slopes, moderate and moderately rapid permeability, medium runoff, moderate erosion hazard, moderate shrink-swell potential;

35% - Manana silty clay loam (MoD2) 12 to 25% slopes, moderately rapid permeability, rapid runoff, severe erosion hazard, moderate shrink-swell potential;

30% - Helemano silty clay (HLMG) 30 to 90% slopes, moderately rapid permeability, medium to rapid runoff, severe to very severe erosion hazard, moderate shrink-swell potential.

The proposed project is expected to be completed in one continuous phase by 1993. The total cost of the proposed project is approximately $27,000,000 (1987 dollars).

B. PROCEDURE

1. An EIS Preparation Notice (EISPN) was published in the "Office of Environmental Quality Control (OEQC) Bulletin" of November 8, 1987, under the Register of Chapter 343, HRS Documents. This bulletin was distributed to Federal, State, and City and County agencies, as well as interested community groups. Simultaneously, the applicant requested comments on the proposal directly from forty-three (43) Federal, State, City and County, and private agencies.

2. The deadline for comments from consulted parties and requests to be a consulted party was set for December 8, 1987. Twenty-three (23) parties made replies to the EISPN. The applicant made responses to all substantive comments, and included these in the Final EIS.

3. On January 20, 1988 the applicant submitted the Draft EIS to the OEQC and the DGP pursuant to the requirements of Chapter 343, HRS.

4. The announcement of the availability of the Draft EIS was published in the January 23, 1988 "OEQC Bulletin." The deadline for public review was set for March 8, 1988.

5. Twenty-seven (27) parties commented on the Draft EIS,. The applicant's responses are included in the Final EIS.

6. The Final EIS was submitted to the DGP on March 21, 1988 and published in the March 23, 1988 "OEQC Bulletin."

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

C. EIS CONTENT

The Final EIS consists of a single volume, containing the EIS, the comments, and nine appendixes. The latter include: (1) "Biological Study - Char and Associates;" (2) Archaeological Study - Bishop Museum;" (3) "Traffic Study - Parsons Brinckerhoff Quade & Douglas, Inc.;" (4) "Air Quality Study - Barry D. Root;" (5) "Noise Study - Y. Ebisu & Associates;" (6) "Social Impact - Environment Capital Managers, Inc.;" (7) "Stormwater Drainage - Gordon L. Dugan;" (8) "Soil Report - Harding Lawson Associates;" and (9) a topographic survey by Community Planning, Inc.

The Final EIS for the Wailuna IV Development adequately addresses the content requirements specified in Sections 11-200-17 and 11-200-18 of the EIS Rules.

D. RESPONSES TO COMMENTS

The applicant provided reasonably adequate responses to comments, although there are considerable unresolved issues (see below).

E. UNRESOLVED ISSUES

1. Government policies with respect to urban usage of the site have yet to be established. The proposal requires changes in the State Land Use District Boundary from Conservation to Urban and requires a change to the City's Development Plan Land Use Map for the Primary Urban Center.

2. The water master plan, sewage master plan, grading and construction plans have yet to be completed. These should be submitted prior to construction activities, or sooner. The United States Department of Agriculture Soil Conservation Service recommends that an erosion plan be developed in a timely manner for gulch areas.

    a. The Board of Water Supply indicates that "Water has not been committed to this project. The availability of water will be determined when the building permit applications are submitted for our review and approval."

b. The Department of Public Works indicates that "The Honouliuli WWTP will have to be expanded before the development is allowed to connect. Completion date for the expanded capacity at the Honouliuli Plant is in the early 1990's."

3. The design capacity of storm drains in the project area is not included in the EIS. The applicant indicates that ". . . the actual runoff quantities are at this time still undetermined since the "ditch/culvert hydraulics" have not been finalized."

   The need for storm water retention is unresolved. The Department of Public Works recommends ". . . the retention of stormwater so that, after development of the site, the quantity and rate of runoff leaving the site will be minimized." The applicant indicates, however, in his response to a similar concern expressed by the State Department of Business and Economic Development that "There will be no ponds or retention basins built for the proposed project."

4. The preliminary layout of proposed residential units is still unresolved since all data from soil and engineering design for site improvements are still being developed. "At this stage of review, the consultants are not final in their determination of site improvements needed for residential unit placement on the land."

5. The recreational needs of the project have yet to be determined and should be resolved prior to rezoning. The applicant ensures that Park dedication requirements will be met.

6. The issue of public school availability for the development is unsettled and should be resolved prior to rezoning. The State Department of Education indicated that it ". . . cannot assure the availability of classroom spaces at the elementary and high school. Legislative appropriation on a timely basis may be required to accommodate the growth."

7. The Hawaiian Electric Company has indicated that, "the subject development crosses or is in close proximity to existing HECO 138KV transmission lines." The specific actions to be taken by the applicant in regard to the lines have not been determined to date. This should also be resolved prior to final design of proposed on-site improvements.

8. Final determination by governmental agencies of number and kinds of affordable housing units to be provided for the project is still unclear at this time. This matter should be clarified by unilateral agreement or contract zoning at the time of rezoning.

F. DETERMINATION

Based upon our analysis, the Department of General Planning has determined that the Final EIS is acceptable under the procedures established in Chapter 343, HRS, subject however to resolution the issues highlighted in the previous Section E "Unresolved Issues."

Donald Clegg

DONALD A. CLEGG
Chief Planning Officer

Final Environmental Impact Statement

Wailuna IV

Waiau, Ewa District, Oahu, Hawaii

The Lusk Company March 1988

Prepared by Environmental Communications, Inc.

FINAL ENVIRONMENTAL IMPACT STATEMENT

WAILUNA IV

Waiau, Ewa District, Oahu, Hawaii

March 1988

Prepared for
The Lusk Company

by

Environmental Communications, Inc.

F. J. Rodriguez

Mr. F. J. Rodriguez, President
Environmental Communications, Inc.

MAR 18 1988
Date

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E	Noise Study - Y. Ebisu & Associates
F	Social Impact - Environment Capital Managers, Inc.
G	Stormwater Drainage - Gordon L. Dugan
H	Soil Report - Harding Lawson Associates

I. SUMMARY

CHAPTER 343, HRS
FINAL ENVIRONMENTAL IMPACT STATEMENT

Action:	Applicant
Applicant:	The Lusk Company
Landowner:	Kamehameha Schools/Bernice Pauahi Bishop Estate
Project Name:	Wailuna IV Development
Project Description:	The proposed project represents the fourth increment of the existing Lusk Wailuna Development. The proposed project will include the construction of 180 single-family residential condominium units and all appurtenant infrastructure on approximately 26 acres. The 1,500 square foot units, including garages will be sited on 4,000 square foot minimum condominium lots which are comparable to the Patio Home units developed in Increment III.
Project Location:	Mauka of the existing Wailuna Development, off Kaahumanu Street, Ewa, Oahu.
Area:	26 acres
Tax Map Key:	9-8-02: por. 3
Existing Use:	The project site consists of fallowed sugar cane lands.

State Land Use:	Conservation
Development Plan Designation:	a. Land Use Map: Preservation b. Public Facilities Map: None
Zoning:	P-1 Preservation
Accepting Authority:	Department of General Planning
Agent:	Community Planning, Inc.
Contact Person:	*Environmental Communications, Inc.* Attention: F. J. Rodriguez P.O. Box 536 Honolulu, Hawaii 96809 Phone: 521-8391

Summary:

The proposed project represents the fourth increment of the existing Lusk Wailuna Development Masterplan. The proposed project will include the construction of 180 single-family residential condominium units and all appurtenant infrastructure on approximately 26 acres.

The 1,500 square foot units, including garages will be sited on 4,000 square foot minimum condominium lots which are comparable to the Patio Home units developed in Increment III. Typical units will consist of 3 bedroom and 2 baths and will be sold at average sales prices of $160,000, 1987 market value.

The site is a relatively flat area on the crest of a ridge on the southern flank of the Koolau

Mountain Range of Oahu. There are major drainages in deep gulches on either side of the site. Within the site is a small gulch with a drainage area. To the extent possible, this site will be utilized and developed for housing purposes. This will be dependent upon more detailed Soils, Engineering, and other analysis. Slopes range from about 10 percent in the flat areas on the ridge tops to about 50 percent on the sides of the gulches.

There is a paved road along the highest ridge on the northern edge of the site. Previous agricultural use consisted of sugar cultivation on approximately 25% of the site, under the Oahu Sugar Company management. At the present time, grazing rights are leased by the landowner, the Bishop Estate.

The project will affect the air and noise environment as well as increase the demand for; traffic, drainage, water and other utilities; however, these changes are typical of developments of this nature.

Long-term impacts, beneficial and adverse, result from the implementation and operation of the proposed project. No geological, soils or climatic impacts are expected to occur as a result of the proposed project. Topographic alterations should be limited to grading and infrastructure requirements. Hydrological impacts should also be limited to increased demand on existing drainage systems and additional offsite surface runoff.

Flora and fauna are not expected to be significantly impacted although some may be displaced during the construction period. Former agricultural use of the site makes the presence of any rare or endangered species of fauna or wildlife unlikely. This former use has also significantly disturbed the topography, therefore, no archaeological features are likely to be found on-site.

No significant environmental impacts are expected to occur as a result of the proposed project. Mitigation measures for any minor impacts will be utilized wherever practicable.

II. PURPOSE

This Environmental Impact Statement is prepared pursuant to Chapter 343, Hawaii Revised Statutes and in accordance with the City and County of Honolulu's Department of General Planning Development Plan regulations.

The initial action required for this project involves a Development Plan amendment from Preservation usage to Low Density Apartment designation in keeping with the adjacent urban use of the area. The document will be reviewed by the City and County Department of General Planning.

III. PROJECT DESCRIPTION AND STATEMENT OF OBJECTIVES

A. Location of the Proposed Project

The proposed project will be located mauka of the existing Wailuna Developments. The site which is off Kaahumanu Street in Waiau, Ewa District of Oahu is identified as TMK 9-8-02: por. 3 and consists of approximately 26 acres (Figures 1 & 2).

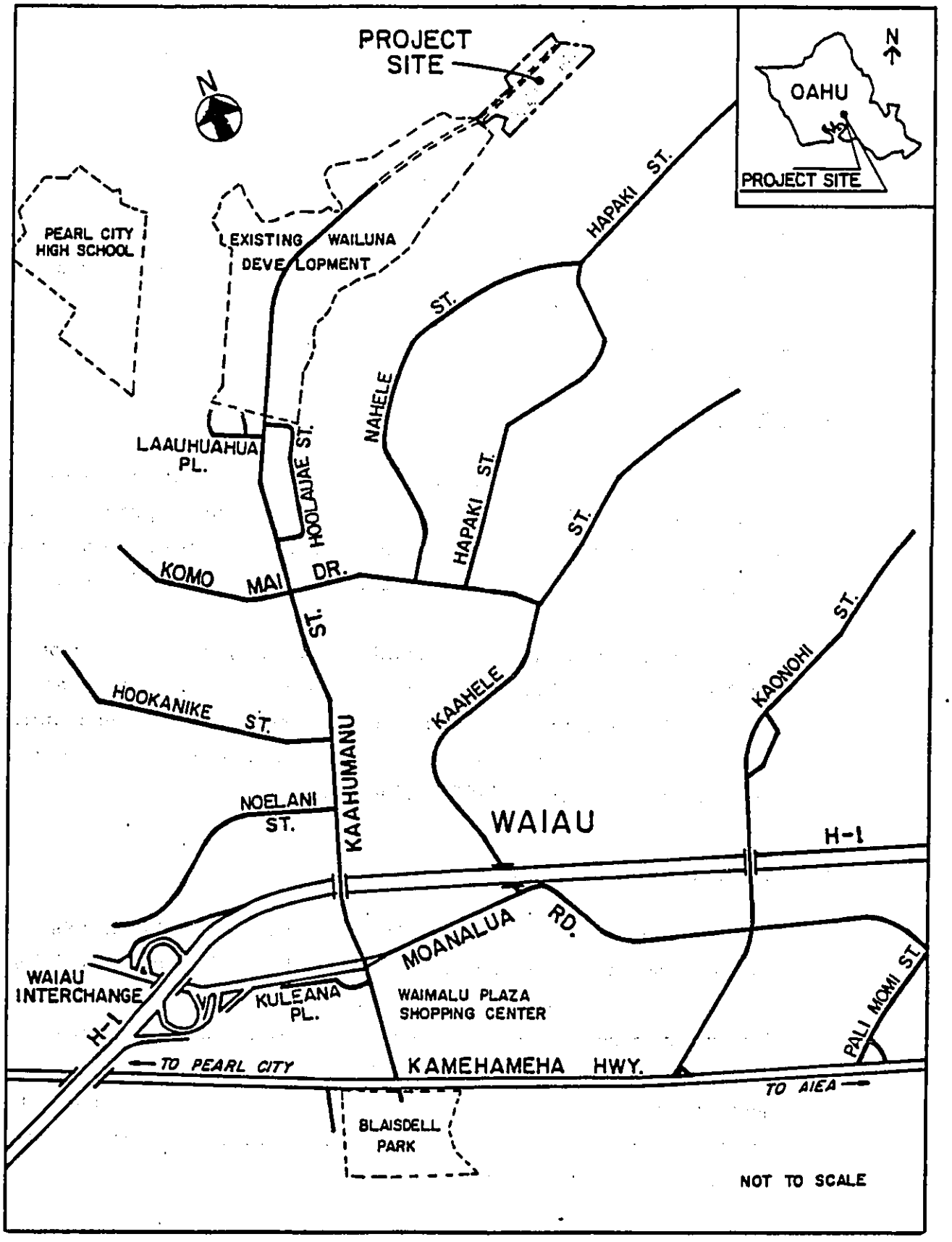
B. Project Description

The proposed project represents the fourth increment of the existing Lusk Wailuna Development Masterplan. The proposed project will include the construction of 180 single-family residential condominium units and all appurtenant infrastructure on approximately 26 acres.

The 1,500 square foot units, including garages, will be sited on 4,000 square foot minimum condominium lots which are comparable to the Patio Home units developed in Increment III. Typical units will consist of 3 bedroom and 2 baths and will be sold at average sale prices of $160,000, 1987 market value.

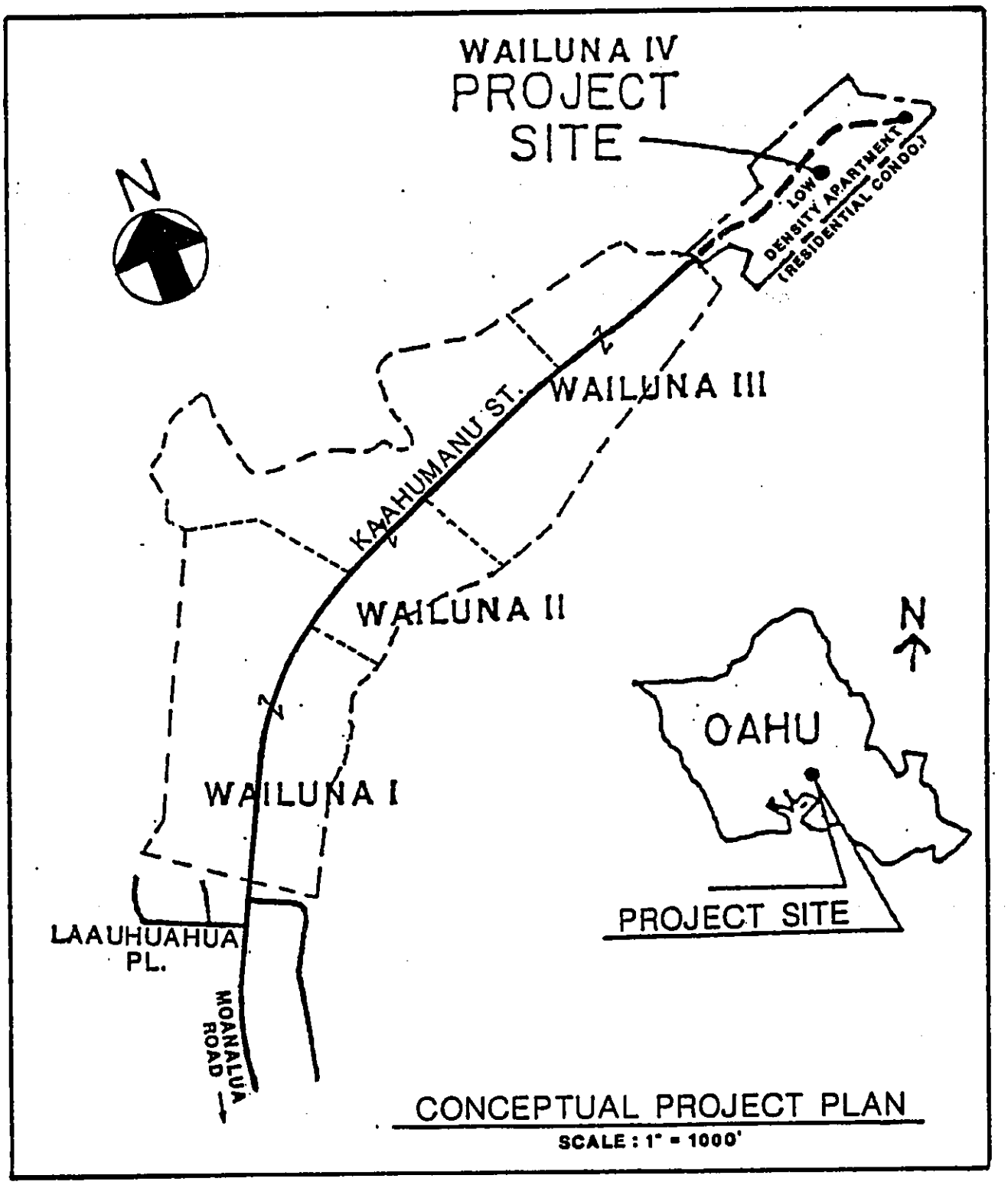
C. Statement of Objectives

The applicant is seeking to provide more homes for the State's growing population (particularly in the Primary Urban Center) by continuing its development on Bishop Estate land in Waiau, off Kaahumanu Street adjoining and mauka of the existing Wailuna communities. The applicant is desirous of satisfying the need to meet the demands for "market housing" in this area, as well as to provide affordable housing in negotiation with the Department of Housing and Community Development.



LOCATION MAP

FIGURE 1



CONCEPTUAL PROJECT PLAN

FIGURE 2

D. Project Phasing and Cost

The proposed project is expected to be completed in one continuous phase in 1993. The total cost of the proposed project is approximately $27,000,000 (1987 Dollars), all of which will be assumed by the developer. The proposed project will not involve the use of County funds.

IV. ALTERNATIVES CONSIDERED

1. Proposed Use

This alternative would result in implementation of the proposed project and would represent further development of the Wailuna Masterplan. This increment is planned to be the final phase of residential development at the Wailuna site.

2. Alternative Residential Uses

Alternative residential uses, which would consist of higher density residential uses, have not been seriously considered since such uses would constitute higher intensities and would not be in keeping with the character of the surrounding community or the Wailuna Masterplan.

3. No Action

This alternative would result in no action being implemented. The impact of this alternative would be that the project site would remain as is. Weeds and grasses would cover the vacant portions of the site. However, this use would generally be inconsistent with the surrounding residential developments.

Non-use would render the properties useless to the landowner and the tremendous waste of valuable land adjacent to urbanized areas would not provide any benefit to the surrounding communities or the State at large.

Conversely, development of the site would constitute an irretrievable use of land and would preclude any other uses for the site.

V. AFFECTED ENVIRONMENT

A. Geographical Characteristics

1. Topography

The project site is located on gentle to steeply sloped lands. The site which consists of fallowed sugar cane lands, is clear of any abandoned structures or topographic variations. The site is located on a ridge on 600 to 800 foot mean sea level elevations. The Waiau Gulch and Punanani Gulch are found on the northern and southern sides respectively. There is an unnamed gulch on the proposed development site which is the existing drainage way for runoff leaving the subject parcel. This on-site gulch will be filled in at the time of development and approved drainage improvements will convey runoff to the major gulches on each of the project site.

The site is a relatively flat area on the crest of a ridge on the southern flank of the Koolau Mountain Range of Oahu. There are major drainages in deep gulches on either side of the site. Within the site is a small gulch with a drainage area that roughly coincides with the area to be developed. Slopes range from about 10 percent in the flat areas on the ridge tops to about 50 percent on the sides of the gulches. There is a paved road along the highest ridge on the northern eidge of the site.

2. Soils

The site is covered by various types of vegetation including grasses, bushes, shrubs, and large trees. The rock beneath the site is basaltic lava of the Koolau Volcanic series. The original slopes of the volcano are reflected by the flat parts

of the ridges. The gulches ere formed by stream flow on the slopes. The rock has been subjected to weathering and there is a mantle of residual soil at the ground surface underlain by soil that displayed the relict structure of the rock. Soil with the parent rock's structure is known as saprolite. The residual soil observed at the site is about 1/2 to 1 foot thick. The saprolite is probably many hundreds of feet thick and underlain by less-weathered rock.

Samples of the residual soil were collected at the site and Atterberg limits tests performed for classification purposes. According to the Unified Soil Classification System, the soil is a silt (ML) and (MH), similar to soils encountered in the previous Wailuna developments.

According to the Soil Conservation Service, the soils are in the Manana and Helemano Soil Series. These soils are in Soil Erosion Resistance Groups II and I, respectively, which are the least erodible of the four groups. Soils on steep slopes are more erodible because of higher runoff velocity.

The soil survey consultants have indicated that in adjacent areas, the soils and saprolite are stiff to very stiff in their natural condition and have moderate to high shear strength and low to moderate expansion potential. During the reconnaissance, no evidence of slope instability was observed on either natural slopes or cut slopes by the sides of roadways.

B. Hydrological Characteristics

1. Surface Water

There are no perennial streams or surface water features on site, however, intermittent streams can be found in the adjacent Waiau and Punanani Gulches.

Annual rainfall onsite is approximately 50 inches (Giambelluca et al. 1984). An established drainage pattern is on the site and provides drainage from lands mauka of the proposed site.

2. Drainage

The proposed project is located slightly over 2 miles in a northerly direction from East Loch, Pearl Harbor. The drainage from the proposed site is a portion of the nearly 90 square mile area that drains into Pearl Harbor; however on a subdrainage basis, 23 acres of the project site drains to Punanani Gulch while the remaining 3 acres drains to Waiau Gulch located on the north and west side of the project. The tributary drainage areas to Punanani Gulch and the Waiau Gulch at the project site are 1300 and 3000 acres, respectively, and both eventually drain to East Loch; Punanani Gulch via Waimalu Stream, and Waiau Gulch by a series of unlined and lined drainageways and channels (Community Planning, Inc. 1987).

3. Flood Insurance Study Designation

The project site lies within the National Flood Insurance Program Flood Insurance Rate Map Designation of Zone D, an area in which flood hazards are undetermined.

4. Wetlands Protection

The project site is not within a wetland area.

5. Coastal Zone Management

The site is not located within a coastal zone Special Management Area.

C. Biological Characteristics

A biological survey for the project was conducted by Char & Associates and is summarized below.

The site has been disturbed for some time, first by sugar cane cultivation, and, later by a macadamia nut orchard and grazing. As a result, the biota on the site is represented largely by introduced or foreign species. No rare, threatened or endangered plants or animals were found on the project site during the course of this survey.

1. Flora

The project site was formerly planted in sugar cane and in areas where the soil horizon is exposed there is a layer stained black with charcoal. Sugar cane cultivation was apparently abandoned many years ago and the site then used for a macadamia nut grove. The grove too has since been abandoned and a weedy scrub association has filled in the matrix between the trees. The western portion of the property, along the Waimalu boundary, is covered by grassland with scattered shrubs and appears to still be used for grazing. The soil is very deep, with few stones, perhaps as a consequence of the sugar cultivation. Along the Diamond Head-makai (southeast) corner of the site, severe soil erosion has exposed perhaps eight to ten feet of the soil column.

While there are three vegetation types on the site, they are not generally distinct, but represent successive stages in plant predominates in the lower portion along the roadside. The forest canopy varies from 25 to more than 40 feet in height, with the understory about one-half as high. The macadamia trees are mature to senescent, many having lost their original trunks and subsequently resprouting from near

the base. Under the macadamia trees, the combination of deep shade and heavy pig disturbance has eliminated almost all ground cover. Where the macadamia trees have died, the understory consists of the same plants that constitute the scrub vegetation. Just north of the powerline which crosses the site, there appears to be an old well and housesite. A number of exotic ornamentals persist here, but are not significant constituents of the vegetation.

A comprehensive list of the plant species found during this survey is presented in Appendix A.

2. Fauna

A total of ten avian (bird) species were recorded during the project survey. The birds generally prefer the forest and scrub areas on the project site. The Japanese White-eye was abundant during the early morning hours, foraging among the albizia trees. Later in the day, the two cardinal species and the Red-vented Bulbul became more numerous. Although not observed during this survey, game birds such as francolin and possibly pheasant as well as a number of mannikin (or munia) species are expected to visit the grassland area.

Feral pigs appear to frequent the site on a regular basis. Evidence of rooting was observed in the grassland, scrub, and forested areas. Plant species which provide edible fruit (guava, strawberry guava, passion fruit, macadamia nut) appear to be visited regularly as evidenced by well-worn pig trails.

Although the grassland was used for grazing horses, no animals were observed during the survey. Cattle from neighboring parcels may occasionally stray onto the property.

D. Historic and Archaeological Characteristics

An Archaeological Reconnaissance Survey for the project area was conducted by the Bishop Museum and is summarized below and is attached as Appendix B.

1. Historical Setting

In 1899, Honolulu Plantation Company began operation (Best 1973: 313). The property consisted of about 9,000 acres and its upper limits were at the 198 meter (650 feet) contour level (Evening Bulletin, Industrial Edition 1901: 5). From a period of 1906 to 1914, Honolulu Plantation Company harvested an average of about 19,000 tons per year (Directory 1914: 26). Oahu Sugar Company eventually took control in 1947 (Best 1973: 313).

2. Previous Archaeological Work

The literature search produced no previous archaeological work conducted in Waiau. The nearest area where previous work took place was in the next ahupua'a (major land division) to the southeast, Waimalu (pers. comm. Joyce Bath, Hawaii State archaeologist). A rockshelter (State No. 80-09-1169), located on the southern slope of Waimalu gulch at an elevation of 61 meters (200 feet) was excavated by Dr. Everett Frost in 1976. As of yet, there is no written report.

Handy and Handy discuss in general terms the Ewa district, noting the area's agriculture, legends, abundance of productivity in Pearl Harbor, and as an established place of political power (Handy 1972: 469-473).

3. Survey Results

Extensive prior disturbance, mainly bulldozer activity is

indicated. Several bulldozer backdirt mounds, cuts and tracks were observed throughout the project area. Also, the area is conspicuously devoid of rocks. The few that are present are either on the bulldozer mounds, along with modern trash, or exposed through erosion on the slopes of the gully. The secondary growth of lantana and Christmas berry found throughout the project area is another indicator of recent disturbance. Moreover, large macadamia nut trees planted in rows indicate an orchard was present at one time.

One recent feature has been found near a banyan tree (Ficus sp.) about 244 meters northeast of the metal gate and 15 meters southeast of the Kaahumanu Street extension. It appears to be a cement cistern sunken in the ground. It measures 3.5 meters in diameter and the concrete roof extends 30 centimeters above the ground surface. The condition of the feature is fair.

About 18 meters southwest of the cistern, near a small stand of eucalyptus trees, is another feature, a collapsed wooden structure. It measures about 13 x 9 meters, oriented on an east-west axis. Due to deterioration and bulldozer activity, it is difficult to determine its exact dimensions. One-gallon jugs, window glass, pieces of stoneware, bits of concrete, fragments of bottle glass, rubber hoses, and a small metal wash tub are in and around the feature. The condition of this feature is very poor.

The spatial relationship, type, and construction of these features indicate that the two structures were associated and probably share common modern origins.

E. Existing Roadways and Traffic

A Traffic Impact Study prepared by Parsons, Brinkerhoff, Quade & Douglas, Inc. was prepared for the proposed project. The study, attached as Appendix C, is summarized below:

1. Roadway System

The project site has no existing public access. In the future, the site would be served by the mauka extension of Kaahumanu Street.

Kaahumanu Street, a collector road, runs between the existing Wailuna Development and Blaisdell Park at Kamehameha Highway. For most of its length, the Kaahumanu Street right-of-way is 80 feet, which allows two travel lanes in each direction with a parking lane and sidewalk on each side. This road has three signalized intersections: at Komo Mai Drive, at Moanalua Road, and at Kamehameha Highway; all the signals are demand-actuated. Separate turn lanes at intersections are provided by limiting on-street parking at approaches.

Komo Mai Drive links the Pearl City and Newtown communities. At the Kahumanu Street intersection, mauka bound approach is striped with an optional left turn lane and a separate right turn lane; the makai bound approach has a similar configuration, except that the right turn lane results from the lack of parked vehicles alongside the fire station instead of pavement striping.

Moanalua Road services many residential units and commercial uses along the corridor connecting Pearl City with Aiea town. Within the local communities, Moanalua Road also provides an alternative route to the regional H-1 and Moanalua Freeways and Kamehameha Highway. At Moanalua Road, the Kaahumanu Street mauka bound approach allows separate left and right turn lanes with two through lanes. The makai bound approach designates a single lane for each left, through, and right turn movement. In this area Moanalua Road provides two travel lanes in each direction; separate left turn storage bays are striped at the Kaahumanu Street intersection.

Kamehameha Highway is a primary arterial supplementing the H-1 freeway. East-west commuter flows are highly evident during the AM and PM periods. The neighboring commercial uses along this highway also contribute to the traffic flows, especially to the turning movement volumes at the intersections.

2. Existing Traffic Conditions

Manual traffic counts and observations taken during the latter part of October 1987 serve as the basis of this discussion on the existing traffic conditions. The AM and PM peak hour differed with each intersection; the roadways that carry regional traffic tended to have its peak hour at an earlier time than roadways serving mostly local traffic.

The signalized intersections were analyzed by the operational methodology described in the 1985 Highway Capacity Manual.

The two-phase traffic signal at the intersection of Komo Mai Drive and Kaahumanu Street is highly responsive to the traffic demand, as indicated by the high Level of Service A during both AM and PM peak hours.

At the Moanalua Road intersection with Kaahumanu Street, the traffic signal provides a protected phase (separate from the opposing through movement) for the left turn movements. The results of the analysis show Level of Service E for left turns from the Kokohead bound, mauka bound and makai bound approaches, indicating that these movements incur long delays. Field observations note that the delays are due to the long signal cycle lengths and that the left turn movements receive adequate green time.

The Level of Service D condition reported for the Moanalua Road intersection (overall) is generally reflective of actual

operating conditions at this intersection; waiting vehicles tended to clear during the next green phase. However, during the AM peak hour, the mauka bound left turn and the makai bound right turn movements were impeded by the queue of vehicles in the Moanalua Road left ewa bound lane desiring to enter the H-1 freeway Kokohead bound on-ramp at Waiau Interchange.

At the Kamehameha Highway/Kaahumanu Street intersection, Kamehameha Highway left turns have leading protected phases, while all vehicles from the Kaahumanu Street and Blaisdell Park approaches must execute their movements in the same signal phase. For this intersection, the analysis tends to result in levels of service that were higher than observed for the through traffic on Kamehameha Highway. The traffic signals along Kamehameha Highway are not coordinated, which contributes to the poor progression along this corridor. As a result, many of the platoons from downstream intersections are caught by the red phase at this intersection, while portions of the green phase remain underutilized.

F. Ambient Air Quality

An Air Quality study for the proposed project was conducted by Barry D. Root and is summarized below:

A summary of air pollutant measurements from State of Hawaii long term monitoring stations located nearest to the project is presented in Appendix D. Data from several different sampling stations are included in the tabulation.

Particulate measurements are from Pearl City, about 3 miles southwest of the project site. Sulfur dioxide concentrations were also monitored at the Pearl City location until 1985. Sulfur dioxide data for 1985 and 1986 is from Barbers Point, about 13 miles southwest of Wailuna.

During 1981 carbon monoxide was measured at Fort DeRussy in Waikiki (about 11 miles southeast of the project), and in 1982 and 1983 carbon monoxide was monitored at Leahi Hospital in Kaimuki, about 13 miles southeast of the project. Carbon monoxide readings from 1984 onward are from the Department of Health building in urban Honolulu, about 10 miles southeast of Wailuna.

Ozone levels were also measured at the Department of Health building until December 1980, when the monitor was relocated to Sand Island (about 8 miles southeast of the project site). During 1981 nitrogen dioxide was also monitored at the Sand Island location, but all nitrogen dioxide monitoring has since been discontinued. Lead measurements are taken at the Department of Health building on South Beretania Street.

From the data presented in the Air Quality study, it appears that State of Hawaii ambient standards for particulates, sulfur dioxoide, nitrogen dioxide, and lead are currently being met at nearest monitoring stations to the project site.

On the other hand, carbon monoxide and ozone readings from urban Honolulu indicate that allowable State of Hawaii standards for these vehicle-related air pollutants are being violated at a rate of about one to three times a year. Ozone is an indicator of the formation of photochemical pollutants in the air, a condition which tends to develop if the air mass over the islands has been fairly stable with little wind flow for a period stretching over several days.

Concentrations of carbon monoxide are more directly related to vehicular emissions and tend to be highest during periods of rush hour traffic. Carbon monoxide would thus be the pollutant most likely to cause difficulty in meeting allowable Air Quality Standards as a result of new residential development in leeward Oahu.

G. Ambient Traffic Noise

A Traffic Noise study was conducted by Y. Ebisu & Associates and is summarized below:

AM and PM peak hour traffic volumes, speeds, and mix assumptions for the existing period, with computed hourly equivalent noise (Leq) at 50 Ft. distance from the centerlines of the Kaahumanu Street sections which will service project traffic are attached in Appendix E. Calculated Day-Night Average Sound Levels (Ldn) at 50 Ft. distance from the roadway's centerline are also shown. For those homes which benefit from the shielding effects of existing walls along Kaahumanu Street, the existing traffic noise levels at these residences are probably 5 to 10 Ldn units less than those without these buffering features. The existing setback distances of the 60, 65, and 70 Ldn contours from the centerline of the street for various street segments from the project site to Kamehameha Highway are shown in the Appendix for worst case, unobstructed conditions. Existing traffic noise levels are in the FHA/HUD "Acceptable, Moderate Exposure" category at residences fronting Kaahumanu Street and north of Komo Mai Drive. Also in the "Acceptable" category are those residences fronting Kaahumanu Street and south of Komo Mai Drive which are shielded from traffic noise by 6 Ft. high walls. Those residences which are not shielded by walls and which are within the setback distances to the existing 65 Ldn contours are in the FHA/HUD "Normally Unacceptable, Significant Exposure" category.

H. Existing Infrastructure and Utilities

1. Water Supply

The project site, although undeveloped, is traversed by an existing 16-inch water main, from Kaahumanu Street. The water main serves as the transmission pipe for the upper

Board of Water Supply's Waiau "850" Reservoir located on Parcel 32 of TMK: 9-8-02. Water for the reservoir is pumped from a lower municipal storage tank, Waiau "550" Reservoir, whose water, in turn, is pumped from the Waiau "285" Reservoir located on Komo Mai Drive. Within the "285" Reservoir site are located several deepwells which provide the water source for the system.

2. Existing Sanitary Sewage Disposal

An existing underground 8-inch sanitary sewer extends to the upper end of Kaahumanu Street at the boundary of the project site. Sewage collected by the pipeline is conveyed by existing municipal sewer mains to the wastewater pump station in lower Pearl City. From there it is pumped to the Honouliuli Wastewater Treatment Plant with the effluent discharged by outfall into the Pacific Ocean.

I. Existing Public Facilities and Services

1. Police Service

The Honolulu Police Department currently services the area through the Pearl City Station and has indicated that the proposed project will not affect the level of police services for the area.

2. Fire Protection

Primary fire protection for the area is provided by engine and ladder companies from the Waiau Fire Station. Additional service is available from the Aiea and Pearl City Fire Stations. The Fire Chief has indicated that existing services can adequately accommodate the proposed project.

3. Public Educational Facilities

Waimalu Elementary, Aiea Intermediate, and Aiea High School currently serve the area. Coordination between the Department of Education and the project developer is expected to produce adequate services and facilities to accommodate the increase in student enrollment.

4. Recreational Facilities

Presently, the previous three Wailuna increments have provided recreational amenities for its residents and it is expected that Wailuna IV will also provide to the recreational facility inventory. The applicant will coordinate with the Department of Parks and Recreation to address Park Dedication requirements.

VI. RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

A. Federal

No federal plans or programs directly affect development of the proposed residential development.

B. State

1. Hawaii State Plan

The Hawaii State Plan consists of a series of broad goals, objectives, and policies which act as guidelines for the growth and development of the State. In general, the proposed project is consistent with the overall intent of the State Plan. 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 and fiscal management. The Wailuna IV project is consistent with many of the goals and policies of the Hawaii State Plan and has been designed to facilitate its objectives. The project's relationship to these plans are presented below:

Section 226-5 Objectives and Policies for Population

The proposed Wailuna IV project represents a housing increase of approximately 180 new housing units or 450-500 persons. Demographic

Analysis for the project (Appendix F) indicates the increase should not significantly impact the area. The majority of future project residents are expected to come from other parts of the island representing a population shift rather than net increase.

Section 226-6 Objectives and Policies for the Economy in General

Development of the proposed project will directly benefit the economy in construction, real estate opportunities, and tax revenues.

Section 226-7 Objectives and Policies for the Economy-Agriculture

The project site is currently designated for Conservation on the State Land Use Classification Map. The project will not have any agricultural impact.

Section 226-12 Objectives and Policies for the Physical Environment-Scenic, Natural Beauty, and Historic Resources

The project plan will generally follow the natural contours of the site and will be designed to be aesthetically pleasing and compatible with the surrounding area.

Section 226-13 Objectives and Policies for the Physical Environment-Land, Air Water Quality

The project site will be cleared with some grading and site clearing, however, no significant environmental impacts are expected from this action. Air quality will be adverse to some extent to the additional vehicular traffic generated by the project.

Water quality impacts will be minimal due to implementation of an effective potable water and drainage systems.

Section 226-15 Objectives and Policies for Facility Systems-Solid and Liquid Wastes

Wastewater generated by the proposed project will utilize the existing sewerage system which connects to the wastewater pump station in lower Pearl City. Solid waste will be collected by governmental or private refuse collection services.

Section 226-16 Objectives and Policies for Facility Systems-Water

Potable water for the project has been appropriated by the Board of Water Supply. The project, which is expected to have an average daily demand of 90,000 gpd, will be serviced by the existing Waiau Reservoir system.

Section 226-17 Objectives and Policies for Facility Systems-Transportation

The proposed project will add to traffic volumes around the project site, however, the project traffic report has indicated that the demand actuated traffic signals should accommodate the additional project generated traffic. Net impact on the regional system will represent less than a one percent increase.

Section 226-18 Objectives and Policies for Facility Systems-Energy/Telecommunications

Energy and telecommunication facilities necessary for the development will be planned and coordinated with the appropriate agencies and public utilities.

Section 226-19 Objectives and Policies for Socio-Cultural Advancement-Housing

The Wailuna IV project will provide a notable number of affordable and market housing units to the Master Planned Wailuna community. The developers previous experience in the area and the project integral function in the Masterplan should insure units of high quality and value.

Section 226-20 Objectives and Policies for Socio-Cultural Advancement-Health

Medical and health care facilities are currently available in Pearl City, Aiea, Moanalua and Waipahu with emergency services provided by the Kaiser Moanalua Hospital.

Section 226-21 Objectives and Policies for Socio-Cultural Advancement-Education

Education facilities currently serving the project site are: Waimalu Elementary, Aiea Intermediate, and Aiea High School. Coordination between the applicant and the Department of Education will insure that facilities to accommodate the additional demand will be available.

Section 226-23 Objectives and Policies for Socio-Cultural Advancement-Leisure

Recreational facilities to meet park dedication requirements will be provided by the developer. Coordination between the developer and the Department of Parks and Recreation will insure compliance with this requirement.

Section 226-104 Population Growth and Land Resources Priority Guidelines

The proposed project will result in land use change of conservation land to urban usage. The site was formerly used for sugar cane cultivation; however, the surrounding area has been converted to urban use. The proposed project will be consistent with the present surrounding usages and should not be environmentally critical.

Section 226-106 Affordable Housing, Priority Guidelines for the Provision of Affordable Housing

The proposed project will consist of the development of 180 affordable and market units. Coordination between State and County agencies will be utilized in developing guidelines for establishing specific housing target inventories.

2. State Functional Plans

The Hawaii State Plan has been prepared for use as the primary planning tool in directing the planning process for Hawaii's long and short-term goals. By setting the overall theme and directive, functional plans were created as

extensions of the State Plan. These functional plans specify objectives, policies, and implementing actions to address these concerns. The following plans were reviewed to determine their applicability and relationship to the proposed project and are found to be generally compatible without any significant conflicts for: Agriculture, Education, Energy, Health, Historic Preservation, Housing, Recreation, Transportation, and Water Resources.

3. State Land Use

All land in the State of Hawaii have been classified into four classifications by the State Land Use Commission. These classifications are Urban, Rural, Agricultural, and Conservation. The proposed project lies within the Conservation District and will require a land use boundary amendment for Urban use.

4. H.R.S. Chapter 205-A Coastal Zone Management (CZM)

The project site is subject to provisions of the CZM and is, therefore, subject to H.R.S. Chapter 205-A's objectives and policies. The project site is not designated as a Special Management Area, so no permits will be required pursuant to Chapter 205-A.

C. City and County

1. General Plan of the City and County of Honolulu

The General Plan of the City and County of Honolulu provides a statement of long range social, economic, environmental, and design objectives for the Island of Oahu as well as a statement of policies necessary to meet these objectives. The proposed project is generally in conformance with the Economic Activity,

Population, Natural Environment, Transportation and Utilities, Physical Development and Urban Design, Health and Education, and Culture and Recreation plans and policies, however, the plan for Housing is of particular significance.

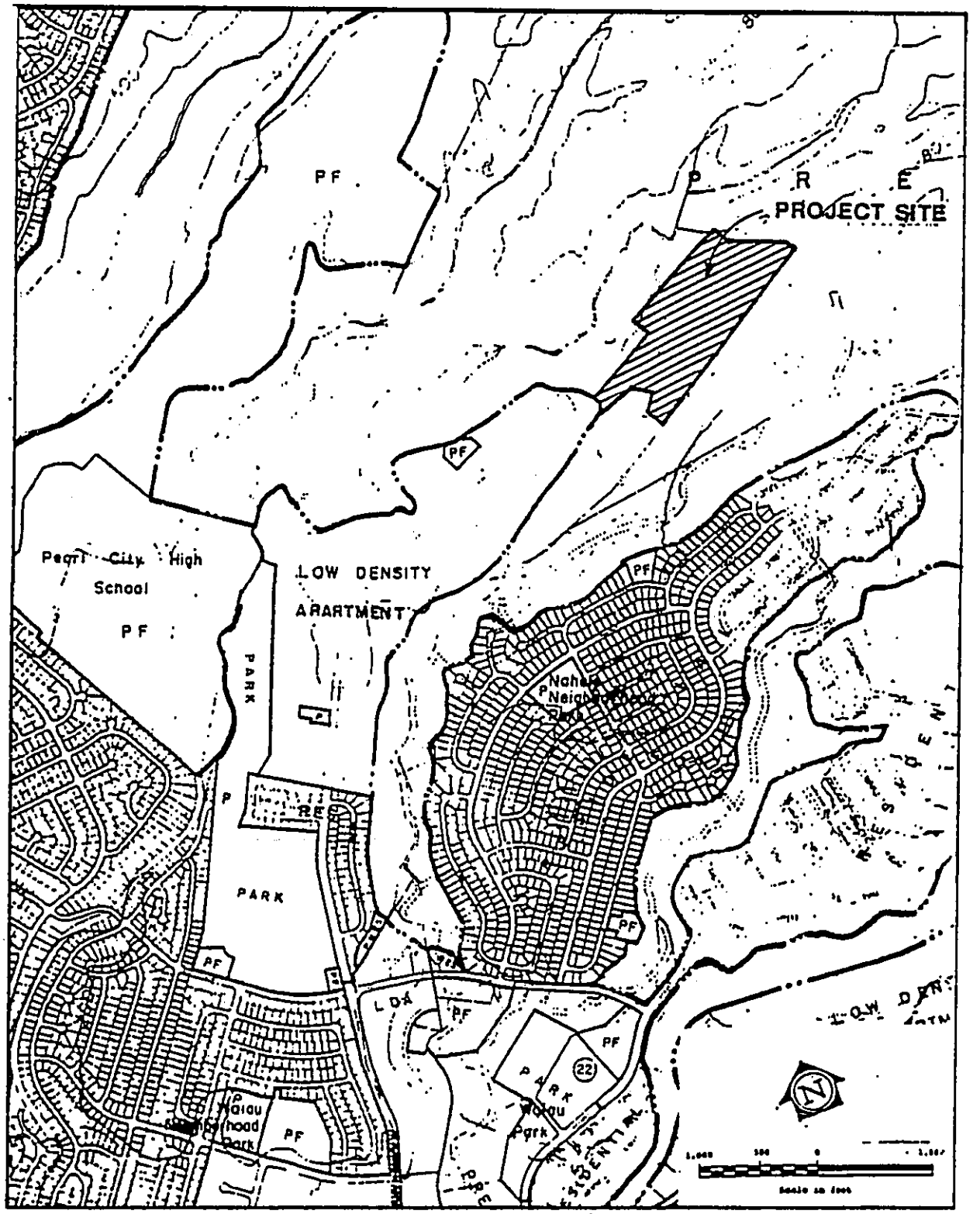
Housing Objective A promotes the provision of "decent" housing for all the people of Oahu at prices they can afford. Of this objective, Policies: 1, development of programs and controls which will provide decent homes at the least possible costs; and 3, encourage innovative residential development which will result in lower costs, added convenience and privacy, and the more efficient use of streets and utilities; are premises for the development of the proposed project.

2. Development Plan

The project site is identified on the Primary Urban Center Development Plan Map as Preservation. A Development Plan Land Use Map Amendment for Low Density Apartment is currently being requested from the City and County of Honolulu, Department of General Planning (Figure 3).

3. City and County Zoning

The project parcel is currently zoned P-1 Preservation. A change in the zoning designation for urban use is planned to be obtained from the Department of Land Utilization.



DEVELOPMENT PLAN
LAND USE MAP

FIGURE 3

VII. ANTICIPATED IMPACTS AND MITIGATIVE MEASURES

A. Impact on Geographic Characteristics

The upper portion of the site would be cut and graded, and the gulch area will be backfilled to more moderate slopes. Geographic and topographic alterations; cutting, clearing, and grading should be limited to these areas which are established by subsequent engineering, soils, and drainage analysis activities appropriate for residential subdivision purposes. No major impacts are expected from the proposed construction. All earthwork will be conducted using landscaping and other mitigation and good housekeeping measures in conformance with State and City standards. The civil engineering consultant will minimize the anticipated impacts of site stabilization by adhering to the City's Grading Ordinance and also instructing the general contractor to control the volume of work and extensive grading to periods of time when the weather is conducive to earth moving; i.e. cease work during heavy rains, etc. It is felt that with effective scheduling, the site improvements can be achieved with a minimum of runoff.

Based on the preliminary soil study, it was concluded that the proposed development is feasible from a geotechnical standpoint. The precise developable area would be established and concerns regarding erosion, stability and expansion potential can be mitigated using currently accepted design practices, as discussed below:

1. Erosion

By filling the gulch in the central part of the site and limiting new cut/fill slope inclinations, steep slopes will be eliminated from the site. Site grading will direct surface waters away from slope faces and concentrated flows will be carried in lined drainage channels. These measures will mitigate erosion

concerns. A related concern is that there will be increased runoff below the site; we understand that the runoff can be carried by established drainage systems.

2. Stability

By cutting the higher area and filling low areas, overall slope stability will be increased by the planned grading. Keying, benching and subdrainage of sidehill fills are the accepted practices for providing stable fills. Subdrains will also be installed in drainage courses to increase slope stability. Cut and fill slope inclinations will be limited based on the results of future test borings and laboratory testing of soil samples. If cut slopes reveal seepage or other adverse conditions, additional features and sub-surface drains can be installed.

3. Expansion Potential

This concern can be mitigated by proper moisture control during grading, and by using less expansive soils in the upper few feet below final grade. If highly expansive areas are encountered at final grade, the upper few feet can be removed and replaced with compacted fill of low expansion potential.

From the point of view of soil properties related to engineering, the proposed site is similar to the adjacent projects at lower elevations on the ridge. Harding Lawson Associates (HLA) has performed similar grading work in the previous phases of Wailuna II and III. To date, these adjacent projects have performed as planned. Recent problems in other areas of Oahu were caused mainly by factors which are not present at Wailuna IV. For example, the recent storm damage in Hawaii Kai was in a valley area subject to large, concentrated runoff flows, while Wailuna IV is located near the top of a ridge

where watershed area is relatively small. Also, the movements in Manoa occur in weak, saturated "Adobe Clay" soils which are not found at Wailuna.

Continuous soil engineering observation during construction is important to mitigate the above concerns and to check for unanticipated conditions. As for the previous Wailuna developments, soil engineering services will be provided on a daily basis during construction to observe geotechnical aspects of the work and provide consultation, as necessary.

B. Impact on Hydrological Characteristics

Groundwater is not expected to be adversely affected by the proposed project and on-site drainage will be handled by project's infrastructure system. Offsite ecological impacts resulting from alterations on the project site are addressed in the Storm Water Runoff Report attached as Appendix G and summarized below:

The results of the storm water runoff volumes indicated that for the 2-year recurrence interval 1 hour duration storm, the full developed conditions are about a magnitude greater than present (1987) conditions; however, as the storm duration and recurrence interval increases, this difference reduces down to approximately 1.4 times greater for the 100-year, 24-hour storm, which produced the greatest calculated incremental storm runoff volume. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs. The increased runoff from the project area will correspondingly result in less groundwater recharge within the site of the project; however, the annual evaporation rate at the project site is greater than the annual median rainfall, thus, groundwater recharge would only be expected during significant storm events. Nevertheless, the total incremental volumes involved from the 26 acre site are relatively small. Consequently the resulting groundwater recharge is essentially negligible.

Constituents transported by storm water runoff are of equal, if not greater, environmental significance than the runoff volumes. The incremental changes per storm event for the present (1987) and full developed project conditions for the various duration and recurrence interval storms indicate that from the least to the greatest amount of rainfall: nitrogen increases for the lower level storms, and then decreases at the higher level storms; phosphorus increases for all storms, but the maximum incremental difference is calculated to be less than 38 lb; while suspended solids increases slightly for the 2-and 10-year recurrence interval 1 hour duration storms and then notably decreases for the remaining 1 and 24-hour storms.

The foregoing hydrologic and water quality aspects were only considered for the present and projected full developed conditions. However, increases in constituent loads could result from construction activities, especially if a significant storm occurs during the interim period between exposed and stabilized soil conditions. Thus, to limit these potential increases it is imperative that strict erosion control measures be adhered to.

Other water quality constituents of general concern include biocides and heavy metals. Typically, the biocides in general use tend to breakdown more readily in comparison to the more long lasting types in past decades. Consequently, except for runoff from agricultural land operations, the types and concentrations are usually considered insignificant. Heavy metals, on the other hand, do apparently increase somewhat as a result of urbanization; however, a biological study of Pearl Harbor conducted by the U.S. Navy in the early 1970's concluded that the heavy metal burden in Pearl Harbor was below the level of concern (even though several heavy metal sources that were discharging into Pearl Harbor at that time have since been eliminated), and the major detriment to the marine environment appeared to be silt. As previously noted, the suspended solids load for all, except the lower level 1 hour storm events, are calculated to decrease.

C. Impact on Flora and Fauna

Impact on the biological characteristics of the project site have been discussed in the biological survey conducted for the project (Appendix A) and are summarized below:

Because the site has been disturbed for such a long period of time, it is dominated almost exclusively of introduced or foreign species. No rare, threatened or endangered plant or animal species designated by the federal and/or state governments exist on the site.

The project is not expected to have a significant impact on the fauna of the site as all the species are foreign. Common species such as the Myna and House Sparrow will probably increase in numbers.

While the project will result in loss of vegetation and some faunal habitat, it is expected to have only a minimal impact on the total island populations of the species involved.

D. Impact on Historical and Archaeological Characteristics

The archaeological reconnaissance conducted for the project site (Appendix B) concluded that historic documents researched indicate that the project area was in heavy commercial sugar production. Sugar was cultivated as late as 1947. Sugar cultivation practices like the removal of rocks and the use of Fowler stem plows that cut through the soil to a depth of 91 centimeters (36 inches) accounts for much of the man-made disturbances in the project area (Evening Bulletin, Industrial Edition 1901: 5). More recent disturbances probably occurred with the macadamia nut orchard after commercial sugar production. Since the only features encountered were recent and no other remains of archaeological significance were encountered, no further archaeological work is recommended for the project area.

In the event that any archaeological remains are uncovered during construction, all work will be stopped and the State Historic Preservation Officer will be notified.

E. Social and Economic Impacts

A study of demographic, economic and housing impacts was conducted for the project and is attached as Appendix F. Conclusions of the study are presented below.

1. Demographic Impact

The proposed project will cause the in-migration of approximately 180 new households, or 450-500 persons. Based on the buyer profile of the Wailuna II and Wailuna III projects, the majority of these households will be from other parts of the island. The project will have the effect of raising the overall average family income within the area, while lowering the average household size, but will not be significant due to the proposed 180 units.

Overall, the addition of the proposed 180 new homes and households is not expected to have a significant impact on the area. The increase of the general population level by the additional 450-500 new individuals will not change the character of the neighborhood significantly.

2. Economic Impact

The current trends and projections indicate that the economy of Hawaii and the City and County of Honolulu should fare well in the future. This implies that the employment picture will remain favorable for the existing and projected labor force.

The project will contribute approximately $18 million in private authorizations over a 2-year period. It will also provide short-term employment to approximately 50 persons in the construction service (management, clerical, etc.) fields.

3. Housing Impact

Based on the ability of The Lusk Company Hawaii to develop and previously sell Wailuna I, II, and III, and the foregoing housing impact analysis, there is an adequate potential market for the proposed residential units. These proposed units will alleviate the pent-up demand for housing in the upper moderate income to high income brackets. The "affordable" units that will be built as part of the City's requirements will address some of the housing demand of moderate income families. The effective buying power of this group will be heavily dependent upon the economy's ability to support a higher wage level, while maintaining a moderate growth in the cost of living.

F. Impact on Traffic Conditions

The Traffic Impact study (Appendix C) conducted for the project presented the following summary for project and regional traffic impacts.

1. Project Traffic Impacts

The number of vehicles expected to be generated by the 180 single-family dwelling unit project are based on rates compiled by the Institute of Transportation Engineers. The study assumed the Wailuna IV traffic would have similar travel patterns to the existing development. The existing turning volumes at the intersections were utilized as indicators of direction and distribution of travel; these volumes also take

into account the circuitous and alternative routing to the regional system that exists in this area. Data indicates that with the proposed project, volume-to-capacity ratios would increase. At the intersection of Moanalua Road and Kaahumanu Street, makai bound through and right movements would experience Level of Service E conditions in the AM peak hour.

However, the overall intersection Levels of Service would not change. No mitigation measures would be needed at the three Kaahumanu Street intersections to accommodate project traffc. Improved traffic flow could result from changes in signal operation by timing adjustments and coordination with other traffic signals in the area.

2. Regional Impacts

The proposed project would add traffic to the regional highway system. Comparisons of the project-generated traffic to existing volumes in the area and on the H-1 Freeway were used to indicate the magnitude of this increase.

The total peak hour volume of traffic crossing an imaginary line, or screenline, east of Kaahumanu Street was used for the first comparison. Komo Mai Drive, the H-1 Freeway, Moanalua Road and Kamehameha Highway all cross this screenline. In the AM peak hour, the 1987 eastbound traffic totaled over 13,000 vehicles per hour (vph) across the Kaahumanu-east screenline. Westbound traffic in the AM peak hour was nearly 5,400 vph. The proposed project would add 84 vph eastbound and 22 vph westbound to these volumes, or 0.6% and 0.4%, respectively. In the PM peak hour, 1987 volumes were 12,000 vph westbound and 7,300 vph eastbound. The project traffic volumes of 73 vph westbound and 44 vph eastbound would each be 0.6% of existing volumes.

The traffic increases on the H-1 Freeway from the project is projected to be 36 vph eastbound in the AM peak hour, or 0.4% of the existing traffic on H-1. PM peak hour increase in the westbound direction is projected to be 21 vph, or 0.3% of existing traffic. These increases compare to an average annual increase of traffic on H-1 of 15% (AM eastbound) and 10% (PM westbound) over the last two years. Improved transit service to Leeward and Central Oahu could decrease the rate of growth of traffic volumes in this area.

The State Department of Transportation (SDOT) has plans to add a sixth lane in each direction on H-1 between the Waiau and Halawa Interchanges. The added eastbound lane is expected to improve the merging condition at Waiau Interchange, thereby easing congestion and decreasing delays on the approaches to the on-ramp to Honolulu.

A project to interconnect the traffic signals and to improve traffic flow on Kamehameha Highway has also been proposed by the SDOT. The City and County of Honolulu Department of Public Works is planning to widen a portion of Moanalua Road to relieve congestion near Aiea town. These improvements will increase regional capacity to serve the increasing traffic demand; as noted above, less than one percent of the demand would be due to the proposed project.

G. Impact on Air Quality

The Air Quality study conducted for the proposed project is attached as Appendix D and is summarized below.

There will be short-term dust emissions during the construction phase of the development. Adequate control measures such as periodic watering and landscaping exist to limit the scope of this impact, but special care will have to be exerted to insure that

nearby residents are not subjected to excessive levels of particulate pollution from construction activities.

Indirect air quality impacts are expected to result from new demands for electrical energy. But this impact is most likely to occur in the vicinity of existing or new power plants such as the Kahe Plant on the Waianae Coast and the H-POWER and other proposed new coal-fired plants in Campbell Industrial Park where increased levels of particulates and sulfur dioxide can be expected. Maximum use of solar energy designs in project development can at least partially mitigate the magnitude of this impact. In the future, new methods of generating electrical power such as wind or ocean thermal energy conversion may eventually also play a mitigative role in this regard.

Traffic generated by Wailuna IV will increase emissions of carbon monoxide and nitrogen dioxide in the project area. Detailed carbon monoxide modeling carried out for three critical intersections indicates that State of Hawaii Air Quality Standards could be exceeded near the intersections of Kaahumanu Street with Moanalua Road and Kamehameha Highway under present peak hour traffic conditions and worst case meteorological dispersion conditions. By 1993, the anticipated project completion date, decreased carbon monoxide emissions from newer individual vehicles coupled with a relatively low traffic growth rate in this area will still yield projected worst case levels at these two intersections that are lower than present levels, but still higher than allowable standards, with or without the additional traffic from Wailuna IV. The regional scale air pollution impact of Wailuna IV traffic is estimated to be minimal.

H. Impact on the Noise Environment

The Traffic Noise study conducted for the proposed project is attached as Appendix E and is summarized below.

Predictions of future traffic noise levels along the Kaahumanu Street sections expected to service the project site were made using the traffic volume projections of Traffic Impact Study. Projected increases in peak hour traffic volumes attributable to the project are small (less than 8 percent) south of Komo Mai Drive and large (greater than 30 percent) north of Komo Mai Drive. Projected increases in traffic noise levels attributable to the project are also small (less than 0.3 Ldn) south of Komo Mai Drive, and moderately significantly (greater than 1.2 Ldn) north of Komo Mai Drive.

South of Komo Mai Drive, where existing traffic noise levels are high, project related traffic is predicted to increase current noise levels by 0.1 to 0.3 Ldn by the Year 1993, and non-project traffic is predicted to increase current noise levels by 0.4 to 0.6 Ldn units. Because computed projected traffic noise increases associated with project traffic are very small, the proposed development is not expected to generate significant traffic noise impacts along the sections of Kaahumanu Street south of Komo Mai Drive.

North of Komo Mai Drive, project related traffic is predicted to increase current noise levels by 1.2 to 58.3 Ldn by the Year 1993, and non-project traffic is predicted to increase current noise levels by 1.7 Ldn. The larger increase of 58.3 Ldn is expected to occur in the now vacant lands adjacent to the project site. The increases in traffic noise levels are predicted to be moderately significant.

However, because of the low volumes of existing traffic to the north of Komo Mai Drive, total traffic noise levels after project completion are not expected to exceed 65 Ldn at 50 Ft. setback distance from the centerlines of the north sections of Kaahumanu Street between Komo Mai Drive and the project entrance. At the project entrance, predicted traffic noise levels at 50 Ft. setback from the centerline of Kaahumanu Street are expected to be 58.3 Ldn, and in the "Acceptable, Moderate Exposure" category. For

these reasons, project related traffic is not expected to generate significant noise impacts along the north section of Kaahumanu Avenue.

Because traffic volume and noise level increases along Kaahumanu Street are predicted to be small or result in total noise levels below FHA/HUD standards, traffic noise mitigation measures are not necessary for mitigating noise impacts which might have resulted from project traffic.

Short term construction noise impacts from construction vehicles and on-site activities may occur with projects of this type. However, State Department of Health permit procedures applicable to construction activities would be applicable to this project, and if followed, should minimize noise impacts resulting from on site construction activities.

I. Impact on Infrastructure and Utilities

1. Storm Drainage System

Urban development of the former agricultural area will increase storm runoff. However, that increase can be considered insignificant since the project's tributary areas of 23 acres and 3 acres are only a relatively small portion of the drainage basins of 1,300 and 3,000 acres. The project's tributary areas represent only about 2.5% and 0.1% of their respective overall drainage areas. Therefore, the storm runoff increase due to urbanization should have an insignficant effect on existing down-stream drainage facilities.

During grading and construction, on-site basins will be used as desilting facilities in the event of storms during that period.

The runoff quantities and ditch/culvert hydraulics will be

prepared and submitted to the appropriate City/State agencies for approval when design of grading and construction plans are undertaken.

2. Water Supply

The existing municipal water system in Waiau is adequate to service the proposed 180-unit project with average daily water demand of 90,000 gpd.

The existing Waiau "850" System originally constructed by the developers of Waiau and Waimalu (Newtown), and presently maintained and operated by BWS, was designed for a total average daily demand of 705,000 gpd. However, both projects, which have already been completed, requires only an average daily demand of 480,000 gpd. Inclusion of the proposed project's 180 units would increase that total to 570,000 gpd. Consequently, the existing system has the capacity to serve the project's water requirements.

Also, the project development is limited to an area below the 750-foot elevation which, therefore, is within the pressure service limit of the Waiau "850" System.

For source allocation, however, the developer proposes to request the water from the Board of Water Supply.

The developer also proposes to pay the applicable facility charge to the Board of Water Supply for service to the project.

3. Sanitary Sewage Disposal

The existing municipal wastewater system is presently adequate to accommodate the conveyance, treatment and disposal of the estimated average daily sewage generated by the proposed project of 72,000 gallons per day.

However, the City's Department of Public Works has indicated that the existing 25 MGD capacity of the Honouliuli Wastewater Treatment Plant has already been committed to present and planned projects. They also note that planning for the plant's expansion is underway with construction to start in 1991.

The developer proposes to pay their porportionate share or assessment as established by the City for the expansion of the Honouliuli Wastewater Treatment Plant.

J. Impact on Public Facilities and Services

1. Police

The Honolulu Police Department has indicated that the proposed project will not affect the level of police services for the area which is served by the Pearl City Station.

2. Fire

The Honolulu Fire Department has indicated that existing fire protection facilities and services are considered adequate. Primary fire protection is provided by engine and ladder companies from the Waiau Fire Station with additional service available from the Aiea and Pearl City Fire Stations.

3. Public Educational Facilities

The project area is currently serviced by Waimalu Elementary, Aiea Intermediate and Aiea High Schools. Enrollment increases expected to result from the project are: 30-60 for grades K-6; 5-15 for grades 7-8; and 15-30 for grades 9-12. The Department of Education has indicated that legislative appropriation on a timely basis may be required to accommodate future growth.

4. Recreational Facilities

The project is subject to provisions of a City and County of Honolulu park dedication requirement. It is the developers intent to fulfill this requirement through recreational facilities similar to those provided in Phase I to III of the existing Wailuna Development in compliance with the City's. requirements.

5. Electrical Utilities

The existing Waiau-Koolau-Pukele 138 kv line and the Waiau-Wahiawa and Waiau-Koolau 138 kv lines are all in proximity to or pass over by the proposed development. Discussions with HECO for future services will be coordinated prior to and during project development.

VIII. THE 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

It is anticipated that the construction of the proposed project will commit the necessary construction materials and human resources (in the form of planning, designing, engineering, construction labor, landscaping and management, service 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 state of our economy, it is felt that the reuse of much of these materials is not practical. Labor expended for this development is not retrievable. However, labor will be compensated during the various stages of the project by the developer.

The appearance of the project site will be altered from its present open vacant appearance to that of a completed planned low density residential community. The development will be highly visible but visually integrated with the surrounding areas.

Air and noise quality will be adversely affected by this proposed project, but will remain in compliance with State standards. While ambient air and noise quality 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 pollution emissions.

The project development will result in a commitment of land for a long-time period. Once the land use of the property is established, it is unlikely that the land will be reverted to a lower usage in the long-term future. Commitment of land for these purposes will likely foreclose certain future use options of the land.

The project development will, in the short- and long-term periods, result in a residential use which will likely benefit the developer, the landowner, private businesses, and most significantly, future residents of the community.

IX. ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

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

(1) Agricultural use of the land will be lost.

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

(3) Traffic will increase from the number of additional cars utilized by the proposed development. Additional impacts associated with increased traffic include those for potential air and noise quality. It should be noted that carbon monoxide levels during peak period traffic conditions have exceeded allowable State of Hawaii Air Quality Standards under unfavorable meteorological dispersion conditions.

(4) The need for utility services will increase.

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

(6) Solid waste and sewage generated by the project will increase the need for disposal and treatment and will increase total local waste output.

X. SUMMARY OF UNRESOLVED ISSUES

At this time, there are no unresolved issues with respect to potential physical impacts. No environmental approvals outside of normal building and construction permits are required for the project. A State Land Use Amendment as well as a City Zoning change, will be filed for at the appropriate stage of the planning process. Alternatives to the proposed action were found to be less desirable than the proposed residential condominium project.

XI. LIST OF ORGANIZATIONS AND AGENCIES CONSULTED AND LIST OF EIS PREPARERS

ORGANIZATIONS AND AGENCIES

Agency	Date of Comment	Date Comment Received	Date of Response
City and County			
Building Department	11/09/87	11/12/87	NRN
Board of Water Supply	11/25/87	11/30/87	12/28/87
Department of General Planning	--------	--------	--------
Department of Housing & Community Development	--------	--------	--------
Department of Land Utilization	12/03/87	12/07/87	12/28/87
Department of Parks & Recreation	12/01/87	12/09/87	12/28/87
Department of Public Works	--------	--------	--------
Department of Transportation Services	11/18/87	11/19/87	12/28/87
Oahu Metropolitan Planning Organization	11/05/87	11/10/87	12/28/87
Fire Department	12/15/87	12/18/87	12/28/87
Police Department	11/24/87	11/27/87	12/28/87
State			
State Land Use Commission	11/12/87	12/09/87	12/28/87
Department of Accounting and General Services	11/10/87	11/12/87	NRN
Department of Agriculture	12/01/87	12/07/87	12/28/87
Department of Business and Economic Development	*12/04/87	12/21/87	12/28/87
Department of Defense	11/04/87	11/09/87	NRN
Department of Education	11/18/87	12/03/87	12/28/87
Department of Hawaiian Home Lands	11/09/87	11/16/87	NRN
Department of Health	12/08/87	12/10/87	12/28/87
Department of Land and Natural Resources	*12/14/87	12/15/87	12/28/87
OEQC	--------	--------	--------
Department of Transportation	--------	--------	--------
University of Hawaii			
U.H. Water Resources Research Center	--------	--------	--------
U.H. Environmental Center	--------	--------	--------

Organizations and Agencies Consulted (Continued)

Organizations/Agencies	Date of Comment	Date Comment Received	Date of Response
Federal			
U.S. Army Corps of Engineers	--------	--------	--------
U.S. Soil Conservation Service	11/24/87	11/30/87	NRN
U.S. Fish and Wildlife Service	12/04/87	12/07/87	12/28/87
Headquarters, U.S. Navy, 14th Naval District	11/13/87	11/16/87	NRN
U.S. Department of Transportation	--------	--------	--------
Organizations and Individuals			
Association of Apartment Owners of Wailuna	--------	--------	--------
Association of Apartment Owners of The Heights at Wailuna	--------	--------	--------
Momilani Community Association	--------	--------	--------
Newtown Community Association	--------	--------	--------
Pearl City Community Association	--------	--------	--------
Waiau Community Association	--------	--------	--------
Aiea Neighborhood Board No. 20	--------	--------	--------
Pearl City Neighborhood Board No. 21	11/20/87	11/20/87	12/28/87
Waipahu Neighborhood Board No. 22	--------	--------	--------
Kamehameha Schools/Bernice Pauahi Bishop Estate	--------	--------	--------
Ms. Ariana A. Fairbanks, et al.	--------	--------	--------
Mr. Rodney K. Biven	--------	--------	--------
Hawaiian Electric Company, Inc.	11/03/87 12/10/87	11/20/87 12/14/87	NRN 12/28/87
Oahu Sugar Company, Ltd.	--------	--------	--------

* Received After Deadline Date
NRN - No Response Needed

LIST OF PREPARERS

Community Planning, Inc. - EIS Coordination
George K. Houghtailing
Bernard P. Kea

Environmental Communications, Inc. - Technical Writers
Fred J. Rodriguez
Taeyong M. Kim

LIST OF PREPARERS (Continued)

Char and Associates - Biological Survey
Winona P. Char

Bishop Museum - Archaeological Reconnaissance Survey
Jeff Yamauchi

Parsons Brinckerhoff Quade & Douglas, Inc. - Traffic Impact Study
Julian Ng

Barry D. Root - Air Quality Study

Y. Ebisu & Associates - Traffic Noise Study
Yoichi Ebisu

Environment Capital Managers, Inc. -
Demographic, Economic and Housing Impacts
Bay K.C. Yee

Gordon L. Dugan, Ph.D. - Environmental Aspects of Storm Water Runoff

XII. COMMENTS AND RESPONSES DURING EIS PREPARATION NOTICE

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

LU11/87-5945(AC)

December 3, 1987

MEMORANDUM

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

FROM: JOHN P. WHALEN, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE -- WAILUNA IV DEVELOPMENT, PEARL CITY, OAHU
TAX MAP KEY 9-8-02: PORTION 3

The Department of Land Utilization (DLU) has reviewed the above-referenced Preparation Notice and offers the following comments:

1. The EIS should address the long-term impact of the proposed project on existing groundwater systems.

2. The EIS should justify the need to take the land from Conservation District Use for the development of the proposed housing project. This discussion should focus on the impacts to the watershed.

We hope these comments will be helpful to you in preparation of the EIS. If you have any questions, please contact Art Challacombe of our staff at 523-4648.

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
14908
cc: F. J. Rodriguez

DEC 7 1987

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

December 28, 1987

Mr. John P. Whalen
Director of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated December 3, 1987 on the Environmental Preparation Notice (EISPN) for the Wailuna IV project. We have reviewed the comments and respond as follows:

1. There is a study currently being prepared for the DEIS on impacts that the surface runoff and drainage will have on the project site and also the adjacent areas. There are also analyses included addressing the groundwater systems.

2. An economic/marketing analysis on housing demand is to be provided in the Draft EIS for your review and comment. The impacts on the watershed located mauka of the proposed project site will also be reviewed.

Thank you for your comments.

Very truly yours,

F. J. Rodriguez

FJR:la

1146 FORT STREET MALL, SUITE 200 • P.O. BOX 538 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8391

DGP 12/87-
#179

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

HIRAM K. KAMAKA
DIRECTOR

WALTER N. OZAWA
DEPUTY DIRECTOR

December 1, 1987

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

FROM: HIRAM K. KAMAKA, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
WAILUNA IV DEVELOPMENT - WAIAU
TAX MAP KEY 9-8-02: POR. 3

We have reviewed the Environmental Impact Statement Preparation Notice for the proposed Wailuna IV Development in Waiau and make the following comments:

The notice has not addressed the recreational impact and needs of this large condominium project.

Thank you for the opportunity to review and comment on the EISPN.

HIRAM K. KAMAKA, Director

HKK:ei

DEC 9 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Mr. Hiram K. Kamaka, Director
Department of Parks and Recreation
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kamaka:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated December 1, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the Wailuna IV development. The applicant/developer and their civil engineering consultants will be in contact with your staff to best determine how compliance with the Park Dedication Ordinance should be met.

At the present time, the previous three increments provide recreational amenities for the current residents; the planning for Wailuna IV will add to these amenities, so that compliance with the City's requirements will be observed.

Finally, the continuing land use policy amendment process remaining with the current Development Plan Amendment including Zoning Application, and the State Land Use Commission Boundary amendment will take approximately 18-24 months of planning and review. We are confident that during this period of time, the Park Dedication Ordinance compliance will be met.

Thank you for your comments and we look forward to working with your department and staff on this project.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 FORT STREET MALL, SUITE 209 • P. O. BOX 538 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8311

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

November 25, 1987

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

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

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR WAILUNA IV DEVELOPMENT, TMK: 9-8-02: POR. 3

Thank you for consulting with us on the environmental document for the proposed 180 residential condominium units.

Our existing water system can accommodate the proposed development.

The project is sited in the "no-pass zone" where ground disposal of wastewater is not permitted.

If you have any questions, please contact Lawrence Whang at 527-6138.

cc: F. J. Rodriguez

NOV 3 0 1987

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL COMMUNICATIONS INC.

December 28, 1987

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
630 South Beretania
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Subject: Environmental Impact Statement Preparation Notice
Walluna IV Development

We have received your comments dated November 25, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Walluna IV residential development. The comment that the existing water system can accommodate the proposed development have been forwarded to the consultants for future reference.

As the project continues through the remaining land use policy change applications (Land Use Commission Boundary review, zoning, and currently, the Development Plan Amendment), a water master plan will be developed and submitted for your approval.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1148 FORT STREET MALL, SUITE 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 0581

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 • AREA CODE (808) 943-3111

FRANK F. FASI
MAYOR

DOUGLAS G. GIBB
CHIEF

WARREN PERREIRA
DEPUTY CHIEF

OUR REFERENCE KN-LK

November 24, 1987

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

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

SUBJECT: WAILUNA IV DEVELOPMENT

We have reviewed the project description and location map for the proposed development. The completed single family units will not affect the level of police services for the area.

Thank you for the opportunity to comment.

DOUGLAS G. GIBB
Chief of Police

cc: F. J. Rodriguez

NOV 27 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

December 28, 1987

Chief Douglas G. Gibb
Honolulu Police Department
1455 South Beretania Street
Honolulu, Hawaii 96814

Dear Chief Gibb:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your department's comments dated November 24, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) prepared for the proposed Wailuna IV project. The comments provided advising that the project will not affect the level of police service for the area has been provided to the applicant/developer for their information.

We look forward to your office's review of the draft EIS currently under preparation. Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 • P.O. Box 536 • Honolulu, Hawaii 96809 • Telephone (808) 521-2321

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

JOHN E. HIRTEN
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

PL1.0865
TE-9265

November 18, 1987

MEMORANDUM

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

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

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
WAILUNA IV DEVELOPMENT, EWA, OAHU, HAWAII
TMK: 9-8-02: POR. 3

This is in response to a letter dated November 2, 1987 from Environmental Communications, Inc. requesting our review of the subject preparation notice.

We have the following comment:

The EIS should address the traffic generated by the proposed project and its effect on the surrounding street system. In particular, the capacity of critical intersections should be analyzed.

If there are any questions, please contact Kenneth Hirata of my staff at Local 5031.

NOV 18 '87
JOSEPH M. MAGALDI, JR.

cc: Environmental Communications Inc.

NOV 19 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Mr. John E. Hirten, Director
Department of Transportation Services
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Hirten:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated November 18, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Wailuna IV development. The comments have been forwarded to the applicant/developer and they will be including a traffic impact analysis to be prepared by Parsons, Brinckerhoff, Quade & Douglas, Inc. in the Draft Environmental Impact Statement (DEIS).

We look forward to your agency's review of these findings and the appropriate comments. Thank you again for your continuing interest.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-2321

PB 87-1090

November 9, 1987

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

FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: EIS PREPARATION NOTICE FOR
WAILUNA IV DEVELOPMENT
EWA, OAHU, HAWAII

We have reviewed the EIS Preparation Notice for the Wailuna IV Development project and have no comments.

Thank you for the opportunity to review the preparation notice.

HERBERT K. MURAOKA
Director and Building Superintendent

TH:jo
cc: F. J. Rodriguez
J. Harada

NO RESPONSE NEEDED

NOV 12 1987

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EPHSO

December 8, 1987

MEMORANDUM

To: Mr. Donald Clegg, Chief Planning Officer
Department of General Planning, City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Wailuna IV Development Project, Tax Map Key 9-8-02: Portion 3

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

Noise

1. Activities associated with the construction phase must comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.

   a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules.

   b. Construction equipment and onsite vehicles requiring an exhaust of gas or air must be equipped with mufflers.

   c. The contractor must comply with the conditional use of the permit as specified in the rules and conditions issued with the permit.

2. Traffic noise from heavy vehicles travelling to and from the construction site must be minimized near existing residential areas, schools, and the hospital, and must comply with the provisions of Title 11, Administrative Rules Chapter 42, Vehicular Noise Control for Oahu.

Drinking Water

The EISPN does not identify the projected source of water for the Wailuna IV Development Project. The environmental impact statement should identify and discuss the potable water system which will supply the 180 condominium units. The Drinking Water Program will comment further when they have more information on this water system.

DEC 10 1987

Wastewater Disposal

The EISPN for the subject project must address the quantity of sewage that will be generated and how the sewage will be treated and disposed.

Vector Control

Activities associated with the clearing of land and construction must comply with the provisions of Title 11, Chapter 26, Vector Control, Section 11-26-35, Rodents; and Demolition of Structures and Clearing of Sites and Vacant Lots.

The applicant should also be aware of potential infestations of mongooses, rats, mosquitoes, flies, honeybees, wasps and other venomous arthropods after the completion of the project.

BRUCE S. ANDERSON, Ph.D.

cc: F. J. Rodriguez ✓

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Dr. Bruce S. Anderson
Deputy Director
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Anderson:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

We have received your department's comments dated December 8, 1987 for the Environmental Impact Statement Preparation Notice (EISPN) of the Wailuna IV project. We respond as follows:

Noise

1. a thru c: The contractor responsible for all construction activity will be advised that these requirements for compliance with Community Noise Control for Oahu will rest with his operations at the project site.

2. All traffic heavy vehicles that emanates from the construction site will also require compliance with Vehicular Noise Control for Oahu, and will be the responsibility of the contractor.

Drinking Water

The Board of Water Supply (BWS) has advised the developer that there will be potable water supplied for the Wailuna IV project. The draft EIS will discuss this requirement and also provide correspondence from the BWS to that effect.

Wastewater Disposal

Sewage generated from the proposed project and the methods of disposal will be described in the draft EIS and a sewage master plan will be prepared and submitted for review to the City Department of Public Works, Division of Wastewater Management.

Vector Control

The contractor that will be clearing and grubbing the project site is also responsible for obtaining the necessary permits to comply with the Health Department Vector Control requirements.

1146 Fort St. Mall, Suite 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8361

Thank you for your comments and we look forward to your review of the Draft EIS.

Yours very truly,

F. J. Rodriguez

FJR:ls

OMPO

Oahu
Metropolitan
Planning
Organization

Suite 1509
1164 Bishop Street
Honolulu, Hawaii 96813
(808) 523-4178
(808) 548-2634

November 5, 1987

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Wailuna IV Development - EISPN

We have reviewed the environmental impact statement preparation notice for the Wailuna IV Development and have no comments to offer on that document at this time. However, we would like to review the transportation impacts identified in the subsequent EIS documents. The transportation impacts should include, at a minimum, the peak hour volumes and some measure of level of service on Kaahumanu Street and the nearby major arterials resulting from this development.

Thank you for the opportunity to review this project.

Sincerely,

Gordon G.W. Lum
Executive Director

cc: F.J. Rodriguez

NOV 10 1987

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

December 28, 1987

Mr. Gordon G.W. Lum
Executive Director
Oahu Metropolitan Planning
Organization
1164 Bishop Street, Suite 1509
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: Environmental Impact Statement Preparation Notice
Walluna IV Development

Thank you for your comments dated November 5, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Wailuna IV development. The comments have been forwarded to the applicant/developer and they will be including a traffic impact analysis to be prepared by Parsons, Brinckerhoff, Quade & Douglas, Inc. in the Draft Environmental Impact Statement (DEIS).

We look forward to your agency's review of these findings and the appropriate comments. Thank you again for your continuing interest.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-2321

HONOLULU FIRE DEPARTMENT
1455 S. Beretania Street, Room 305
Honolulu, Hawaii 96814

December 15, 1987

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

FROM: FRANK K. KAHOOHANOHANO, FIRE CHIEF

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
FOR THE WAILUNA IV DEVELOPMENT AT EWA, OAHU

We have reviewed the material provided for the subject EISPN and have no objections to the proposed project. Existing fire protection facilities and service is considered adequate. Primary fire protection is provided by engine and ladder companies from the Waiau Fire Station with 11 on-duty personnel. Additional service is available from the Aiea and Pearl City Fire Stations.

Thank you for the extension to complete our review and hope our delay in responding has not caused you difficulty. Should you have any questions, please contact Battalion Chief Kenneth Hord at local 3838.

FRANK K. KAHOOHANOHANO
Fire Chief

FKK/KAH:sb

cc: F. J. Rodriguez

DEC 18 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Chief Frank K. Kahoohanohano
Honolulu Fire Department
1455 S. Beretania Street, Room 305
Honolulu, Hawaii 96814

Dear Chief Kahoohanohano:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your department's comments dated December 15, 1987 for the proposed Wailuna IV Environmental Impact Statement Preparation Notice. Your agency's concerns are duly noted and will be reflected in the Draft Environmental Impact Statement currently under preparation.

Thank you again for your continuing interest and concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8791

JOHN WAIHEE, GOVERNOR
ROGER A. ULVELING, DIRECTOR
MURRAY E. TOWILL, DEPUTY DIRECTOR
BARBARA KIM STANTON, DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7430250 HIDED

Ref. No. P-7739

December 4, 1987

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

Dear Mr. Clegg:

Subject: Wailuna IV Development, Environmental Impact Statement Preparation Notice (EISPN)

We have reviewed the subject EISPN and have the following comments to offer with respect to the Hawaii Coastal Zone Management (CZM) Program.

The EIS should include a discussion of the relationship of the proposed project to the objectives and policies of the Hawaii CZM Law, Chapter 205A, Hawaii Revised Statutes.

Detailed maps should be included in the EIS that depict the environmental characteristics of the site, as well as the layout and infrastructure of the proposed project. In addition, a copy of the Wailuna Master Plan should be included so that the cumulative impact of all phases of construction can be considered.

Finally, the DEIS should discuss the impacts of the proposed project on runoff, siltation, and aquifer percolation. In this regard, special attention should be paid to effects on the Pearl Harbor aquifer and on endangered species in the Pearl Harbor area.

We look forward to reviewing the DEIS for this project.

Sincerely,

Roger A. Ulveling

DEC 21 1987

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

December 28, 1987

Mr. Roger A. Ulveling, Director
Department of Business and
Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Ulveling:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

We are in receipt of your department's comments dated December 4, 1987 on the proposed Wailuna IV Development Environmental Impact Statement Preparation Notice (EISPN). We would advise at this time that the comments were forwarded to us by the City Department of General Planning and received in our office December 21, 1987; no copy was provided to us as requested in the EISPN sent to all reviewers. Therefore, please provide us with your comments on the Draft Environmental Impact Statement (DEIS) as well as the City Department of General Planning.

The items of concern will be addressed in the DEIS currently under preparation. We will discuss the impacts relative to Chapter 205A, Hawaii Revised Statutes for the policies of the Hawaii CZM law.

The DEIS will also include a map of the previous three increments for a comparison of the completed Wailuna I, II, III, and the proposed increment IV.

Finally, the discussions on surface runoff, infiltration and impacts on the basal aquifer will be discussed by Gordon L. Dugan, Ph.D. in the DEIS.

Thank you for your continuing concern and comments.

Very truly yours,

F. J. Rodrigues

FJR:ls

1146 Fort St. Mall. Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96808 • TELEPHONE (808) 521-8391

JOHN WAIHEE
GOVERNOR

SUZANNE D. PETERSON
CHAIRPERSON, BOARD OF AGRICULTURE

DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

December 1, 1987

MEMORANDUM

To: Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Wailuna IV Development
The Lusk Company
TMK: 9-8-02: por. 3 Ewa, Oahu
Area: 26 acres

The Department of Agriculture has reviewed the subject EISPN and offers the following additional soils information.

The project site has Land Study Bureau Overall Productivity Ratings of D74, D75 and E107. By this method of classification, the project site has marginal productivity potential for grazing.

We note that the proposed project is within the State Conservation District and is designated Preservation by the City and County.

From the information provided in the EISPN and our own research, we do not foresee adverse impacts on the agricultural resources of the area resulting from the proposed project.

Thank you for the opportunity to comment.

Suzanne D Peterson

SUZANNE D. PETERSON
Chairperson, Board of Agriculture

cc: Mr. Fred J. Rodriguez
OSP
LUC

DEC 7 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Ms. Suzanne D. Peterson, Chairperson
Department of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96822-0159

Dear Ms. Peterson:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

We have received your comments dated December 1, 1987 on the EIS Preparation Notice for the Wailuna IV project. We acknowledge your department's comments that the proposed project will not adversely impact the agricultural resources of the area.

Thank you for your comments and continuing concern.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 6551

STATE OF HAWAII
DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

LAND USE COMMISSION

Room 104, Old Federal Bldg., 335 Merchant Street
Honolulu, Hawaii 96813 Telephone 548-4811

JOHN WAIHEE
Governor

TEOFILO PHIL TACBIAN
Chairman

FREDERICK P. WHITTEMORE
Vice Chairman

COMMISSION MEMBERS:
Alfonso B.F. Choy
Lawrence F. Chun
Everett L. Cuskaden
Sharon R. Himeno
Toru Suzuki
Robert S. Tamaru
Renton L.K. Yip

ESTHER UEDA
Executive Officer

November 12, 1987

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

Dear Mr. Clegg:

Subject: EISPN for Wailuna IV Development at Ewa, Oahu, Hawaii

Thank you for the opportunity to comment on the proposed development.

We have no comments to offer except that the proposed project location appears to be designated within the State Land Use Conservation District and will require a Land Use District Boundary Amendment.

Sincerely,

ESTHER UEDA
Executive Officer

EU:to

DEC 9 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

December 28, 1987

Ms. Esther Ueda
Executive Officer
Land Use Commission
335 Merchant Street, Room 104
Old Federal Bldg.
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

We have received the comments dated November 12, 1987 which your office provided to the Department of General Planning on the Environmental Impact Statement Preparation Notice (EISPN) for the Wailuna IV project. Please be advised that the applicant/developer is currently preparing a petition to be filed in 1988 to amend the State LUC Boundary District of Conservation to Urban for the proposed project.

This petition will be filed at the appropriate time by the developer and your agency will be afforded the opportunity to review the ammendment application at that time. Thank you for your comments.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 FORT STREET MALL, SUITE 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8391

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

November 18, 1987

CHARLES T. TOGUCHI
SUPERINTENDENT

Mr. Donald A. Clegg, Planning Director
Department of General Planning
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

SUBJECT: Wailuna IV Development
EIS Preparation Notice

Our review of the proposed 180 single family unit development indicates that it will have the following enrollment impact on our area schools:

SCHOOL	GRADE	APPROXIMATE ENROLLMENT
Waimalu Elementary	K-6	30 - 60
Aiea Intermediate	7-8	5 - 15
Aiea High	9-12	15 - 30

The DOE cannot assure the availability of classroom space at the elementary and high school. Legislative appropriation on a timely basis may be required to accommodate the growth.

Please keep us informed of any changes to the project plans.

Sincerely,

Charles T. Toguchi
Superintendent

CTT:jl (MRI)

cc E. Imai, OBS
G. Nakamoto, Central Dist.
F. J. Rodriguez

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

DEC 3 1987

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

December 28, 1987

Mr. Charles T. Toguchi, Superintendent
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Toguchi:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated November 18, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the Wailuna IV project. We have included the enrollment projections provided by your District planners in our overall project plan and will maintain close contact with them during the ensuing months that this project will take to complete the land use policy changes. As you know, the project is currently in the City's Annual Development Plan Amendment process stage and will also require a State Land Use Commission amendment, and finally, a Zoning change request.

We will be in touch with your office and staff to insure that there will be adequate classroom space at the appropriate time.

Thank you for your comments.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 FORT STREET MALL SUITE 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-4151

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LIBERT K. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

DOC. NO.: 2156E
FILE NO.: 88-229

DEC 14 1987

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

Dear Mr. Clegg:

SUBJECT: Wailuna IV Development
Waimalu, Ewa, Oahu
TMK: 9-8-02: por. 3

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

Historic Sites Concerns:

As this area has never been archaeologically surveyed, we do not know if significant historic sites are present. However, past agricultural use of the project area has almost certainly destroyed any surface sites which may have been present. In addition, agricultural use also tends to destroy archaeological subsurface deposits. We believe, therefore, that this project will have "no effect" on significant historic sites.

The EIS preparation notice includes the caveat that if historic remains such as artifacts, shell or charcoal deposits, burials, and stone platforms, pavings, or walls are found during construction, work will stop until the Historic Sites Section evaluates the situation and makes recommendations for mitigative action, if needed. Our concerns are therefore addressed.

Recreation Concerns:

The subject proposal must comply with county park dedication and public access ordinances. Access to hiking trails used by the public crosses the subject property.

DEC 15 1987

Forestry and Wildlife Concerns:

We request that access be provided to the lands above and for "hose-drag" easements to the adjacent lands for the purpose of addressing fire and other emergencies.

Water and Land Development Concerns:

The applicant proposes to use 26 acres of Conservation-zoned lands (General subzone) for the construction of 180 single-family dwellings. The project is located in the Pearl Harbor Ground Water Control Area, which is nearing its maximum capacity relative to allowable ground-water pumpage. For this reason, project water requirements, sources of supply, and related matters should be specifically addressed in the EIS. Also, any modification of stream channels and its effect on instream values should be addressed.

A Conservation District Use Application has not been filed and is unlikely for a project of this kind and size. We expect to see a land use boundary amendment petition for this proposal.

Thank you for your consideration of our concerns.

Very truly yours,

WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

cc: Mr. F. J. Rodriguez

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Mr. William W. Paty, Chairperson
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

We are in receipt of your department's comments dated December 14, 1987 on the Wailuna IV Environmental Impact Statement Preparation Notice. The comments were received after the deadline date of December 8, 1987 and will be included in the Draft Environmental Impact Statement (DEIS) currently under preparation. Please be assured that your comments will be addressed with similar concerns expressed by other agencies. We will look forward to a response of the DEIS by your staff during the 45-day review period.

Thank you for our continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200. P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8301

JOHN WAIHEE
GOVERNOR OF HAWAII

DISTRICT OFFICES

WEST HAWAII OFFICE
P. O. BOX 139
KAMUELA, HAWAII 96743

EAST HAWAII OFFICE
100 BAKER STREET
HILO, HAWAII 96720

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

DISTRICT OFFICES

MAUI OFFICE
P. O. BOX 22
KAHULUI, MAUI 96732

MOLOKAI OFFICE
P. O. BOX 198
HOOLEHUA, MOLOKAI 96729

KAUAI OFFICE
P. O. BOX 332
LIHUE, KAUAI 96766

November 9, 1987

Mr. Donald A. Clegg
Planning Director
Department of General Planning
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Thank you for the opportunity to comment on the Preparation Notice for an Environmental Impact Statement concerning the Wailuna IV development on Waiau Ridge.

There are no Hawaiian Home Lands in this area, and the Department of Hawaiian Home Lands finds no basis for comment on this project.

Sincerely,

Ilima A. Piianaia, Chairman
Hawaiian Homes Commission

IAP:CI

cc: F.J. Rodriguez ✓
P.O.Box 536
Honolulu, Hawaii 96809

NO RESPONSE NEEDED

NOV 16 1987

(P)1947.7

NOV 10 1987

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Environmental Impact Statement
Preparation Notice for
Wailuna IV Development

We have reviewed the subject document and have no comments to offer.

Very truly yours,

TEUANE TOMINAGA
State Public Works Engineer

MY:jk
cc: F. J. Rodriguez

NO RESPONSE NEEDED

NOV 12 1987

DEPARTMENT OF DEFENSE

November 4, 1987

Engineering Office

Mr. Donald A. Clegg, Planning Director
Department of General Planning
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Wailuna IV Development
Ewa, Oahu, Hawaii

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

signed

Jerry M. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

cc: F. J. Rodriguez

NO RESPONSE NEEDED

NOV 9 1987

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

November 24, 1987

Mr. Donald A. Clegg, Planning Director
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Mr. Clegg:

Subject: Wailuna IV Development

We have no comments to offer at this time but appreciate the opportunity to review the draft EIS on this project.

Sincerely,

RICHARD H. DUNCAN
State Conservationist

cc:
F. J. Rodriguez, P.O. Box 536, Honolulu, HI 96809

NO RESPONSE NEEDED

NUV 3 0 1987

DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO
5090 (6B)
Ser N5B/2702
13 NOV 1987

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

Dear Mr. Clegg:

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
WAILUNA IV DEVELOPMENT

The EIS Preparation Notice for the Wailuna IV Development has been reviewed and we have no comments to offer.

Thank you for the opportunity to review the EIS.

Sincerely,

Copy to:
P. J. Rodriguez
P. O. Box 536
Honolulu, Hawaii 96809

NO RESPONSE NEEDED

NOV 16 1987

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P.O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307
DEC 4 1987

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

Re: Environmental Impact Statement Preparation Notice, Wailuna IV Development, Ewa, Oahu, Hawaii

Dear Mr. Clegg:

The referenced notice has stated that the environmental impact statement will address flora and fauna of the areas affected by the proposed housing development; therefore, we have no additional comments to offer at the present time.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka

Ernest Kosaka, Field Supervisor
Office of Environmental Services
Pacific Islands Office

cc: F. J. Rodriguez
✓Environmental Communications, Inc.

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

DEC 7 1987

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

December 28, 1987

Mr. Ernest Kosaka, Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated December 4, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the Wailuna IV project. We'll look forward to your agency's review and comments on the Draft EIS currently under preparation.

Thank you for your initial advice.

Very truly yours,

F. J. Rodriguez

F. J. Rodriguez

FJR:ls

1146 FORT STREET MALL, SUITE 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-4161

November 3, 1987

Department of General Planning
City and County of Honolulu
Honolulu Municipal Building
650 So. King Street
Honolulu, Hawaii 96813

Attention: Mr. Melvin Murakami

Gentlemen:

Subject: Wailuna IV Low Density Apartment Development
TMK: 9-8-02: Por 3
Comments and Recommendations

We have received correspondence from Community Planning, Inc., acting as agents for The Lusk Company; applicants for the subject development.

The subject parcel is presently occupied by our Waiau-CEIP 138KV transmission line and we wish to be kept informed of the progress on this application and of any hearing that may be held.

Sincerely,

William F. Huench
Senior Distribution Engineer
Distribution Engineering Department

/WFH:U605w-2

cc: Bernard Kea
Community Planning Inc.

RECEIVED NOV 4 1987

NO RESPONSE NEEDED

NOV 20 1987

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840 0001

ENV 2-1
JA/G

Brenner Munger, Ph D., P.E.
Manager
Environmental Department
(808) 548 6880

December 10, 1987

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

Dear Mr. Clegg:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Wailuna IV Development

We have reviewed the subject EISPN and have the following comments:

As shown on the attached location map (see Enclosure 1), the subject development crosses or is in close proximity to existing HECO 138KV transmission lines. Since these facilities will remain energized during construction, we recommend that the following HECO Notes be included as part of the final construction plans:

1. The Contractor shall exercise extreme caution when the excavation and construction crosses or is in close proximity of our lines and shall maintain 13'-0" clearance for his equipment while working close to and/or under the overhead facilities.

2. The Contractor shall comply with the directions of the State of Hawaii Occupational Safety and Health Law (DOSH).

3. When excavation is adjacent to or under existing structures or facilities, the Contractor shall be responsible for properly sheeting and bracing the excavation and stabilizing the existing ground to render it safe and secure from possible slides, cave-ins and settlement, and for properly supporting existing structures and facilities with beams, struts or underpinning to fully protect it from damage.

4. Should it become necessary, any work required to relocate HECO facilities shall be done by HECO. The Contractor shall be responsible for all costs and coordination.

DEC 14 1987

5. The Contractor shall be liable for any damages to HECO's facilities.

6. The Contractor shall report any damages to HECO's facilities to the HECO Trouble Dispatch at phone 548-7961.

7. A minimum of 30'-0" shall be maintained between HECO overhead conductors and the final land grade of the development.

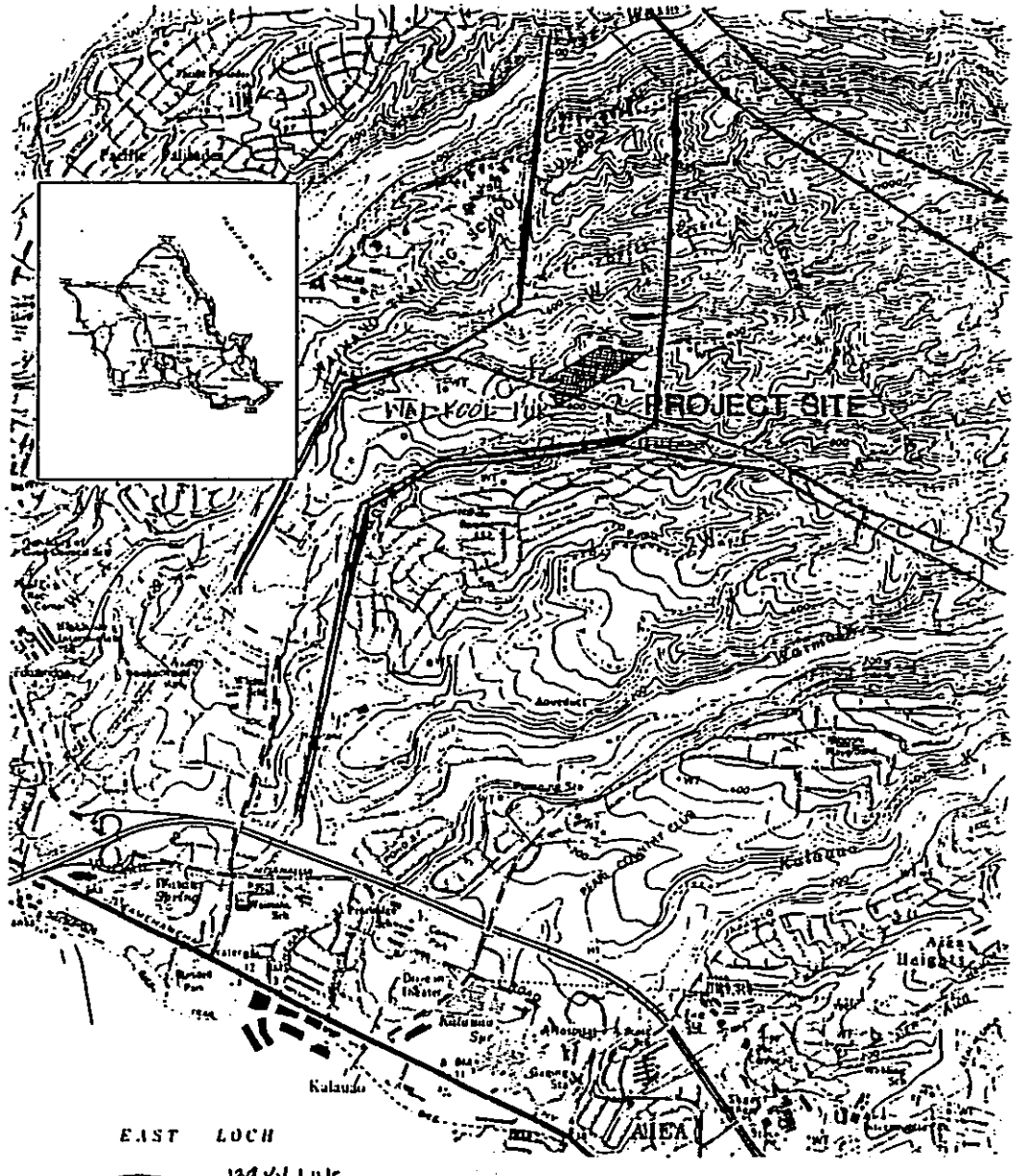
8. Service roads and/or trails leading to and from HECO's facilities shall remain accessible for HECO's use at all times.

Sincerely,

Brenner Munger

Enclosure

cc: F. J. Rodriguez (w/enclosure)



LOCATION MAP FIGURE 1

III-2

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Dr. Brenner Munger, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Dr. Munger:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated December 10, 1987 on the current status of the HECO 138-KV lines on the proposed project site at Waiawa, Ewa, Oahu.

Discussions with the applicant on this issue have been initiated. Please be assured that the project's electrical design engineer will be made aware of the existing HECO lines so that design can be completed and approved with HECO's involvement in the review process.

It should be noted that the LUC land use policy change amendment process for the project remaining will require approximately 18-24 months to achieve. During this time, the retained civil engineering firm of Community Planning, Inc. will be supervising the project with the applicant.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 6181

PEARL CITY NEIGHBORHOOD BOARD NO. 21
P.O. BOX 1026
PEARL CITY, HAWAII 96782

November 20, 1987

Mr. Donald A. Clegg, Chief Planning Officer
DEPARTMENT OF GENERAL PLANNING
City & County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Mr. Clegg:

Subject: Environmental Impact Statement
Preparation Notice
Wailuna IV Development
Waiau, Ewa, Oahu, Hawaii

Thank you for allowing us to review the subject document.

Although we have concerns regarding traffic impacts, adequacy of infrastructure and public services and facilities, and provisions for affordable housing, the Pearl City Neighborhood Board No. 21 wishes to reserve comments on the project until review of the Draft EIS is made and additional meetings are held with the developer/applicant on this matter.

Very truly yours,

John Gerard

John Gerard, Chairman

cc: F.J. Rodriguez
P. O. Box 536
Honolulu, HI 96809

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

December 28, 1987

Mr. John Gerard, Chairman
Pearl City Neighborhood Board No. 21
P.O. Box 1026
Pearl City, Hawaii 96782

Dear Mr. Gerard:

Subject: Environmental Impact Statement Preparation Notice
Wailuna IV Development

Thank you for your comments dated November 20, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Wailuna IV residential subdivision. We recognize your request to reserve comment on the project until review of the draft EIS is completed and additional meetings are held with the applicant/developer.

You will be provided with the draft EIS for your review and comment during January, 1988 and we look forward to your comments. Thank you for your continuing interest.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 FORT STREET MALL, SUITE 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8461

XIII. LIST OF ORGANIZATIONS AND AGENCIES CONSULTED DURING THE DEIS CONSULTATION PERIOD AND LIST OF EIS PREPARERS

ORGANIZATIONS AND AGENCIES

Agency	Date of Comment	Date Comment Received	Response to Comment
State			
Dept. of Accounting & General Services	01/25/88	01/27/88	NRN
Dept. of Agriculture	03/08/88	03/10/88	03/18/88
Dept. of Defense	02/09/88	02/10/88	NRN
Dept. of Education	02/02/88	02/08/88	03/18/88
Dept. of Health	02/09/88	02/18/88	NRN
Dept. of Land & Natural Resources	02/04/88	02/08/88	03/18/88
	02/16/88	02/17/88	NRN
Dept. of Business and Economic Development	02/23/88	03/01/88	03/18/88
Housing Finance and Development Corp.	02/09/88	02/12/88	03/18/88
Dept. of Transportation	---	---	---
State Energy Office	01/25/88	01/28/88	NRN
State Land Use Commission	01/27/88	01/28/88	03/18/88
OEQC	---	---	---
University of Hawaii			
Environmental Center	03/08/88	03/09/88	03/18/88
Water Resources Research Center	---	---	---
City & County			
Board of Water Supply	02/22/88	02/25/88	03/18/88
Building Department	01/29/88	02/01/88	NRN
Dept. of Housing & Community Develop.	02/05/88	02/10/88	03/18/88
Dept. of General Planning	03/03/88	03/04/88	03/18/88
Dept. of Land Utilization	03/03/88	03/04/88	03/18/88
Dept. of Parks & Recreation	---	---	---
Dept. of Public Works	02/09/88	02/11/88	03/18/88
Dept. of Transportation Services	---	---	---
Fire Department	02/09/88	02/11/88	NRN
Oahu Metropolitan Planning Organization (OMPO)	03/02/88	03/07/88	03/18/88
Police Department	02/08/88	02/08/88	03/18/88

Organizations and Agencies

	Date of Comment	Date Comment Received	Response to Comment
Federal			
Army-DAFE (Facilities Eng.-USASCH)	--------	--------	--------
Navy	01/25/88	01/27/88	NRN
Soil Conservation Service	--------	--------	--------
U.S. Army Corps of Engineers	02/23/88	02/25/88	03/18/88
U.S. Coast Guard	--------	--------	--------
U.S. Fish and Wildlife Service	02/03/88	02/05/88	NRN
U.S. Geological Survey	--------	--------	--------
Private Organizations/Agency			
American Lung Association	03/08/88	03/10/88	NRN
Hawaiian Electric Company	02/18/88	02/23/88	03/18/88
Aiea Neighborhood Board No. 20	--------	--------	--------
Pearl City Neighborhood No. 21	03/07/88	03/08/88	03/18/88

LIST OF PREPARERS

Community Planning, Inc. - EIS Coordination
George K. Houghtailing
Bernard P. Kea

Environmental Communications, Inc. - Technical Writers
Fred J. Rodriguez
Taeyong M. Kim

Char and Associates - Biological Survey
Winona P. Char

Bishop Museum - Archaeological Reconnaissance Survey
Jeff Yamauchi

Parson Brinckerhoff Quade & Douglas, Inc. - Traffic Impact Study
Julian Ng

Barry D. Root - Air Quality Study

Y. Ebisu & Associates - Traffic Noise Study
Yoichi Ebisu

Environment Capital Managers, Inc. -
Demographic, Economic and Housing Impacts
Bay K.C. Yee

Gordon L. Dugan, Ph.D. - Environmental Aspects of Storm Water Runoff

XIV. COMMENTS AND RESPONSES DURING THE DEIS CONSULTATION PERIOD

(P)1072.8

JA: 25 1988

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Wailuna IV
Draft Environmental Impact Statement

We have reviewed the subject document and have no comments to offer.

Very truly yours,

TEUANE TOMINAGA
State Public Works Engineer

SS:jk
cc: Mr. F. J. Rodriguez

NO RESPONSE NEEDED

JAN 27 1988

JOHN WAIHEE
GOVERNOR

SUZANNE D. PETERSON
CHAIRPERSON, BOARD OF AGRICULTURE

ROBERT Y. TSUYEMURA
ACTING DEPUTY
TO THE CHAIRPERSON

COPY

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

March 8, 1988

MEMORANDUM

To: Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu

Subject: Draft Environmental Impact Statement (DEIS)
Wailuna IV Development
The Lusk Company
TMK: 9-8-02: por. 3 Ewa, Oahu
Area: 26 acres

The Department of Agriculture has reviewed the subject DEIS and as previously indicated, we do not foresee adverse impacts on the agricultural resources of the area resulting from the proposed project.

Thank you for the opportunity to comment on this document.

Suzanne D. Paterson
Chairperson, Board of Agriculture

cc: Mr. P. J. Rodriguez
OSP (Attn: LUD)
LUC

NO RESPONSE NEEDED

MAR 10 1988

Engineering Office

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

Dear Mr. Clegg:

Wailuna IV
Waiau, Ewa District, Oahu

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Sincerely,

Jerry H. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

Enclosure

cc:
Mr. F. J. Rodriguez

NO RESPONSE NEEDED

FEB 10 1988

JOHN WAIHEE
GOVERNOR

CHARLES T TOGUCHI
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P O BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

February 2, 1988

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

Dear Mr. Clegg:

SUBJECT: Wailuna IV - Draft EIS

Our review of the Wailuna IV Draft EIS indicates that the number of students projected in our November 18, 1987, memo to you is still valid.

We have no additional comments to add at this time.

Should you require any clarification, please call Mr. Richard Inouye at 737-4743.

Sincerely,

Charles T. Toguchi
Superintendent

CTT:jl (ART)

cc E. Imai, OBS
L. Viduya, Central Dist.
F. J. Rodriquez

FEB 8 1988

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

Mr. Charles T. Toguchi
Superintendent
Department of Education
State of Hawaii
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Toguchi:

Subject: Draft EIS for the Proposed Wailuna IV Development

We have received your department's comments dated February 2, 1988 on the Draft Environmental Impact Statement prepared for the Wailuna IV project. We acknowledge the student projections as prepared in your November 18, 1987 analysis are still valid. In the event that the project design changes to affect this projection, we will so advise the Department of Education.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

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JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

COPY

In reply, please refer to:
EPHSD

February 9, 1988

MEMORANDUM

To: Mr. Donald A. Clegg, Chief Planning Officer
Department of General Planning, City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Draft Environmental Impact Statement (DEIS) for Wailuna IV, Waiau, Ewa District, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject DEIS. We have no comments to make at this time.

BRUCE S. ANDERSON, Ph.D.

cc: Mr. F. J. Rodriguez ✓

NO RESPONSE NEEDED

FEB 18 1988

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LIBERT E. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

DOC. NO.: 2722E
FILE NO.: 88-349

FEB 16 1988

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

Dear Mr. Clegg:

SUBJECT: Wailuna IV, Draft EIS
TMK: 9-8-2: por. 3

In response to your request, we have reviewed the document cited above; however, we have no comments to offer.

Thank you for the opportunity to review this project.

Very truly yours,

for WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

cc: Mr. F. J. Rodriguez

NO RESPONSE NEEDED

FEB 17 1988

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LUBERT E. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

February 4, 1988

MEMORANDUM

TO: Roger C. Evans, OCEA

FROM: Ralston H. Nagata, State Parks Administrator

SUBJECT: Comments on Draft EIS -- Wailuna IV (88-349)
Waiau, Ewa District, Oahu
TMK: 9-8-2: por 3

HISTORIC SITES SECTION CONCERNS:

The applicant has completed an archaeological survey, and no significant historic sites were found on the project parcel. The area was once under intensive sugar cane cultivation. Therefore, we believe that there will be "no effect" to significant historic sites.

RECREATION CONCERNS:

There are no state park concerns.

RALSTON H. NAGATA

FEB 8 1988

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

March 18, 1988

Mr. Ralston H. Nagata
Department of Land & Natural
Resources - Division of
State Parks
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Nagata:

Subject: Draft EIS for the Proposed Wailuna IV Development

We have received your comments dated February 4, 1988 on the Draft Environmental Impact Statement prepared for the Wailuna IV project. Your early determination that there will be "no effect" to significant historic sites is acknowledged. Please be assured that in the event sites are uncovered during the construction phase, we will contact your offices.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

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JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 743026 HIDPED

Ref. No. P-8100

February 23, 1988

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

Dear Mr. Clegg:

Subject: Draft Environmental Impact Statement (EIS) for the Wailuna IV Development, Waiau, Ewa, Oahu

The proposed project represents the fourth increment of the existing Lusk Wailuna Development. It will include the construction of 180 single family residential condominium units on approximately 26 acres of land currently within the Conservation District. We have reviewed the subject EIS and have the following comments:

1. The final EIS should evaluate the cumulative environmental impacts of the total Wailuna development, including the proposed action and the existing three phases, as required by the Environmental Impact Statement Rules found in Chapter 200 of Title 11, Administrative Rules. Section 11-200-17(i) of the EIS Rules states, "the interrelationships and cumulative environmental impacts of the proposed action and other related projects shall be discussed in the draft EIS."

2. The Hawaii Coastal Zone Management (CZM) law, embodied in Chapter 205A, Hawaii Revised Statutes, mandates that coastal ecosystems be protected from disruption and adverse impacts. The EIS implies that storm water runoff will not have adverse impacts to coastal receiving waters because the constituent load for the higher level storms decreases for nitrogen and suspended solids, and increases only slightly for runoff volumes and for phospherous. However, the data presented in the consultant's report (Appendix G) shows that the greatest constituent loads occur with the lower intensity storms. This is a significant factor because the lower intensity storms occur with greater frequency than the higher intensity storms. Thus, the cumulative net result may pose significant adverse impacts on coastal receiving waters. The final EIS should address this matter.

MAR 1 1988

3. The EIS does not present measures to mitigate the impacts of storm water runoff from the project site as required by the EIS rules. Mitigation measures are an essential part of an EIS document and should be included in the final EIS.

4. The EIS should identify the values and resources of the site which contributed to its Conservation District designation. In addition, the need to remove these lands from the Conservation District have not been addressed. These issues have been raised in comments on the EIS Preparation Notice, but remain unanswered in the draft EIS.

5. Other alternatives to the proposed use, which should be considered, are relocation of the proposed project to another site, perhaps outside of the Conservation District, and lower density uses of the site.

6. The "No Action" alternative to the proposed use fails to recognize the values that Conservation lands provide to surrounding communities and the State in general. The benefit and compatibility of vacant Conservation lands, with urban areas situated in adjacent locations, should be recognized in the final EIS. The open space values, increased groundwater recharge, and natural beauty of lands within the Conservation District are factors that should be considered.

7. The final EIS should address in more detail the impact of the proposed project on groundwater recharge and on the groundwater resources of the region. The cumulative, long-term effects of similar developments at such elevations or higher should also be addressed.

8. The final EIS should identify the number and kinds of affordable housing units planned for the project.

Sincerely,

Roger A. Ulveling

cc: Mr. F.J. Rodriguez
Environmental Communications, Inc.

Dr. Marvin T. Miura, OEQC

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. Roger A. Ulveling, Director
Department of Business and Economic
Development
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Ulveling:

Subject: DEIS for the Wailuna IV Development Project

We have received your department's comments dated February 23, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. We have reviewed these comments with the applicant, their civil engineer and the technical consultants respond as follows:

1. Discussions with The Office of Environmental Quality Control (OEQC) staff on the appropriateness of Section 11-200-17(i) as requested by your staff for "evaluation of cumulative environmental impacts of the total Wailuna Development" is incorrect. OEQC interpretations of this section indicated the cumulative effect would be applicable if the application was for all four increments, instead of only Increment IV. As it is understood, the three prior increments are completed, sold, and occupied; the DEIS analyzed the potential impacts of Increment IV only.

2. The potential impacts of surface drainage runoff affecting coastal ecosystems are acknowledged as described during lower intensity storms. Present practice of discharging drainage runoff into the stream in accordance with City & County Drainage standards will be employed consistent with the first three increments of Wailuna. The City Drainage standards are designed to achieve rapid de-watering to prevent flooding and other impacts from rains and storm events.

3. Mitigation measures to reduce potential impacts to the coastal ecosystems were considered, but due to terrain features, are not practicable. There will be no ponds or retention basins built for the proposed project.

4. The Lusk Company has planned for four increments in their Wailuna project and this foresight is reflected in the design of their infrastructural system. The location of the "existing" water reservoir establishes the upper limits of future expansion at the 750-foot elevation. Increments 1-3 were constructed on zoned lands and development of Increment IV

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requires an amendment to the State Land Use Conservation District designation. We cannot dispute the value of the open space resource that would be afforded to present residents of Wailuna as well as the total community at large; however, it is the position of the applicant that Increment IV will provide much needed housing for projected increase in population for this portion of the Primary Urban Center. The ability to meet this demand and alleviate housing deficit, clearly overrides the present use of the Conservation District designation.

5. The applicant indicates that for purposes of completing the Wailuna project, there are no other lands adjacent to the existing project site that could meet the feasible requirements of Increment IV. Designing to a lower density would result in higher cost that would be beyond the target market.

6. The applicant does not ignore the obvious open space values and natural beauty of the site; these are in fact, the marketing factors that make Wailuna an attractive residential product. The Lusk Company does recognize, however, that in terms of "No Action," the use of the adjacent 26 acres to the upper urbanized areas, will not significantly impact the ability of the larger remaining portion of Conservation District lands project site, to continue its existing function for ground water recharge, open space, and natural beauty.

7. The ability of the proposed project to provide ground water re-charge capability is minimal at best due to the terrain features of the site (20-30 degree slope). In an undeveloped condition, the runoff drainage patterns already established do not permit retention time adequate for ground water recharge of any reasonable quantity.

8. Final determination by governmental agencies of number and kinds of affordable housing units to be provided for the project is still unclear at this time.

   The applicant will comply with all reasonable requests for housing units to be developed for affordable market uses.

Thank you for your comments and continuing concern.

Yours very truly,

F. J. Rodriguez

FJR:ls

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

Joseph K. Conant
Executive Director

IN REPLY REFER TO:
88:PLNG/590JT

February 9, 1988

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

Dear Mr. Clegg:

Re: Draft Environmental Impact Statement (EIS) for the Proposed Wailuna IV

Thank you for the opportunity to review the subject draft EIS. Our comments are as follows:

The applicant is proposing to develop approximately 180 units at an average sales price of $160,000. Based upon the following assumptions, a family would require an annual income of nearly $51,000 to qualify for financing to purchase the averaged priced home:

1. An interest rate of 10.00%
2. A down payment of 10% of the sales price, or, $16,000.
3. A customer trust fund of $150.00 for real property tax, fire insurance, lease rent, maintenance fees, etc.
4. An income-to-payment ratio of 3:1.

This required income is approximately 150% of the $34,100 median income for a family of four, as established by the U.S. Department of Housing and Urban Development.

We believe that there is a great need for housing that is affordable to families earning below 140% of median. We therefore believe that, in addition to providing 10% of the units to families earning less than 80% of the median, a portion of the units should also be made available to families with incomes ranging from 80% to 140% of median. This translates to sales prices of approximately $76,000 to $147,000, based upon the assumptions listed above.

Sincerely,

JOSEPH K. CONANT
Executive Director

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. Joseph K. Conant
Executive Director
Housing Finance and Development
Corporation - DBED
State of Hawaii
P.O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Conant:

Subject: Draft Environmental Impact Statement for Wailuna IV

We have received your office's comments dated February 9, 1988 on the Draft Environmental Impact Statement (DEIS) which were prepared for the Wailuna IV project, and a copy was not directed to us.

The comments have been provided to the applicant/developer for their review and future use in determining how best to satisfy your concerns for project sales to the entire market. As you know, the remaining land use amendment process is still very lengthy and still requires a District Boundary Amendment from the State Land Use Commission, the approvals at the City level for the Development Plan Amendment and a Zoning Change Request, as well as the Building Permits. In view of these remaining actions to be completed, the applicant/developer will be working with all public agencies such as yours as well as the City Department of Housing & Community Development to insure compliance with all affordable housing requirements.

Since most of these policies have been determined, future discussions can be continued on how this concern can best be resolved.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-8391

John Waihee

JAN 25 1988

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
465 SOUTH KING STREET, ROOM 104
HONOLULU, HAWAII 96813

DIRECTOR
TELEPHONE NO.
548-6915

January 21, 1988

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) that was prepared pursuant to Chapter 343, Hawaii Revised Statutes and Chapter 11-200, Administrative Rules, EIS Rules:

TITLE: Wailuna IV

LOCATION: Waiau, Ewa District, Oahu

CLASSIFICATION: Applicant Action

Your comments or acknowledgments of no comments on the EIS are welcomed. Please submit your reply to the accepting authority or approving agency:

Mr. Donald A. Clegg, Chief Planning Officer
C & C of Honolulu Dept. of General Planning
650 S. King St.
Honolulu, HI 96813

Please send a copy of your reply to the proposing party:

Mr. F. J. Rodriguez
Environmental Communications, Inc.
P.O. Box 536
Honolulu, HI 96809

Your comments must be received or postmarked by: March 8, 1988

If you have no further use for this EIS, please return it to the Office of Environmental Quality Control.

Thank you for your participation in the EIS process.

NO RESPONSE NEEDED

JAN 28 1988

1/25/88
No comments.
Energy Division

STATE OF HAWAII
DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

LAND USE COMMISSION

Room 104, Old Federal Bldg., 335 Merchant Street
Honolulu, Hawaii 96813 Telephone 548-4811

JOHN WAIHEE
Governor

TEOFILO PHIL TACBIAN
Chairman

FREDERICK P. WHITTEMORE
Vice Chairman

COMMISSION MEMBERS:
Richard B.F. Chee
Lawrence F. Chun
Everett L. Cuskaden
Sharon R. Himeno
Tara Furuti
Robert S. Tamaye
Renton L.K. Nip

ESTHER UEDA
Executive Officer

January 27, 1988

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

Dear Mr. Clegg:

Subject: Draft EIS for the Proposed Wailuna IV Project

We have no comments to offer except that on page X-1, the statement that "A State Land Use Amendment is contingent upon the Development Plan Amendment, . . ." may be misleading. The State Land Use Amendment could be obtained prior to obtaining a Development Plan Amendment.

Thank you for this opportunity to comment.

Sincerely,

ESTHER UEDA
Executive Officer

EU:to

cc: Fred Rodriguez

JAN 28 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Ms. Esther Ueda
Executive Officer
Land Use Commission
335 Merchant Street, Room 104
Old Federal Building
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Subject: Draft EIS for the Proposed Wailuna IV Development

We have received your office's comments of January 27, 1988 on the Draft Environmental Impact Statement (DEIS) for the Wailuna IV Development project. The potential misunderstanding has been corrected on page X-1 to reflect that the State Land Use Amendment can be obtained prior to the Development Plan Amendment.

Thank you for calling this to our attention.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-8351

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

March 8, 1988
RE:0489

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

Dear Mr. Clegg:

Draft Environmental Impact Statement
Wailuna IV
Waiau, Oahu

The above referenced document involves construction of 180 single-family residential units and associated infrastructure on land zoned preservation. The Environmental Center has conducted a review of this document with the assistance of Bertell Davis, Anthropology; Bryce Decker, Geography; Yu-Si Fok, Henry Gee, and Edwin Murabayashi, Water Resources Research Center; and Jennifer Crummer Environmental Center.

Description of the design capacity of storm drains in the project area is not included in this Draft EIS. In the absence of this information, adequancy of the storm drainage facilities cannot be addressed.

We find the Draft EIS to have no other significant omissions in the environmental aspects which we have reviewed. We have no further comments to offer at this time.

We thank you for the opportunity to review this Draft EIS.

Yours truly,

John T. Harrison
Environmental Coordinator

cc: OEQC
F.J. Rodriguez,
Environmental Communications, Inc.
L. Stephen Lau
Bertell Davis
Bryce Decker
Yu-Si Fok
Henry Gee
Edwin Murabayashi (Water Resources Research Center)
Jennifer Crummer

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

March 18, 1988

Mr. John T. Harrison
Environmental Coordinator
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Mr. Harrison:

Subject: DEIS for the Wailuna IV Development Project

We have received the comments dated March 8, 1988 from your group on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The comments have been reviewed by the applicant and their civil engineer and we respond as follows:

As stated in the DEIS (page VII-11) the actual runoff quantities are at this time still undetermined since the "ditch/culvert hydraulics" have not been finalized. The new storm drain system will be designed and runoff quantities submitted to the appropriate City/State agencies for approval when design of grading and construction plans are completed. The proposed drainage systems will be routed to outlet into the existing Waiau and Punanani gulches. The increase which are are due to urbanization is expected to have an insignificant effect on existing down-stream drainage facilities.

Thank you for your comments and continuing concern.

Very truly yours

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 8781

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

February 22, 1988

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

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: LETTER DATED JANUARY 21, 1988 FROM THE STATE OFFICE OF ENVIRONMENTAL QUALITY CONTROL TRANSMITTING THE DRAFT EIS FOR WAILUNA IV, TMK: 9-8-02: POR. 3

We have the following comments on the draft EIS:

1. Our existing Waiau 850-foot water system is adequate to service the proposed development. The water service limit of the system is the 750-foot elevation.

2. The reference on page V-12 to the Waiau "250" Reservoir should be corrected to the Waiau "285" Reservoir.

3. Water has not been committed to this project. The availability of water will be determined when the building permit applications are submitted for our review and approval. If water is made available, the applicant will be required to pay our Water System Facilities Charges for source-transmission and storage.

4. A water master plan for the Wailuna IV development should be submitted for our review and approval.

5. The project is in the "no-pass zone," where ground disposal of wastewaters is not permitted. All wastewater disposal should be handled by the municipal sewer system as indicated in the environmental document. (Note: Comments by DPW was not incorporated in Section XII.)

If you have any questions please contact Lawrence Whang at 527-6138.

cc: Mr. P. J. Rodriguez

FEB 25 1988

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL COMMUNICATIONS INC.

March 18, 1988

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
630 South Beretania
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Subject: DEIS for the Wailuna IV Development Project

We have received your agency's comments dated February 22, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. We have forwarded these comments to the applicant and their civil engineering consultant and respond as follows:

1. Service availability from the Waiau 850-foot water system is acknowledged and we will observe the service limit established at the 750-foot elevation.

2. We will revise the reference to page V-12 to the Waiau "250" Reservoir to read Waiau "285" Reservoir.

3. The applicant is aware that there are no water commitments for this project. Availability will be determined upon application for building permit and the applicant is prepared to pay a Water System Facilities charge, source-transmission and storage.

4. A Water Master Plan will be submitted to your office for your review and approval in a timely manner.

5. The applicant acknowledges the "No-Pass Zone" condition for the project site and will be meeting all codes and standards for the disposal and treatment of wastewater generated by the proposed project.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 8151

FB 88-109

January 29, 1988

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

FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: DRAFT EIS FOR WAILUKA IV
WAIAU, EWA DISTRICT, OAHU

We have reviewed the subject draft EIS and have no comments.

Thank you for the opportunity to review the document.

HERBERT K. MURAOKA
Director and Building Superintendent

TH:ly
cc: J. Harada
F. J. Rodrigues,
Environmental Communications,
Inc.

NO RESPONSE NEEDED

FEB 1 1988

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4161

FRANK F. FASI
MAYOR

MIKE MOON
DIRECTOR

ROBERT MIYASATO
DEPUTY DIRECTOR

February 5, 1988

MEMORANDUM

TO: Donald A. Clegg, Chief Planning Officer
Department of General Planning

FROM: Mike Moon

SUBJECT: Draft Environmental Impact Statement
Wailuna IV
Waiau, Ewa District, Oahu

We appreciate the opportunity to review and comment upon the subject Draft Environmental Impact Statement (DEIS).

The Department's primary concern relates to the provision of housing opportunities for a range of income groups and, in this regard, we note that the DEIS refers to the developer's intent to provide a number of affordable housing units in accordance with the City's requirements. Be advised that the Department's current policy is to request that at least ten percent of the total number of units developed in the project be set aside for households of low and moderate income, or that the developer contribute in-kind toward the development of such housing. However, this policy is presently under review, and we encourage the developer to maintain contact with the Department so as to keep current with respect to any changes.

Thank you for the opportunity to comment.

MIKE MOON
Director

cc: Mr. F. J. Rodriguez
Environmental Communications, Inc.

FEB 10 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

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

Dear Mr. Moon:

Subject: Draft EIS for the Wailuna IV Development

We have received your department's comments dated February 5, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The applicant/developer has been provided with a copy of your department's comments and is aware of the 10% requirement for affordable housing units. Please be assured that as the project continues through the land use policy review process, there will be continuous communication with your staff to meet this requirement and it will be met.

Thank you for your comments and continuing concern.

Yours very truly,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 8791

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER

GENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

MH/DGP-I-278

March 3, 1988

Mr. Fred Rodriguez
Environmental Communications, Inc.
P.O. Box 536
Honolulu, Hawaii 96809

Dear Mr. Rodriguez:

Wailuna IV
Draft Environmental Impact Statement for the
Amendment Application from Preservation to
Low Density Apartment at Wailuna, Waiau, Ewa
Tax Map Key 9-8-01: Por. of 3, Folder No. 88/PUC-1

We have reviewed the subject document, and offer the following comments:

1. The EIS should indicate that a portion of the site is presently leased for grazing purposes.

2. The project site is described as consisting ". . . of fallowed sugar cane lands with gentle moderate slopes." This description should be rewritten to inform reviewers of the following:

   a. An extreme slope of 30% or more covers 25% of the site. This is indicated in the storm runoff analysis which you have attached.

   b. The actual extent of fallowed cane lands is approximately 25% of the site consisting of that portion of the site that is situated below the 650-foot contour level and outside of the gulch. This is indicated in the archaeological reconnaissance done by Bishop Estate.

MAR 4 1988

3. The Draft EIS states that no major topographic changes are expected. As a matter of fact, major topographic changes are anticipated. According to information received from the developer, the upper portion of the site would be cut and graded, and the gulch area which exceeds 30% slope will be filled in an attempt to moderate existing topography. Pertinent paragraphs in the report should be rewritten to reflect the proposal.

4. The impact statement proposed Low Density Apartment use and indicates that higher densities would not be in keeping with the character of the surrounding area. It does not, however, discuss Residential uses per se. A direct comparison between Residential uses and the Low Density Apartment should be made.

5. The HECO 138KV transmission line which bisect the site should also be discussed, along with mitigating measures.

6. The surface water comment is misleading and should be rewritten. There is a gulch onsite which is the result of decades of water runoff from mauka areas. This gulch is the natural drainage system in the area and is an obvious water feature.

The above corrections should be clearly presented in the body of the report.

Finally, the impact statement should include detailed maps that depict the environmental characteristics of the site, as well as the layout and infrastructure of the proposed project. These should include:

1. A slope analysis of existing conditions in order to determine the extent and location of steeply sloping and moderately sloping lands.

2. A preliminary soils reconnaissance would also be appropriate, given the susceptibility of Helemano soils to sliding if used as a foundation for low buildings or as a foundation for roads and other public facilities.

3. Preliminary layout of proposed residential units and related infrastructure would also be appropriate to establish the impact of development on the natural environment.

These details would allow consideration of the cumulative impact of all phases of development.

Sincerely,

DONALD A. CLEGG
Chief Planning Officer

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

March 18, 1988

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

Dear Mr. Clegg:

Subject: DEIS for the Wailuna IV Development Project

We have received your department's comments dated March 3, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. We have reviewed the comments with the applicant and their civil engineering consultant and we respond as follows:

1. The clarification of present land use for grazing will be included on page I-2.

2. The more current description of the site conditions as provided by Harding Lawson Associates based on their Preliminary Geotechnical Assessment, will be included on page I-2,3, and page V-1. The actual acreage of sugar lands previously cultivated on the parcel will be acknowledged and revised accordingly on page I-3.

3. The more current topographical adjustments that will consist of extensive earthwork, grading, and backfilling with less expansive soils will be added as part of the Harding Lawson Associates analysis. Excerpts from their report will be included as additional data on pages VII-1 under Section A, Impact on Geographical Characteristics. Further, the Preliminary Geotechnical Assessment report will be included in the Final Environmental Impact Statement as Appendix H.

4. The project is proposed for a Low Density Apartment amendment on the D.P. Land Use Map in conformity with the zoning designation of the previous phases of the Wailuna development for A-1 Apartment use.

This method for selecting this land use policy option would provide for more flexibility in site design and planning and in earlier approvals which would not require more time to obtain additional permits and increase the cost of housing.

The apartment concept has been determined to be incompatible with existing Heights and Crest residential projects at Wailuna. Potential opposition from residents and previously successful marketing of the

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residential units have made the Lusk Company select single-family use as a more feasible and compatible style of living instead of townhouse garden apartment construction to provide homes for the projected population increase in the Primary Urban Center.

5. There are comments provided by the Hawaiian Electric Company and we have responded to the utility via this document. Mitigation as required, will be achieved by coordination between the applicant, the civil engineering consultant, the electrical engineering consultant, and HECO's engineering department.

6. There is reference to the Waiau and Punanani Gulches and the relationship to the various downstream lined and unlined drainage ways on page V-2 under Drainage. There is limited or no major sources of surface runoff originating mauka of the project site. The on-site runoff generated will be conveyed to outfall into the two major gulches.

   The existence of an on-site gulch is noted; although it will not be a major factor within the proposed project due to filling of the gulch to provide more developable land area.

   Your request for additional data in the impact statement is as follows:

   1. A slope map showing various grade categories of the existing conditions will be included in the Final EIS.

   2. Based on existing governmental Grading and Erosion Control Standards and recommendations of the soil engineer in their preliminary report, the land will be made more suitable for development by cutting the upper area of the project site and filling the central gulch. This concept has been reviewed and accepted by Department of Public Works (See attached March 9, 1988 memorandum to DGP from DPW).

   3. The preliminary layout of proposed residential units is still unavoidable since all data from soil and engineering design for site improvements are still being developed. At this stage of review, the consultants are not final in their determination of site improvements needed for residential unit placement on the land.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls
Attachment

14-0172

March 9, 1988

MEMORANDUM

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

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: PRELIMINARY GEOTECHNICAL ASSESSMENT OF SOILS FOR THE WAILUNA IV - DEVELOPMENT PLAN LAND USE AMENDMENT (88-PUC-1), WAIAU, EWA, OAHU, HAWAII

We have reviewed the preliminary geotechnical assessment of soils prepared by Harding-Lawson Associates for this proposed project. Our review of the data presented indicates that the proposed filling of the gulch is acceptable. We recommend that the design of the fill incorporate settlement plates to provide reference for monitoring possible stability or settlement problems.

Sam Callejo
for ALFRED J. THIEDE
Director and Chief Engineer

cc: Community Planning, Inc.

RECEIVED MAR 11 1988

Harding Lawson Associates

March 16, 1988

9560,009.06

Environmental Communications, Inc.
1146 Fort Street Mall, Suite 200
Honolulu, Hawaii 96813

Attention: Mr. Fred Rodriguez

Gentlemen:

Response to Review Comments
Preliminary Geotechnical Assessment
Wailuna IV, Waiau, Hawaii

We previously performed a preliminary geotechnical assessment of the Wailuna IV site and presented results in a letter report dated February 18, 1988. The report was reviewed and four comments were made. Our responses to the four comments are listed below:

Comment 1. Is our study equivalent to a geologic/soil reconnaissance?

Response: Yes.

Comment 2. If unstable soils are discovered during design or construction, is removal and replacement a possible mitigation measure?

Response: Yes, although unstable soils are not anticipated.

Comment 3. Will drainage be designed to take care of springs, etc., beneath the fills?

Response: Subdrains are required beneath the fills. In addition, if springs or other water sources are encountered, additional drainage will be installed.

Engineers and Geoscientists
Pearl City Business Pk
803 Kamehameha Hwy Rm 404
Pearl City HI 96782
Telephone
808/455 6551
Arizona Alaska California
Colorado Hawaii Nevada
Texas Telecopy
808/455 1507

Comment 4. Settlement plates are recommended to provide reference for monitoring possible stability or settlement problems.

Response: We believe that settlement monitoring is not necessary. However, it would provide additional data and can be installed without much additional effort. Therefore, we have no objection to incorporating settlement plates into the planned fills.

We trust this provides the required information. If there are any questions, please call.

Yours very truly,

HARDING LAWSON ASSOCIATES

Christian P. Muller
Civil Engineer - 5748

CPM/GTSH/bm:

cc: The Lusk Company/Mr. Brian Yahata
Community Planning, Inc./Mr. Albert Fukushima

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

LUI/88-445(mstm)

March 3, 1988

MEMORANDUM

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

FROM: JOHN P. WHALEN, DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
FOR WAILUNA IV, WAIAU, EWA, OAHU
TAX MAP KEY 9-8-02: PORTION OF 3

Thank you for the opportunity to review the DEIS. We have the following comments to offer:

1. Page I-3 states that the project involves "site clearing and grading, however, no major topographic changes may be expected." At an informational meeting held by the Department of General Planning on February 12, 1988, however, the applicant discussed plans for extensive cutting of slopes and filling of gulches. These plans should be fully disclosed in the EIS. The EIS should also discuss requirements for stabilizing large cuts and fills and for mitigating erosion hazards.

2. The impact of storm water runoff and siltation (Appendix G) is based on "geographic and topographic alterations . . . limited to site clearing and some grading." Storm water runoff and siltation impacts should be restudied in light of the magnitude of grading and filling proposed. This information should be included in the text of the EIS.

Thank you for the opportunity to comment. If you have any questions, please contact Maureen St. Michel of our staff at 527-5349.

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
1662B

cc: F. J. Rodriguez

MAR 4 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. John P. Whalen, Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: DEIS for the Wailuna IV Development Project

We have received your department's comments dated March 3, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. We have reviewed the comments with the applicant and their civil engineering consultant and we respond as follows:

1. There will be a full discussion in the Final Environmental Impact Statement regarding site clearing and grading based on the recently completed soils report submitted by Harding Lawson Associates to the applicant. Based on this analysis, a more accurate depiction of the site conditions can be cited. Further, the mitigative measures required to achieve the improvements onsite will also be provided.

2. The civil engineering consultant will minimize the anticipated impacts of site stabilization by adhering to the City's Grading Ordinance and also instructing the general contractor to control the volume of work and extensive grading to periods of time when the weather is conducive to earth moving; i.e. cease work during heavy rains, etc. It is felt that with effective scheduling, the site improvements can be achieved with a minimum of runoff.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8751

ENV 88-37

February 9, 1988

MEMORANDUM

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

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: WAILUNA IV, WAIAU, EWA DISTRICT, OAHU, HAWAII
(TAX MAP KEY: 9-8-02: POR. 3)

We have reviewed the Draft EIS for the subject proposed development and have the following comments:

1. The existing sewers are adequate to serve the proposed development.

2. The Honouliuli WWTP will have to be expanded before the development is allowed to connect. Completion date for the expanded capacity at the Honouliuli plant is in the early 1990's.

3. The lower reach of Waimalu Stream is heavily silted, due in part to recent developments in the upper watershed area. Dredging of the stream has been programed but implementation has been delayed for up to two years because of the difficulty of obtaining a Federal permit.

4. Best management practices should be employed to control erosion and soil loss at the project site during and after construction. We also recommend the retention of stormwater so that, after development of the site, the quantity and rate of runoff leaving the site will be minimized.

Sam Callejo

ALFRED J. THIEDE
Director and Chief Engineer

cc: Environmental Communications, Inc.

FEB 11 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. Alfred J. Thiede
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Thiede:

Subject: Draft EIS for the Proposed Wailuna IV Development

We have received your department's comments dated February 9, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The comments have been provided to the applicant/developer and their civil engineering consultant and we respond as follows:

1. Notification that existing sewers are adequate to serve the development is acknowledged.

2. Expansion at the Honouliuli WWTP to meet future demand is understood and the project's civil engineering consultant will maintain contact with your Wastewater Division to insure compatible scheduling of improvements prior to connection.

3,4. It is acknowledged that the lower reaches of Waimalu Stream are in need of maintenance dredging, and that the permitting process is a long and arduous one. The applicant/developer is working closely with the civil engineering consultant and the Drainage Division of your department to provide best practicable treatment in solving the problems of erosion and surface runoff. As the project continues through the land use policy review process remaining (State Land Use Commission, Development Plan, and Zoning), the mitigative measures considered best practicable will be discussed and reviewed.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8761

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1455 S. BERETANIA STREET, ROOM 306
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

FRANK K. KAHOOHANOHANO
FIRE CHIEF

LIONEL E. CAMARA
DEPUTY FIRE CHIEF

February 9, 1988

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

FROM: FRANK K. KAHOOHANOHANO, FIRE CHIEF

SUBJECT: WAILUNA IV, WAIAU, EWA DISTRICT, OAHU

Reviewing the materials provided, we foresee no adverse impact on Fire Department facilities or services.

We have no further comments at this time.

Should you have any questions, please contact Battalion Chief Kenneth Word at 943-3838.

FRANK K. KAHOOHANOHANO
Fire Chief

FKK/LD:sb

cc: Mr. F. J. Rodgriguez
Environmental Communications, Inc.

NO RESPONSE NEEDED

FEB 11 1988

OMPO

Oahu
Metropolitan
Planning
Organization

Suite 1509
1164 Bishop Street
Honolulu, Hawaii 96813
(808) 523-4178
(808) 548-2638

F. J. RODRIGUEZ
PRESIDENT

March 2, 1988

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Wailuna IV - Draft EIS

We have reviewed the draft EIS for the Wailuna IV Development and have no substantial comments to offer.

We do wish to have one minor point clarified. On page eight, paragraph one of Appendix C - Traffic Impact Study, it indicated that traffic volumes were increased by six percent to yield future (1993) conditions. Was the six percent based on past trends or reflected agencies/developers projections (e.g. Honolulu's development plan objectives, development commitments for the area, etc.)?

Thank you for allowing us to review the draft EIS.

Sincerely,

Gordon G.W. Lum
Executive Director

cc: F.J. Rodriguez

MAR 7 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

March 18, 1988

Mr. Gordon G.W. Lum
Executive Director
Oahu Metropolitan Planning
Organization
1164 Bishop Street, Suite 1509
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: DEIS for the Wailuna IV Development Project

We have received your office's comments dated March 2, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The comments have been reviewed by the applicant and the traffic consultant and we respond as follows:

The increased traffic volumes of six percent to yield future (1993) conditions, was determined on the basis of future growth trends projected for the Primary Urban Center (PUC) Development Plan area. It was felt that the projections would then be consistent with a known or established gauge of growth.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:la

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8191

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 • AREA CODE (808) 943-3111

FRANK F. FASI
MAYOR

DOUGLAS G. GIBB
CHIEF

WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE KN-LK

February 8, 1988

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

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

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT: WAILUNA IV

We have reviewed the draft environmental impact statement on the fourth increment of the Lusk Wailuna Development Master Plan, and would like to offer the following comments.

In the interest of pedestrian safety and traffic flow, we feel it advisable that the State Department of Transportation's proposal to interconnect and coordinate traffic signals on Kamehameha Highway be implemented.

We would also urge that consideration be given to environmental security (e.g. deadbolts, window locks, adequate lighting, etc.) when both the residential units and the public recreational facility are designed.

Thank you for the opportunity to comment.

DOUGLAS G. GIBB
Chief of Police

cc: Mr. F. J. Rodriguez

FEB 8 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

Chief Douglas G. Gibb
Honolulu Police Department
City & County of Honolulu
1455 South Beretania Street
Honolulu, Hawaii 96814

Dear Chief Gibb:

Subject: Draft EIS for the Proposed Wailuna IV Development

We have received your department's comments dated February 8, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The comments have been reviewed by the applicant and we respond as follows:

1. The implementation for the proposed coordination and interconnection of traffic signals on Kamehameha Highway will be monitored by contact with the State DOT.

2. The recommendations on security safeguards have been provided to the applicant/developer and they will give this matter the highest consideration.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 0391

DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO

5090 (68)
Ser N5B/160
25 JAN 1988

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

Dear Mr. Clegg:

DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
WAILUNA IV, WAIAU, EWA DISTRICT, OAHU, HAWAII

The Draft EIS for the Wailuna IV has been reviewed and we have no comments to offer. Since we have no further use for the EIS, it is being returned to the Office of Environmental Quality Control.

Thank you for the opportunity to review the Draft.

Sincerely,

W. K. Lin
Assistant Civil Engineer
By direction of the
Commander

Copy to:
Mr. F. J. Rodriguez
Environmental Communications, Inc.
P. O. Box 536
Honolulu, Hawaii 96809

Office of Environmental Quality Control

NO RESPONSE NEEDED

JAN 27 1988

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF: Planning Branch

February 23, 1988

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

Dear Mr. Clegg:

Thank you for the opportunity to review the Draft Environmental Impact Statement (DEIS) for the Wailuna IV Development. The following comments are offered.

a. Since no work is to be performed in waters of the United States or adjacent wetlands, a Department of the Army permit is not required.

b. The statement in section V.B.3 (page V-2) of the DEIS concerning flood hazards appears to be accurate.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Copy Furnished:

Mr. F.J. Rodriguez
Environmental Communications
P.O. Box 536
Honolulu, HI 96809

FEB 25 1988

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

Mr. Kisuk Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

Subject: DEIS for the Wailuna IV Development Project

We have received your office's comments dated February 23, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The applicant and their civil engineering consultant have been provided copies of your comments and we respond as follows:

1. We acknowledge that a Department of Army permit is not required based on your determination.

2. Our documentation of the flood hazard potential is acknowledged as being acceptable to the Corps of Engineers.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 8351

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P O BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307
3 FEB 1988

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

Re: Environmental Impact Statement, Wailuna IV, Waiau, Ewa District, Oahu

Dear Mr. Clegg:

We have reviewed the referenced material and find that due to its nature, the proposed project will have no significant deleterious impact on fish and wildlife resources. Please do not hesitate to call on us if we may be of further assistance.

We appreciate this opportunity to comment.

Sincerely yours,

John Engbring

for Ernest Kosaka, Field Supervisor
Office of Environmental Services
Pacific Islands Office

cc: ✓Environmental Communications, Inc.
DLNR

NO RESPONSE NEEDED

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AMERICAN LUNG ASSOCIATION of Hawaii
The Christmas Seal People®

March 8, 1988

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

MAR 10 1988

Dear Mr. Clegg:

Subject: Draft EIS for Wailuna IV

We have reviewed the subject EIS with particular attention to the section addressing air quality impacts and have the following comments to offer.

1. Sections G (Impact on Air Quality), pp. VII-8 to 9, failed to point out that traffic generated by the proposed project will be contributing to greater congestion on the H-1 Freeway, longer commute times, and thus greater exposure of occupants to automotive pollutants. While the contribution of the project itself is relatively small, the public health significance of thousands of vehicle occupants, including many school children, along the H-1 corridor being exposed for longer periods to higher concentrations of carbon monoxide and other pollutants as a result of the cumulative impact of projects such as this certainly deserves mention in the main text of this EIS.

2. Given that the air quality study showed violations of state ambient air quality standards, Section IX, "Any Probable Adverse Environmental Effects Which Cannot Be Avoided," (p. IX-1) of the EIS should have made specific note of this.

3. In the sub-consultant's air quality study (Appendix D, p. 9) the methodology of estimating 8-hour carbon monoxide is discussed. An EPA-recommended "persistence factor" of 0.6 was used to convert 1-hour CO levels to 8-hour levels. That EPA factor is based on field studies in several mainland areas and is

based on "worst case" 1-hour concentrations. The author in this case appears to have altered the EPA procedure by applying the factor to 1-hour concentrations generated under more favorable meteorological conditions instead of the "worst case" conditions. This would result in some underestimation of 8-hour concentrations.

We hope that you find these comments useful and informative.

Sincerely yours,

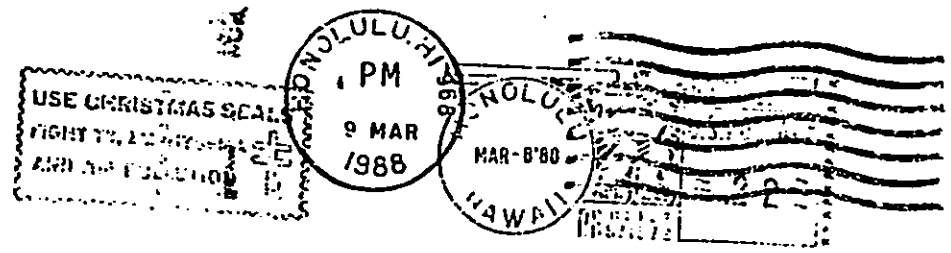
James W. Morrow
Director
Environmental Health

JWM:ct
L8810

cc: OEQC
UH-Environmental Center
Environmental Communications

NO RESPONSE NEEDED

AMERICAN LUNG
ASSOCIATION OF HAWAII
245 N. Kukui Street
Honolulu, Hawaii 96817



Mr. F. J. Rodrigues
Environmental Communications, Inc.
P.O. Box 536
Honolulu, Hawaii 96809

NRN: RECEIVED BEYOND THE 45-DAY DEADLINE DATE

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

Brenner Munger, Ph.D., P.E.
Manager
Environmental Department
(808) 548-6880

ENV 2-1
JA/G

February 18, 1988

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

Dear Mr. Clegg:

Subject: Development Plan Amendment Application and Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Wailuna IV Development, Ewa, Oahu, Hawaii

The subject development crosses the existing Waiau-Koolau-Pukele 138KV line and is also in proximity to the existing Waiau-Wahiawa and Waiau-Koolau 138KV lines. These facilities will remain energized during construction. As a result, we recommend that the following HECO notes be included as part of the final construction plans.

1. The Contractor is to exercise extreme caution when the excavation and construction crosses or is in close proximity of our lines and is to maintain 13'-0" clearance for his equipment while working close to and/or under the overhead facilities.

2. The Contractor is to comply with the directions of the State of Hawaii Occupational Safety and Health Law (DOSH).

3. When excavation is adjacent to or under existing structures or facilities, the contractor is responsible for properly sheeting and bracing the excavation and stabilizing the existing ground to render it safe and secure from possible slides, cave-ins and settlement, and for properly supporting existing structures and facilities with beams, struts or underpinning to fully protect it from damage.

4. Should it become necessary, any work required to relocate HECO facilities shall be done by HECO. The Contractor shall be responsible for all costs and coordination.

5. The Contractor shall be liable for any damages to HECO's facilities.

6. The Contractor shall report any damages to HECO's facilities to the HECO Trouble Dispatch at phone 548-7961.

7. A minimum of 30'-0" shall be maintained between HECO overhead conductors and the final land grade.

8. Service roads and/or trails leading to and from HECO's facilities shall remain accessible for HECO's use at all times.

Sincerely,

Brenner Munger

cc: F. J. Rodrigues

ENVIRONMENTAL
COMMUNICATIONS
INC.

F J RODRIGUEZ
PRESIDENT

March 18, 1988

Dr. Brenner Munger, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Dr. Munger:

Subject: DEIS for the Wailuna IV Development Project

We have received your comments dated February 18, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project. The comments have been provided to the applicant and their civil engineering consultant who will comply with the request to include the recommended HECO notes as part of the final construction plans.

There will be coordination with the HECO engineering staff by both the civil engineering consultant and their electrical engineer for Wailuna IV as the planning continues. There is still a considerable time period remaining before final construction plans are completed, so you may be assured that all concerns will be mitigated.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-8391

PEARL CITY NEIGHBORHOOD BOARD NO. 21
P.O. BOX 1026
PEARL CITY, HAWAII 96782

March 7, 1988

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

SUBJECT: Draft EIS Wailuna IV Development
Waiau, Ewa, Hawaii

Dear Mr. Clegg:

Thank you for allowing us to review the subject report.

The Pearl City Neighborhood Board No. 21 submits the following consensus action from eight members for the proposed 180-unit single-family residential condominium project, as there was no quorum at its February 25, 1988 meeting.

1. Eight members are in agreement that all public elementary age students attend Momilani Elementary School; and that the Leeward School District be designated as the primary agency to implement programs for all public educational activities of students residing in the Wailuna I, II, III, and IV projects.

2. Five members approve, in concept, the designation of the 26-acre project site for low density apartment use, subject to further review of the infrastructure proposals for sewer, water, drainage and traffic facilities when State Land Use Boundary Amendment and City zoning requests are submitted for approval.

3. Three members opposed the project if affordable housing ($100,000 to $120,000 price range) is included as a requirement for the proposed project.

We would appreciate your consideration of our concerns.

Very truly yours,

Thomas K. Y. Kam

Thomas K.Y. Kam
Chair

MAR 8 1988

cc: F. J. Rodriguez
P.O. Box 536
Honolulu, HI 96809

Ed Nakano, Leeward District, DOE
Liberato Viduya, Central District, DOE

Brian Yahata
Lusk Hawaii
98-1910 Kaahumanu St.
Pearl City, HI 96782

Neighborhood Commission

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. Thomas K.Y. Kam, Chair
Pearl City Neighborhood Board No. 21
P.O. Box 1025
Pearl City, Hawaii 96782

Dear Mr. Kam:

Subject: DEIS for the Wailuna IV Development Project

We have received the comments dated March 7, 1988 offered by your Board No. 21 on the Draft Environmental Impact Statement (DEIS) prepared for the Wailuna IV project.

The Board's support of the project in concept is duly noted and the applicant will continue to work closely with Board No. 21 to assure that Wailuna IV is consistent with previous phases at Wailuna.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 936 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 0291

APPENDIX A

Biological Study
Wailuna IV Project
Waiau, O'ahu

by

Char & Associates

November 1987

BIOLOGICAL SURVEY
WAILUNA IV PROJECT
WAIAU, O'AHU

by

Winona P. Char
George K. Linney

CHAR & ASSOCIATES
Botanical/Environmental Consultants
Honolulu, Hawaii

Prepared for: ENVIRONMENTAL COMMUNICATIONS, INC.

November 1987

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BIOLOGICAL SURVEY
WAILUNA IV PROJECT
WAIAU, O'AHU

INTRODUCTION

On November 02, 1987 a biological survey was made of the ±26-acre Wailuna IV Project site. The site has been disturbed for some time, first by sugar cane cultivation, and, later by a macadamia nut orchard and grazing. As a result, the biota on the site is represented largely by introduced or foreign species. No rare, threatened or endangered plants or animals were found on the project site during the course of this survey.

The vegetation on the site consists of a mosaic of plant associations. A broomsedge grassland which grades into a mixed scrub of lantana, Christmas berry, guava, and macadamia nut trees covers most of the project site. A forest of albizia and eucalyptus trees is found along the narrow, paved road which runs the length of the site and services the Board of Water Supply's reservoir located above the project site.

Ten species of birds, all of them foreign, are found on the project site. The most abundant species are the Japanese White-eye and two species of cardinal. Although feral pigs were not encountered during the survey, their occurrence on the site was especially noticable in the abandoned macadamia nut grove where scat and rooting activity were fairly heavy. In addition, many pig trails criss-cross the project site.

FLORA SURVEY

The project site was formerly planted in sugar cane and in areas where the soil horizon is exposed there is a layer stained black with charcoal. Sugar cane cultivation was apparently abandoned many years ago and the site then used for a macadamia nut grove. The grove too has since been abandoned and a weedy scrub association has filled in the matrix between the trees. The western portion of the property, along the Waimalu boundary, is covered by grassland with scattered shrubs and appears to still be used for grazing. The soil is very deep, with few stones, perhaps as a consequence of the sugar cultivation. Along the Diamond Head-makai (southeast) corner of the site, severe soil erosion has exposed perhaps eight to ten feet of the soil column.

Survey Methods

A walk-through survey method was employed, with plants identified in the field. Unknown or unrecognized species were collected for later identification by comparison with the literature and herbarium specimens. Fern taxonomy follows Wagner and Wagner (1987), while flowering plant taxonomy follows Wagner, et al., (in prep.). The species recorded are indicative of the season (rainy vs. wet) and environmental conditions under which the survey was conducted. A survey taken at a different time would no doubt yield slight differences in the species list, especially of the weedy, annual species.

Description of the Vegetation

While there are three vegetation types on the site, they are not generally distinct, but represent successive stages in plant

succession on old fields. The first of these is broomsedge grassland. Broomsedge (Andropogon virginicus) forms a more or less dense cover on the site, varying in height from 3 to almost 6 feet tall. It is particularly well-adapted to periodic burning, and its continued presence on the site may be due to occasional fires. Without these fires, it eventually is invaded by shrubs and trees which shade it out. In fact much of the grassland now has a significant number of shrubs coming in. Locally other grasses supplant broomsedge as the dominant and may form small to medium-sized patches. These species include molasses grass (Melinis minutiflora), Natal redtop (Rhynchelytrum repens), Guinea grass (Panicum maximum), and two species of Paspalum. A few rows of macadamia nut trees (Macadamia integrifolia) are found in the grassland and along the margins of the dense scrub vegetation.

Margins of the grassland are not sharp, but feathered. The number of shrubs increasing, until the vegetation is predominantly or totally shrubs. These are primarily of four species: lantana (Lantana camara), Christmas berry (Schinus terebinthifolius), guava (Psidium guajava), and strawberry guava (Psidium cattleianum). A third species of guava, Psidium littorale, is present on the site in small numbers, and might be confused with the strawberry guava. Christmas berry is present in highest numbers in a shallow gully running lengthwise through the middle of the site. Here it forms an almost pure stand, with a small admixture of Formosan koa (Acacia farnesiana) and kolomona (Senna surratensis). On the lower elevation portions of the project site, this gulch deepens and eucalyptus predominates just outside the study site.

The forest at the upper end of the site is composed of various species of Eucalyptus and albizia (Paraserianthes falcataria), with an understory of macadamia nut trees. Albizia predominates in the lower portion along the roadside. The forest canopy varies from 25 to more than 40 feet in height, with the understory about one-half as high. The macadamia trees are mature to senescent, many having lost their original trunks and subsequently resprouting from near the base. Under the macadamia trees, the combination of deep shade and heavy pig disturbance has eliminated almost all ground cover. Where the macadamia trees have died, the understory consists of the same plants that constitute the scrub vegetation. Just north of the powerline which crosses the site, there appears to be an old well and housesite. A number of exotic ornamentals persist here, but are not significant constituents of the vegetation.

A comprehensive list of the plant species found during this survey is presented in Appendix 1.

FAUNA SURVEY

A total of ten avian (bird) species were recorded. The birds generally prefer the forest and scrub areas on the project site. The Japanese White-eye was abundant during the early morning hours, foraging among the albizia trees. Later in the day, the two cardinal species and the Red-vented Bulbul became more numerous. Although not observed during this survey, game birds such as francolin and possibly pheasant as well as a number of mannikin (or munia) species are expected to visit the grassland area.

Feral pigs appear to frequent the site on a regular basis. Evidence of rooting was observed in the grassland, scrub, and forested areas. Plant species which provide edible fruit (guava, strawberry guava, passion fruit, macadamia nut) appear to be visited regularly as evidenced by well-worn pig trails.

Although the grassland was used for grazing horses, no animals were observed during the survey. Cattle from neighboring parcels may occasionally stray onto the property.

Survey Methods

The survey was conducted on November 02, 1987 between the hours of 0700 and 1400. Birds were detected both by sight and by their vocalizations. Mammalian presence was determined primarily by observation of tracks and scat (droppings) and by damage to vegetation.

Annotated Species List

The common and scientific names are given for each species. Bird species are in accordance with those listed in Pratt, et al. (1987).

1. Avifauna

Zebra Dove (Geopelia striata); Foreign
Also known as the Barred Dove, this species occurs in small flocks on the site, preferring open areas with sparse grass cover.

Feral Rock Dove (Columba livia); Foreign
Four wild pigeons were observed flying over the site. The birds probably do not make use of the site for feeding or nesting.

Spotted Dove (Streptopelia chinensis); Foreign
Also known as the Lace-necked Dove, individuals of this species were observed feeding on the ground in the scrub and forested areas.

Northern Cardinal (Cardinalis cardinalis); Foreign
Pairs of birds were observed in scrub and forested areas; common on the site.

Red-crested Cardinal (Paroaria coronata); Foreign
Also known as Brazilian Cardinal. This species was also observed frequently on the site, with the number of birds increasing during the later part of the morning hours.

Common Myna (Acridotheres tristis); Foreign
This species is usually associated with residential areas. One pair of birds was observed flying over the site during the later part of the day.

White-rumped Shama (Copsychus malabaricus); Foreign
Also known as Shama Thrush, this species prefers forested areas. A pair of birds was observed in the macadamia trees which form a more or less dense grove under a number of large, old albizia trees along the paved road. The birds probably nest in the area.

Japanese White-eye (Zosterops japonicus); Foreign
Also known locally as Meijiro. This species was abundant on the site during the early morning hours, foraging among the albizia trees. Found in lesser numbers in the scrub vegetation.

Red-vented Bulbul (Pycnonotus cafer); Foreign
Since its unauthorized cage release in 1965 or sometime earlier, this species has increased and spread rapidly on O'ahu. This noisy and gregarious species was frequently observed in the scrub and forested areas feeding on fruit.

House Sparrow (Passer domesticus); Foreign
Like the Myna, this species is also associated with humans and is common in urban areas. One bird was observed flying over the site.

2. Mammals

Feral Pig (Sus scrofa); Foreign
Scat of wild pigs and evidence of rooting were frequent in areas where the macadamia nut trees were fairly dense. The pigs probably come down from the forested areas above the site to feed on macadamia nuts, earthworms, insects, and guava fruit during the early morning and late afternoon hours as well as night. Hawaiian pigs use well-defined trails within an area of about two to four square miles (van Riper and van Riper 1982). Such trails criss-cross the study site and usually pass fruit-bearing trees and vines. Rooting was occasionally observed in grassland areas especially where the bracken fern or kilau was common.

Horse (Equus caballus); Foreign
Evidence of browsing and old scat of horses were observed. Horses occasionally use the grassland and scrub areas for grazing but were not seen on the site during the study.

Feral Cat (Felis catus); Foreign
Tracks of cat, probably feral, were found in the badly eroded area on the southeast portion of the site.

Mongoose (Herpestes auropunctatus); Foreign
Scat and tracks of mongoose were found along the margins of the grassland, especially in the area where an old dirt road runs along the Waimalu boundary of the site.

Rat (Rattus spp.); Foreign
Partially gnawed fruit of guava and macadamia nut were observed. Two species of rat -- Roof Rat (Rattus rattus) and Pacific Rat (Rattus rattus) -- probably occur on the site. In addition, the ubiquitous House Mouse (Mus musculus) is expected to occur here, especially in the grassland vegetation.

DISCUSSION AND RECOMMENDATIONS

Because the site has been disturbed for such a long period of time, it is dominated almost exclusively of introduced or foreign species. No rare, threatened or endangered plant or animal species designated by the federal and/or state governments occur on the site.

There is no botanical reason to impose any restrictions or conditions on the development of this site, but some plants on the site do represent potential assests or problems. The following recommendations are offered.

1. Use of native species for landscaping.

Four of the native plants on the site are of some significance and have been used for landscaping by a number of botanic gardens and arboreta as well as a number of individuals. 'Ohi'a lehua (Metrosideros collina) was probably a dominant tree here before the site was disturbed by man, and a few trees were found outside the site. Within the project site, a number of more or less even-aged small trees (some up to 8 feet tall) were encountered on the grassy slope of the shallow central gulley, near the powerlines. A single alahe'e shrub (Canthium odoratum) was found in the same gulley farther downslope, near the edge of the study site. It was probably also common in the native forest ecosystem. 'Akia (Wikstroemia oahuensis) is a shrub three to six feet tall with fragrant yellowish-green flowers. It is characteristic of dryish to moist areas and was probably a dominant understory shrub prior to disturbance. It has adapted well to disturbed areas, and, almost qualifies as a major component of the grassland and scrub. Far less common on the site is u'ulei (Osteomeles anthyllidifolia), a prostrate, almost viny, shrub of dry to mesic areas.

The plants can be dug out with a sufficient rootball during

the construction phase and retained for use as landscaping material around the common areas.

2. Removal of existing large trees.

A potential asset is the wood from the macadamia trees on the site. Macadamia wood is dense, hard, and the grain is well-figured. It might generate some revenue if sold to local artists who work in woods.

The large albizia trees on the site are considered weedy by many people, including foresters, and should be removed. It is a rapid-growing tree which soon reaches immense proportions. Unfortunately, the wood is weak and the trees begin to drop large branches, especially during storms and heavy rains. Eucalyptus also tends to drop branches or blow over in high winds, though not to the extent that albizia does.

The project is not expected to have a significant impact on the fauna of the site as all the species are foreign. Species commensal with man such as the Myna and House Sparrow will probably increase in numbers.

While the project will result in loss of vegetation and some faunal habitat, it is expected to have only a minimal impact on the total island populations of the species involved.

LITERATURE CITED

Pratt, D.G., P.L. Bruner, and D.G. Berrett. 1987. The Birds of Hawaii and the Tropical Pacific. Princeton Univ. Press, Princeton, New Jersey.

van Riper, S.G. and C. van Riper,III. 1982. A Field Guide to the Mammals in Hawaii. Oriental Publ. Co., Honolulu.

Wagner, W.H., Jr., and F.S. Wagner. 1987. Revised Checklist of the Hawaiian Pteridophytes. Manuscript.

Wagner, W.L., D. Herbst,and S. Sohmer. In prep. Manual of the Flowering Plants of the Hawaiian Islands. Bishop Museum Press, Honolulu.

APPENDIX 1. LIST OF PLANT SPECIES.
WAILUNA IV PROJECT, WAIAU, O'AHU

On the following pages is a list all the vascular plants found on the project site during the course of the botanical survey. Ferns are presented separate from the flowering plants, which are further divided into monocots and dicots. Within each of the three groups, plants are arranged alphabetically by family and within each family by genus. For each species, the author citation is provided as well as a common English or Hawaiian name, when known, and the biogeographic status. The following abbreviations are used:

Scientific name

- s.l. = in a very broad sense
- sp. = species not determined
- var. = variety

Biogeographic status

- E = endemic, native only to the Hawaiian Islands
- I = indigenous, native to the islands and elsewhere
- P = Polynesian introduction; brought to the islands before Western contact, not native to the islands
- X = exotic or introduced; brought to the islands accidentally or intentionally after Western contact, not native to the islands

SCIENTIFIC NAME	COMMON NAME	BIOGEOGRAPHIC STATUS
FERNS		
Adiantaceae		
Pityrogramma calomelanos (L.) Link	silver fern	X
Aspleniaceae		
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	sword fern	X
Cyatheaceae		
Odontosoria chinensis (L.) J. Sm.	pala'a	I
Pteridium decompositum Gaud.	bracken	E
Polypodiaceae		
Phlebodium aureum (L.) J. Sm.	hare's-foot fern	X
Phymatosorus scolopendria (Burm.) Pich Sermolli	laua'e	X
FLOWERING PLANTS		
MONOCOTS		
Commelinaceae		
Commelina diffusa N. L. Burm	dayflower	X
Cyperaceae		
Kyllinga brevifolia Rottb.	kyllinga	X
Pycreus polystachyos (Rottb.) Beauv.		I

SCIENTIFIC NAME	COMMON NAME	STATUS
Gramineae		
Andropogon virginicus L.	broomsedge	X
Axonopus affinis Chase	carpet grass	X
Chrysopogon aciculatus (Retz.) Trin.	golden beard-grass	X
Cynodon dactylon (L.) Pers.	Bermuda grass	X
Digitaria ciliaris (Roetz.) Koeler	crab grass	X
Digitaria radicosa (Presl.) Miq.	crab grass	X
Digitaria insularis (L.) Mez ex Ekman	sour grass	X
Eleusine indica (L.) Gaertn.	goose grass	X
Hyparrhenia rufa (L.) Stapf in Prain	thatching grass	X
Melinus minutiflora Beauv.	molasses grass	X
Panicum maximum Jacq.	Guinea grass	X
Paspalum conjugatum Berg.	Hilo grass	X
Paspalum scrobiculatum L.	rice grass	X
Rhynchelytrum repens (Willd.) C. E. Hubb.	Natal redtop	X
Setaria gracilis Kunth. in Humb. & Bonpl.	foxtail	X
Setaria palmaefolia (Koen.) Stapf	palm grass	X
Liliaceae s.l.		
Agave attenuata Salm-Dyck		X
Cordyline terminalis (L.) Kunth.	ti	P
Orchidaceae		
Arundinaria graminifolia (D. Don) Hochr.	bamboo orchid	X
Spathoglottis plicata Bl.	Philippine ground orchid	X

SCIENTIFIC NAME	COMMON NAME	STATUS
DICOTS		
Acanthaceae		
Asystasia gangetica (L.) T. Anders.	Chinese violet	X
Barleria cristata L.	Philippine violet	X
Anacardiaceae		
Schinus terebinthifolius Raddi	Christmas berry	X
Compositae		
Acanthospermum australe (Loefl.) Kuntze	Paraguay bur	X
Ageratina riparium (Regel) King & Robinson	Hamakua pamakani	X
Ageratum conyzoides L.	ageratum	X
Bidens pilosa L.	Spanish needle	X
Conyza canadensis (L.) Cronq.	horseweed	X
Emilia coccinea (Sims) G. Don	emilia	X
Emilia sonchifolia (L.) DC.	purple emilia	X
Pluchea indica (L.) Less.	pluchea	X
Pluchea symphytifolia (Miller) Gillis	pluchea	X
Vernonia cinerea (L.) Less.	ironweed	X
Cucurbitaceae		
Momordica charantia L.	bittermelon	X

SCIENTIFIC NAME	COMMON NAME	STATUS	
Euphorbiaceae			
Chamaesyce hirta (L.) Millsp.	spurge	X	
Euphorbia lactea Haw.	euphorbia	X	
Phyllanthus debilis Klein ex Willd.	phyllanthus	X	
Labiatae			
Hyptis pectinata (L.) Poit.	comb hyptis	X	
Leguminosae			
Acacia confusa Merr.	Formosan koa	X	
Chamaecrista nictitans (L.) Moench.	partridge pea, lau-ki	X	
Desmanthus virgatus (L.) Willd.	virgate mimosa	X	
Desmodium incanum DC.	beggar's ticks	X	
Desmodium triflorum (L.) DC.			X
Indigofera suffruticosa Mill.	indigo	X	
Leucaena leucocephala (Lam.) de Wit	koa-haole	X	
Mimosa pudica L.	sleepinggrass	X	
Paraserianthes falcataria (L.) Nielsen	albizia	X	
Senna surattensis (N. L. Burm.) Irwin & Barneby	kolomona	X	
Lythraceae			
Cuphea carthagenensis (Jacq.) Macbr.	tarweed	X	
Malvaceae			
Sida rhombifolia L.	sida	X	

SCIENTIFIC NAME	COMMON NAME	STATUS
Melastomataceae		
Clidemia hirta (L.) D. Don	Koster's curse	X
Menispermaceae		
Cocculus trilobus (Thunb.) DC.	huehue	I
Moraceae		
Ficus rubiginosa Desf.	Port Jackson fig	X
Myrtaceae		
Eucalyptus deglupta Bl.	Mindanao gum	X
Eucalyptus paniculata Sm.	gray ironbark	X
Eucalyptus resinifera Sm.	red mahogany	X
Eucalyptus robusta Sm.	swamp mahogany	X
Eucalyptus rudis Endl.	flooded gum	X
Eugenia uniflora	Surinam-cherry	X
Leptospermum scoparium J. R. & G. Foster	New Zealand tea	X
Metrosideros polymorpha Gaud.	'ohi'a lehua	E
Psidium cattleianum Sabine	strawberry guava	X
Psidium guajava L.	guava	X
Psidium littorale Raddi		X
Syzygium cumini (L.) Skeels	Java plum	X
Oxalidaceae		
Oxalis corniculata L.	yellow wood-sorrel	X

SCIENTIFIC NAME	COMMON NAME	STATUS
Passifloraceae		
Passiflora edulis Sims	liliko'i	X
Passiflora foetida L.	love-in-a-mist	X
Passiflora suberosa L.		X
Passiflora subpeltata Ortega	white passionflower	X
Pittosporaceae		
Pittosporum sp.		X
Portulacaceae		
Portulaca oleracea L.	ornamental purslane	X
Proteaceae		
Grevillea robusta A. Cunn. ex R. Br.	silk-oak	X
Macadamia integrifolia Maiden & Betche	macadamia	X
Rosaceae		
Osteomeles anthyllidifolia (Sm.) Lindl.	u'ulei	I
Rubiaceae		
Canthium odoratum (G. Forst.) Seem	alahe'e	E
Paederia foetida scandens (Lour.) Merr.	maile pilau	X
Richardia brasiliensis Gomes		X
Spermacoce assurgens Ruiz & Pavon	borreria	X

SCIENTIFIC NAME	COMMON NAME	STATUS
Rutaceae		
Citrus sp.	citrus	X
Sterculiaceae		
Waltheria indica L. var. *americana* (L.) R. Br. ex Hosaka	'uhaloa, hi'aloa	I?
Thymelaeaceae		
Wikstroemia oahuensis (A. Gray) Rock	'akia	E
Umbelliferae		
Centella asiatica (L.) Urban	asiatic pennywort	X
Verbenaceae		
Lantana camara L.	lantana	X
Stachytarpheta dichotoma (Ruiz & Pavon) Vahl	stachytarpheta	X
Stachytarpheta jamaicensis (L.) Vahl	stachytarpheta	X
Stachytarpheta urticifolia (Salisb.) Sims	stachytarpheta	X

APPENDIX B

Archaeological Reconnaissance Survey For The Proposed Wailuna Subdivision Waiau, Ewa District, O'ahu

by

Bishop Museum

December 1987

MS. 120887

ARCHAEOLOGICAL RECONNAISSANCE SURVEY FOR THE PROPOSED EXPANSION OF WAILUNA SUBDIVISION WAIAU, EWA DISTRICT, O'AHU ISLAND

Prepared by
Jeff Yamauchi

Prepared for
Environmental Communications Inc.

December 1987

PUBLIC ARCHAEOLOGY SECTION
Applied Research Group
Bishop Museum
Honolulu, Hawai'i

INTRODUCTION

Under contract to Environmental Communications Inc., an archaeological reconnaissance survey was performed by the Applied Research Group, Bishop Museum. The project area encompasses approximately twenty-six acres located in Waiau, Ewa, Oahu (TMK: 9-8-02:por. 3; Fig. 1). Field work was conducted by the author and Carol Kawachi on November 4 and 5, 1987. The cooperation of Ms. Mary Rush and Ms. Sharon James, of the Lusk Company, the land developer, is appreciated. I would like to thank the following for their assistance: Joyce Bath and Agnes Griffin of the Department of Land and Natural Resources, Charles Okino of the State Survey Office, Kapu Smith and Jim Wriston of Bishop Estate.

SCOPE OF WORK

The purpose of a reconnaissance survey is to determine the presence or absence and general nature of archaeological resources within a specified area. Systematic surface survey, limited subsurface testing, and literature search are major tasks undertaken to meet these objectives.

ENVIRONMENTAL SETTING

The project area is located on the lower portion of the ridge that comprises the southern boundary of Waiau Valley. An erosional gully, traverses along the middle of the project area. Elevations range from 162 to 229 meters (530 to 750 feet), and rainfall averages 125 centimeters (49.4 inches) per year, mostly occurring in the winter months (D.L.N.R. 1982).

Classified in the low-humic latosols type, the soil of the area is characterized as being deep and well drained with absence of pronounced horizonation of soils and deficient in organic matter (Sahara 1972:2). Most of the sugar cane and pineapple crops grown in O'ahu are on this soil type (Ibid.).

Vegetation varies quite dramatically within the project area. A narrow strip of large eucalyptus trees (Eucalyptus sp.) and intermittent patches of

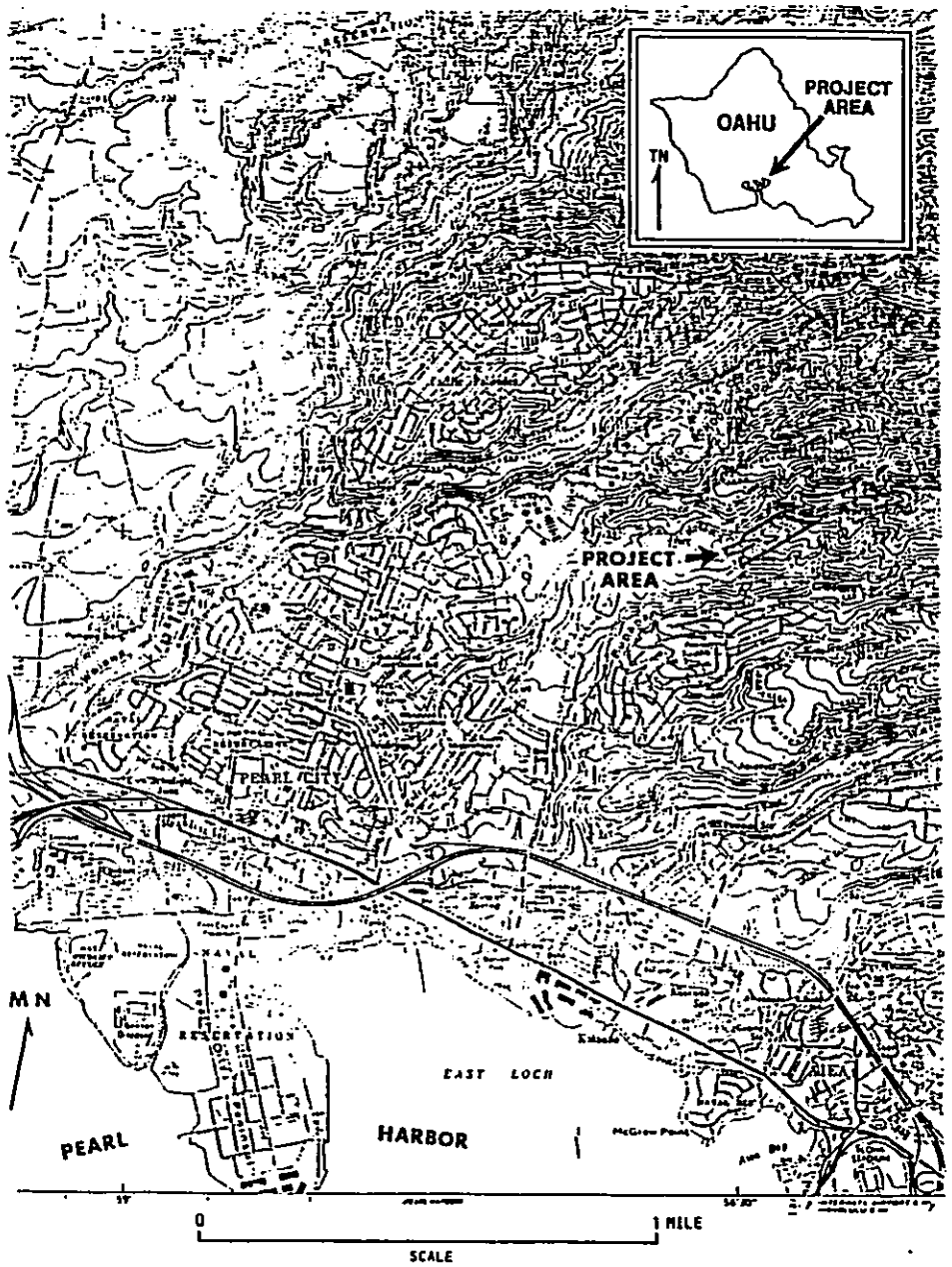

FIG. 1 MAP SHOWING PROJECT AREA, WAIAU, EWA, O'AHU

lantana (Lantana camara) parallels the northwest side of the Kaahumanu Street extension. Ground surface visibility is quite good.

The vegetation on the southeast side of the Kaahumanu Street extension is denser and more varied. Very dense thickets of lantana, Desmodium sp. and other exotic grasses fringe the street. In the interior is a canopy of Christmas berry (Schinus terebinthifolius), macadamia nut (Macadamia integrifolia), java plum (Eugenia cuminii), and guava (Psidium guajava). This large canopy blocks most of the sunlight, keeping the ground surface clear of most other plants. Throughout the interior are persistent pockets of very thick lantana that make the area nearly inaccessible and hamper visibility. In other areas ground surface visibility is clear enough to see low-lying archaeological features.

The gully floor is dominated by Christmas berry and common sword fern (Nephrolepis exaltata). The southeast side of the gully rises back again to the ridge where thick waist-high grasses grow (Fig. 2). Ranging about 20 to 80 meters from the dirt road that makes the southeast boundary of the project area, there are thick stands of strawberry guava (Psidium cattleianum), lantana, java plum, Christmas berry, and two small groves of young koa (Acacia koa). In this section, ground surface visibility is poor and low-lying features may have been missed, although that possibility appears remote in view of the lack of archaeological features in surrounding areas.

Just outside the project area, northwest of the reservoir tank, mountain naupaka (Scaevola gaudichaudiana). 'Ōhi'a lehua (Metrosideros collina), pukiawe (Styphelia tameiameiae), and koa, the most intact remnants of native flora, is found on the steep slope.

Three domesticated horses roam the project area and numerous pig trails were seen. Many exotic species of birds occupy the area.

HISTORICAL SETTING

In 1899, Honolulu Plantation Company began operation (Best 1973: 313). The property consisted of about 9,000 acres and its upper limits were at the 198 meter (650 feet) contour level (Evening Bulletin, Industrial Edition 1901:5; Fig. 3). From a period of 1906 to 1914, Honolulu Plantation Company

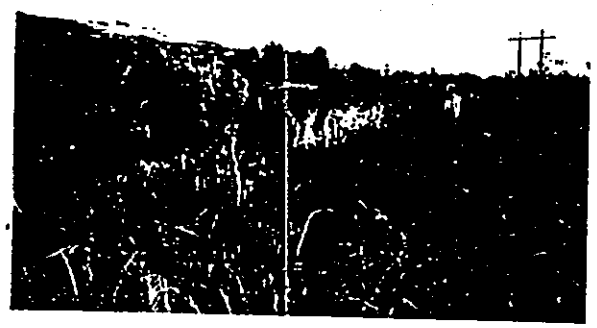

FIG. 2 VIEW OF CONTRASTING VEGETATION IN PROJECT AREA, LOOKING EAST. (BN neg. no. Oa(a) 363-15).

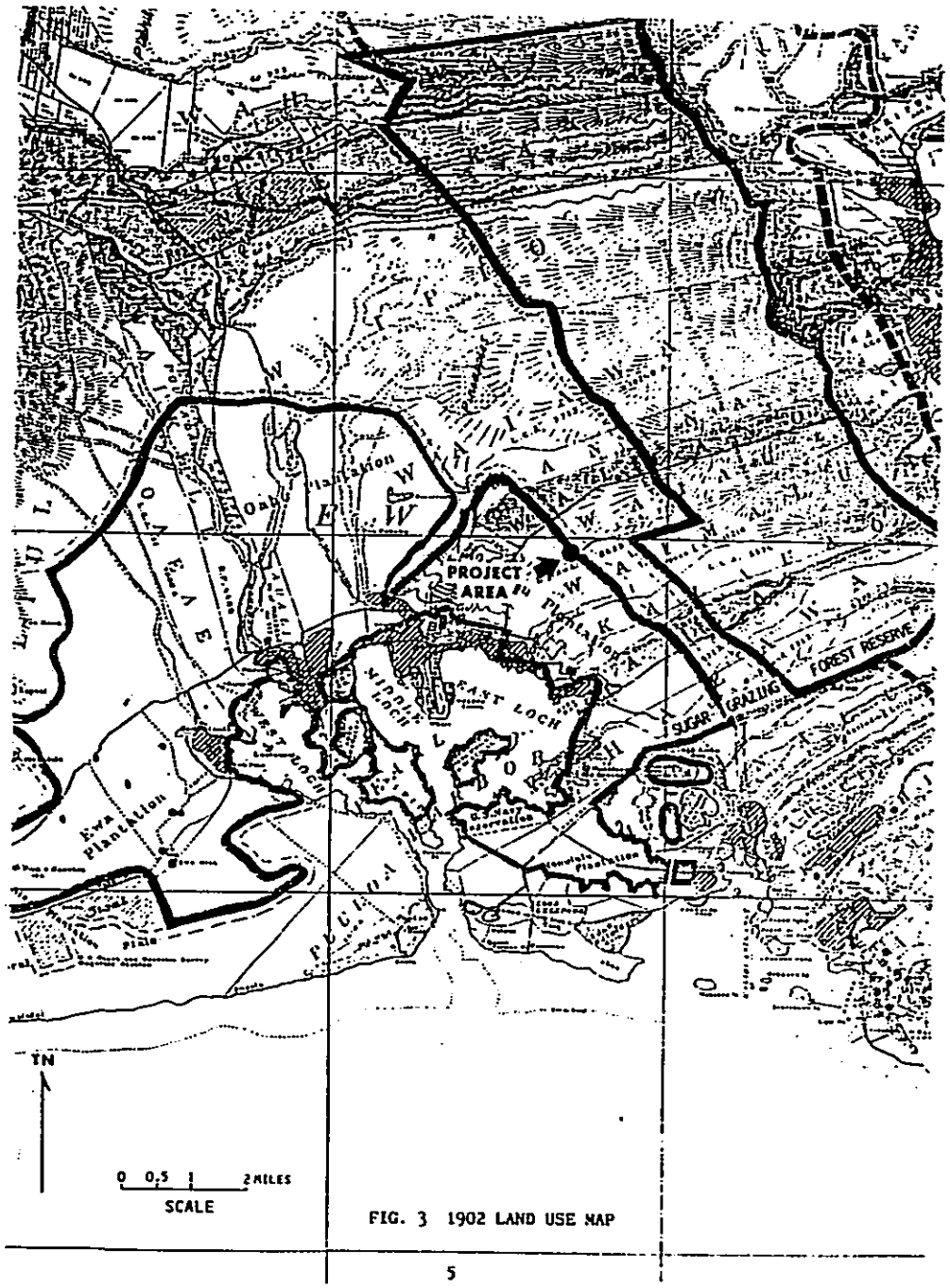

FIG. 3 1902 LAND USE MAP

harvested an average of about 19,000 tons per year (Directory 1914:26). Oahu Sugar Company eventually took control in 1947 (Best 1973:313).

PREVIOUS ARCHAEOLOGICAL WORK

The literature search produced no previous archaeological work conducted in Waiau. The nearest area where previous work took place was in the next ahupua'a (major land division) to the southeast, Waimalu (pers. comm. Joyce Bath, Hawaii State archaeologist). A rockshelter (State No. 80-09-1169), located on the southern slope of Waimalu gulch at an elevation of 61 meters (200 feet) was excavated by Dr. Everett Frost in 1976. As of yet, there is no written report.

Handy and Handy discuss in general terms the Ewa district, noting the area's agriculture, legends, abundance of productivity in Pearl Harbor, and as an established place of political power (Handy 1972:469-473).

SURVEY METHODOLOGY

The project area is bounded by the Kaahumanu Street extension to the northwest, a dirt road to the southeast, a paved road to the northeast, and a metal gate to the southwest (Fig. 4). The Kaahumanu Street extension was used as the base line for the present survey. A total of 33 walk-through transects, placed about 20 meters apart were conducted. The transects were oriented at an angle of 134/314 degrees (magnetic) north, basically perpendicular to the street.

All field and lab notes, drawings, and photographs are on file in the Department of Anthropology, Bishop Museum.

SURVEY RESULTS

Extensive prior disturbance, mainly bulldozer activity is indicated. Several bulldozer backdirt mounds, cuts and tracks were observed throughout the project area. Also, the area is conspicuously devoid of rocks. The few

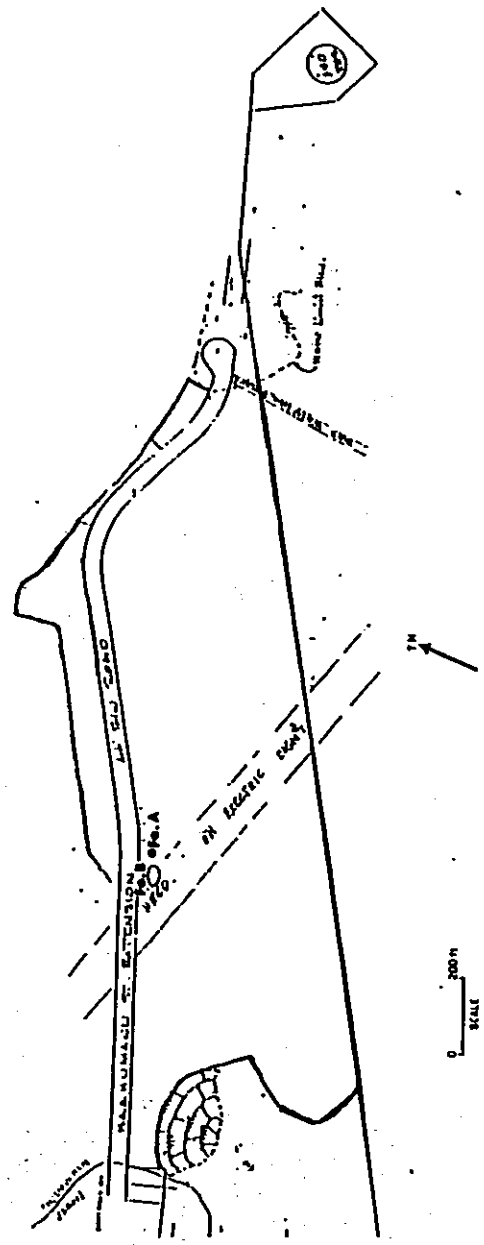

FIG. 4 MAP OF PROJECT AREA SHOWING LOCATIONS OF FEATURES A AND B

that are present are either on the bulldozer mounds, along with modern trash, or exposed through erosion on the slopes of the gully. The secondary growth of lantana and Christmas berry found throughout the project area is another indicator of recent disturbance. Moreover, large macadamia nut trees planted in rows indicate an orchard was present at one time.

One recent feature has been found near a banyan tree (Ficus sp.) about 244 meters northeast of the metal gate and 15 meters southeast of the Kaahumanu Street extension. It appears to be a cement cistern sunken in the ground (Feature A). It measures 3.5 meters in diameter and the concrete roof extends 30 centimeters above the ground surface (Fig. 5). There is a small rectangular hole near the center and the inside depth of the feature is about 3.0 meters., Rusted corrugated iron sheets and various lengths of lumber were found on and around the feature suggesting that there was a structure on top of the cistern. The condition of the feature is fair.

About 18 meters southwest of the cistern, near a small stand of eucalyptus trees, is another feature, a collapsed wooden structure (Feature B). It measures about 13 X 9 meters, oriented on an east-west axis. Due to deterioration and bulldozer activity, it is difficult to determine its exact dimensions. One-gallon jugs, window glass, pieces of stoneware, bits of concrete, fragments of bottle glass, rubber hoses, and a small metal wash tub are in and around the feature. On the southeast side of the collapsed wooden structure, two parallel alignments (3.0 X 0.5 m) of three rectangular boulders each, may have been used as foundations for wooden posts to support a porch. The alignments run in a northwest-southeast axis and the boulders appear to be hewn (Fig. 6). Two shovel pits were dug near the alignments to a depth of about 25 centimeters below ground surface. Only a thick layer of dark red silty-clay matrix, characteristic of the low-humic latosols was encountered. The condition of this feature is very poor.

The spatial relationship, type, and construction of these features indicate that the two structures were associated and probably share common modern origins (see Appendix A).

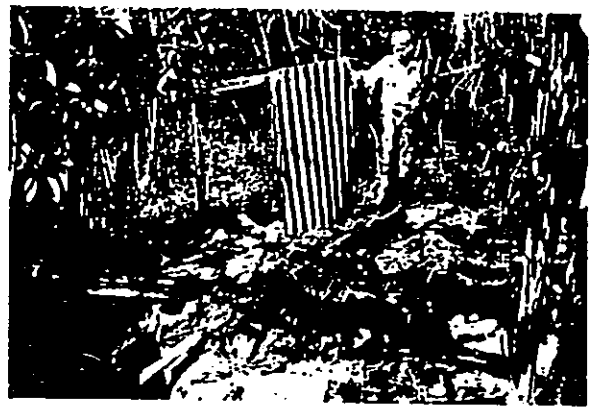

FIG. 5 FEATURE A (CISTERN), LOOKING NORTHWEST. (BM neg. no. Oa(a) 363-3).

Fig. 6. RECTANGULAR HOLE BOULDER IN FEATURE B
(BPBM Neg. No. [illegible])

DISCUSSION

The historic documents researched indicate that the project area was in heavy commercial sugar production. Sugar was cultivated as late as 1947. Sugar cultivation practices like the removal of rocks and the use of Fowler steam plows that cut through the soil to a depth of 91 centimeters (36 inches) accounts for much of the man-made disturbances in the project area (Evening Bulletin, Industrial Edition 1901:5). More recent disturbances probably occurred with the macadamia nut orchard after commercial sugar production.

SIGNIFANCE AND RECOMMENDATIONS

Since the only features encountered were recent and no other remains of archaeological significance were encountered, no further archaeological work is recommended for the project area.

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APPENDIX

BISHOP MUSEUM SURVEY RECORD
Project No. 384

ISLAND : Oahu
DISTRICT: Ewa
AHUPUA'A: Waiau
TMK: 9-8-07: por 3
UTM (N): UTM (E): LATITUDE (N): LONGITUDE (W):
BPBM SITE NO.
STATE NO.
TEMP. NO. 1 FSA

Owner: Bishop Estate Address:

Present Occupant/Use: Not in use

Possibility of destruction: yes

Geomorphic setting: slope gully low ridge prominent ridge overhang floodplain levee other
Soil: rocky sandy silty clayey
Immediate water source: yes no Type: stream spring

Major Vegetation: koa F, hala F, christmas berry F, banyan I ('Kamani' on developer's map) F, verbena F, strawberry guava F, java plum F, Desmodium sp. F
(D=dominant A=abundant F=frequent O=occasional R=rare I=isolate)

Observed fauna: –

Additional information: 15 m SE of present road. Bulldozer cut linear mounds ~3m NW of feature. "Kamani" tree S of feature

Functional interpretation: possible old water tank/cesspool built sunk in ground

Estimated Age: Prehistoric: 5th-14th C. 14th-18th C. undetermined
Historic: 19th C. X 20th C.

Pre-Field Literature Search: yes X no required
Mapped: no X sketch instrument

Photos: X yes no
slides Roll 1 Frame 8,9

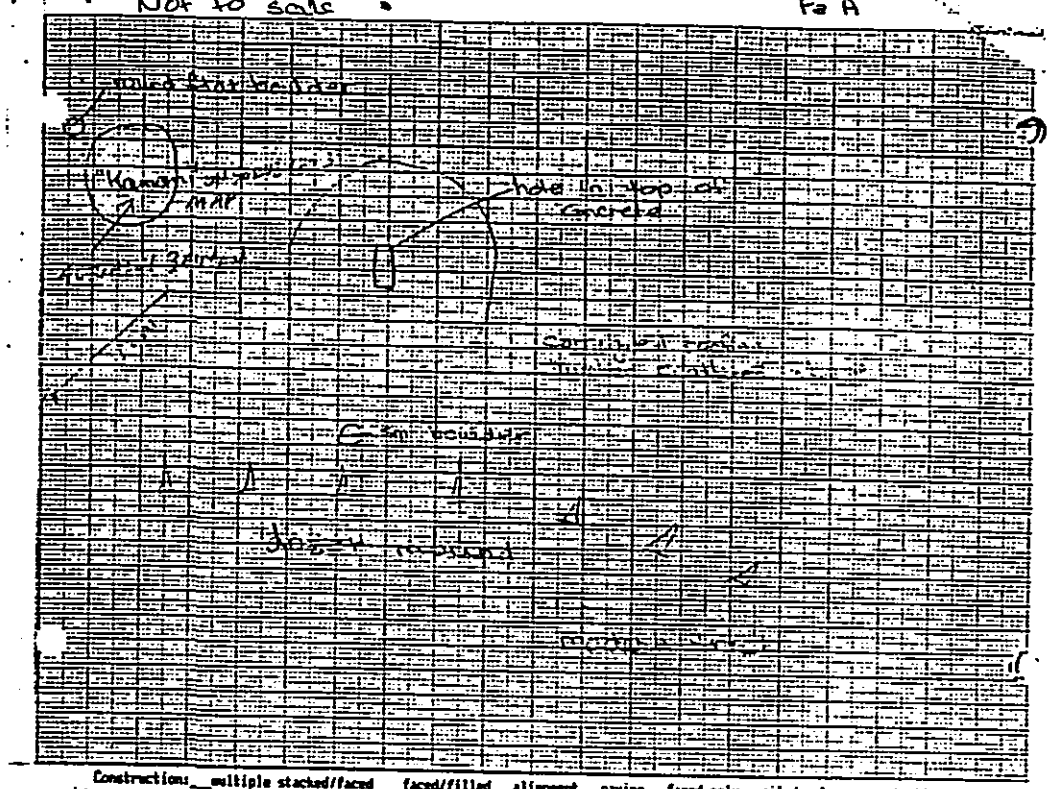
Recorded by: Yamanoshi / Kawachi Date: 4 XI 87

Initial Significance Assessment:
1/ A Criterion A specifies association with events or broad patterns important in the history of an area.
— B Criterion B reflects association with persons important in the history of an area.
— C Criterion C applies to sites that reflect architectural achievements.
— D Specifies that the site has yielded or has the potential to yield information significant for our understanding of traditional culture, history, prehistory, and/or foreign influences on traditional culture and history.
— E Criterion E, currently in draft status, applies to sites perceived by the contemporary community as having traditional cultural value.

Data Recovery Recommendations: ?
record map test excavate monitor

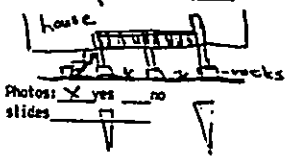
Reviewed and Concurred:
SHPO Date

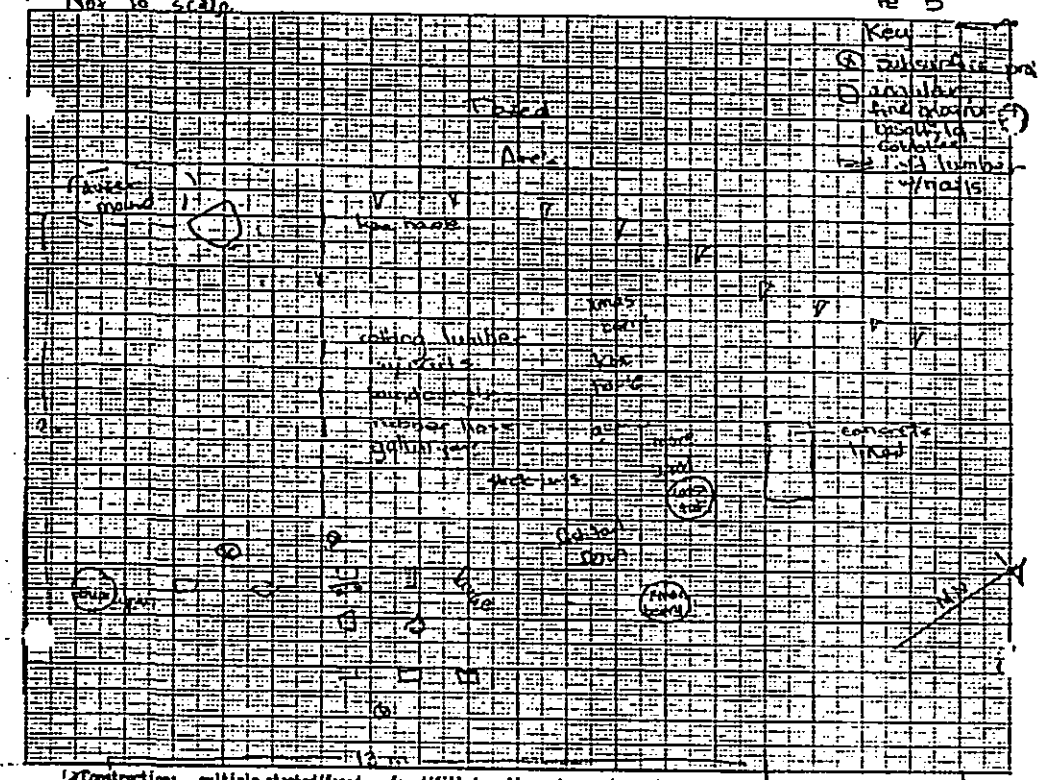
Not to scale



Construction: multiple stacked/faced faced/filled alignment paving faced only piled low concentration
Materials: coral waterworn basalt angular basalt saprolitic basalt cement other
Exterior Dimensions: L 3.5 m W 3.5 m Th Dia. Ht. (outside) 0.3 (OUTSIDE)
Orientation (long axis): N NW W SW S SE E NE
Deposit: none surface scatter depth exposed profile ~3m (INSIDE)
Midden: gastropods bivalves bone kukui charcoal ash fire cracked rock other
(A=abundant F=frequent O=occasional R=rare I=isolate)
Artifacts: tools debitage fabricators waterports (B=basalt C=coral V=volcanic glass)
Historic glass: complete bottles fragments ceramics metal

Top is rounded concrete. Rusted corrugated iron, lumber infer perhaps there had been a structure over it. Inside is concrete lined. On E side, a hole with pipe remains is observed. Also there appears to be a shallow gully which runs into the structure: the concrete is open there. It is difficult to say whether the hole was deliberate or not.





BISHOP MUSEUM SURVEY RECORD

Project No. 384

ISLAND: Oahu
DISTRICT: Ewa
AHUPUA'A: [illegible]
'ILI: ____

TMK: 9-3-02: por 3
UTM (N): ____ LATITUDE (N): ____
UTM (E): ____ LONGITUDE (W): ____

BPBM SITE NO. ____
STATE NO. ____
TEMP. NO. 1

Fe 3

Owner: Bishop Estate Address: ____

Present Occupant/User: Not in use

Possibility of destruction: yes. housing development to go in

Geomorphic setting: __slope __gully __low ridge ✓ prominent ridge __overhang __floodplain __levee __other
Soil: __rocky _sandy __silty ✓ clayey
Immediate water source: __yes X no Type: __stream __spring

Major Vegetation: Christmas berry (D), koa haole (D), verbena (F), laua'e fern (F), strawberry guava (R), [illegible] (A), lantana (R), macadamia nut (I), Eucalyptus downslope SSE
(D=dominant A=abundant F=frequent O=occassional R=rare I=isolate)

Observed fauna: mynah, cardinals

Additional information: Some gallon jars (see back) window glass, bits of concrete ceramic in addition to lots of wooden debris. Lg eucalyptus to SW. Located on top of ridge, slopes down sharply to gully below on SE.

Functional Interpretation: possible house site. In debris behind (upslope-N) sketched, wooden debris appear to be remains of an old porch wall. stones may have been for foundation posts for porch once attached to a house.

— m from road

Estimated Age: Prehistoric: ____5th-14th C. ____14th-18th C. ____undetermined
Historic: ___19th C. X 20th C.
Pre-field Literature Search: ____yes X no ____required
Mapped: X no X sketch __instrument

Photos: X yes __no
slides____

Recorded by: Uyemauchi/Kowachi Date: 4 XI 37

Initial Significance Assessment:
✓ A Criterion A specifies association with events or broad patterns important in the history of an area.
__ B Criterion B reflects association with pesons important in the history of an area.
__ C Criterion C applies to sites that reflect architectural achievements.
__ D Specifies that the site has yielded or has the potential to yield information significant for our understanding of traditional culture, history, prehistory, and/or foreign influences on traditional culture and history.
__ E Criterion E, currently in draft states, applies to sites perceived by the contemporary community as having traditional cultural value.

ACD

Data Recovery Recommendation: Ø
____record ____map ____test ____excavate ____monitor

Reviewed and Concurred:
SHPO____________ Date____________

Page 2
Fe 3

Not to scale

✓ Construction: __multiple stacked/faced __faced/filled __alignment __paving __faced only __piled __low concentration
Materials: __coral __waterworn basalt ✓ angular basalt __saprolitic basalt __cement __other____
Exterior Dimensions: L 13 m W 4 m Th ____ Dia. ____ Ht. (outside) ____
Orientation (long axis): __N __NW __W X SW __S __SE __E X NE
Deposit: __none __surface scatter ____depth __exposed profile
Midden: __gastropods __bivalves __bone __kukui __charcoal __ash __fire cracked rock ____other
(A=abundant F=frequent O=occassional R=rare I=isolate)
Artifacts: __tools __debitage __fabricators __manuports (B=basalt C=coral VG=volcanic glass)
Historic glass: X complete bottles __fragments __ceramics __metal CERAMICS, LUMBER, NAILS, WINDOW GLASS, RUBBER HOSE, GALLON JUGS, WASH TUB

dark brown gallon Ourajhi

APPENDIX C

Traffic Impact Study
Wailuna IV
Waiau, Oahu, Hawaii

by

Parsons Brinckerhoff Quade & Douglas, Inc.

November 1987

TRAFFIC IMPACT STUDY

WAILUNA IV

Waiau, Oahu, Hawaii

Prepared for:

THE LUSK COMPANY

Prepared by:

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

November 1987

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WAILUNA IV

INTRODUCTION

The Lusk Company proposes to develop Wailuna IV for residential uses in Waiau, Oahu. Wailuna IV would provide 180 single-family dwelling units. The purpose of this study is to identify the expected traffic impact of this proposed project.

The study examined existing traffic conditions at the three signalized Kaahumanu Street intersections during the morning (AM) and afternoon (PM) peak hours. Future traffic volumes without and with the proposed project were estimated and traffic conditions were evaluated. The effect of the proposed project's traffic generation on regional traffic volumes was also identified.

EXISTING CONDITIONS

The project site, shown in Figure 1, has no existing public access. In the future, the site would be served by the mauka extension of Kaahumanu Street. The first two increments of the Wailuna project, containing 328 apartment units and 127 single-family units, have been completed and are occupied. Currently, the third increment with 170 single-family units is under construction.

Roadway System

Kaahumanu Street, a collector road, runs between the existing Wailuna development and Blaisdell Park at Kamehameha Highway. For most of its length, the Kaahumanu Street right-of-way is 80 feet, which allows two travel lanes in each direction with a parking lane and a sidewalk on each side. This road has three signalized intersections: at Komo Mai Drive, at Moanalua Road, and at Kamehameha Highway; all the signals are demand-actuated. Separate turn lanes at intersections are provided by limiting on-street parking at approaches.

Komo Mai Drive links the Pearl City and Newtown communities. At this intersection, the Kaahumanu Street maukabound approach is striped with an optional left turn lane and a separate right turn lane; the makaibound approach has a similar configuration, except that the right turn lane results from the lack of parked vehicles alongside the fire station instead of pavement striping. The Komo Mai Drive kokoheadbound approach designates a separate right turn lane, while the ewabound approach has a separate left turn lane.

Moanalua Road services many residential units and commercial uses along the corridor connecting Pearl City with Aiea town. Within the local communities, Moanalua Road also provides an alternative route to the regional H-1 and Moanalua Freeways and Kamehameha Highway. At Moanalua Road, the Kaahumanu Street maukabound approach allows separate left and right turn lanes with two through lanes. The makaibound approach designates a single lane for each left, through, and right turn movement. In this area, Moanalua

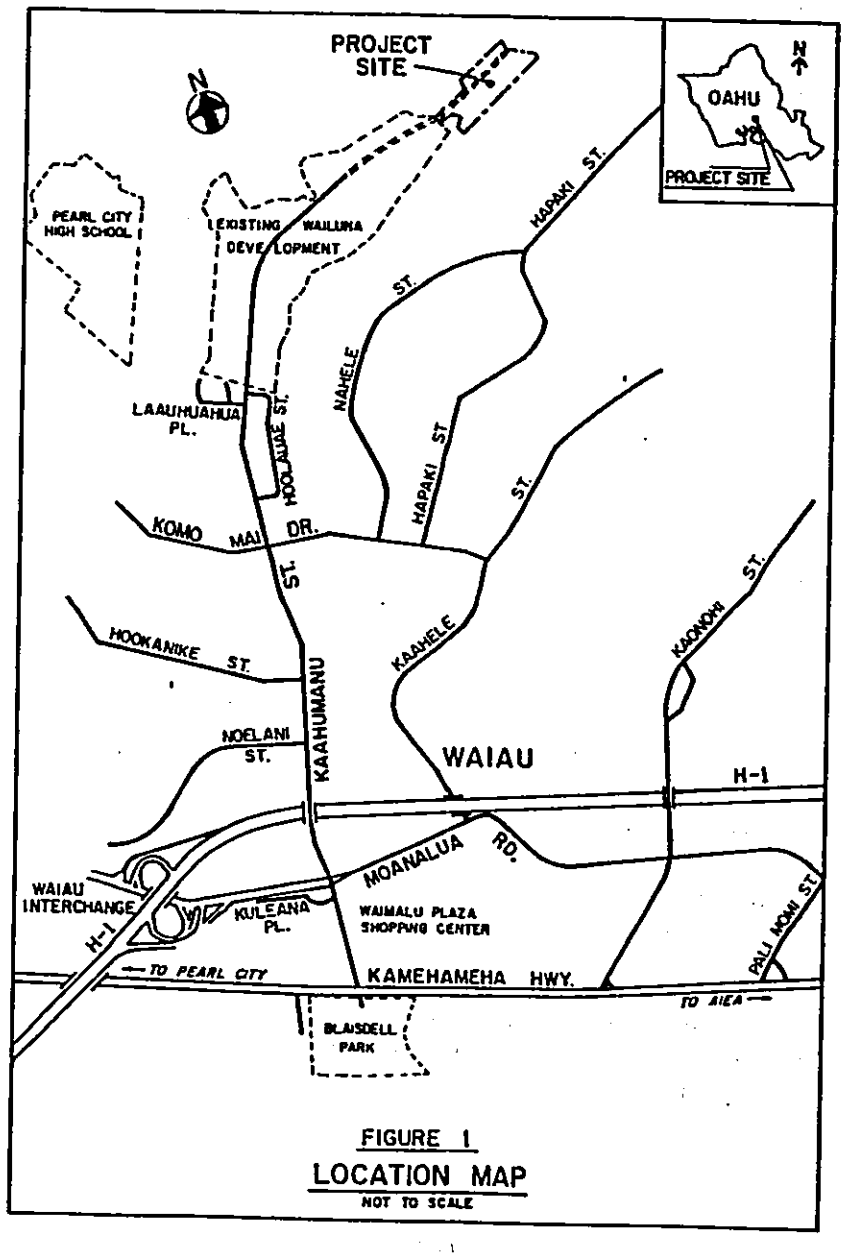


FIGURE 1
LOCATION MAP
NOT TO SCALE

Road provides two travel lanes in each direction; separate left turn storage bays are striped at the Kaahumanu Street intersection. During the AM peak period, the left eastbound lane on Moanalua Road, ewa of Kaahumanu Street, becomes a storage bay for the queue of motorists desiring to turn left to enter the H-1 freeway loop on-ramp, kokoheadbound, at Waiau Interchange.

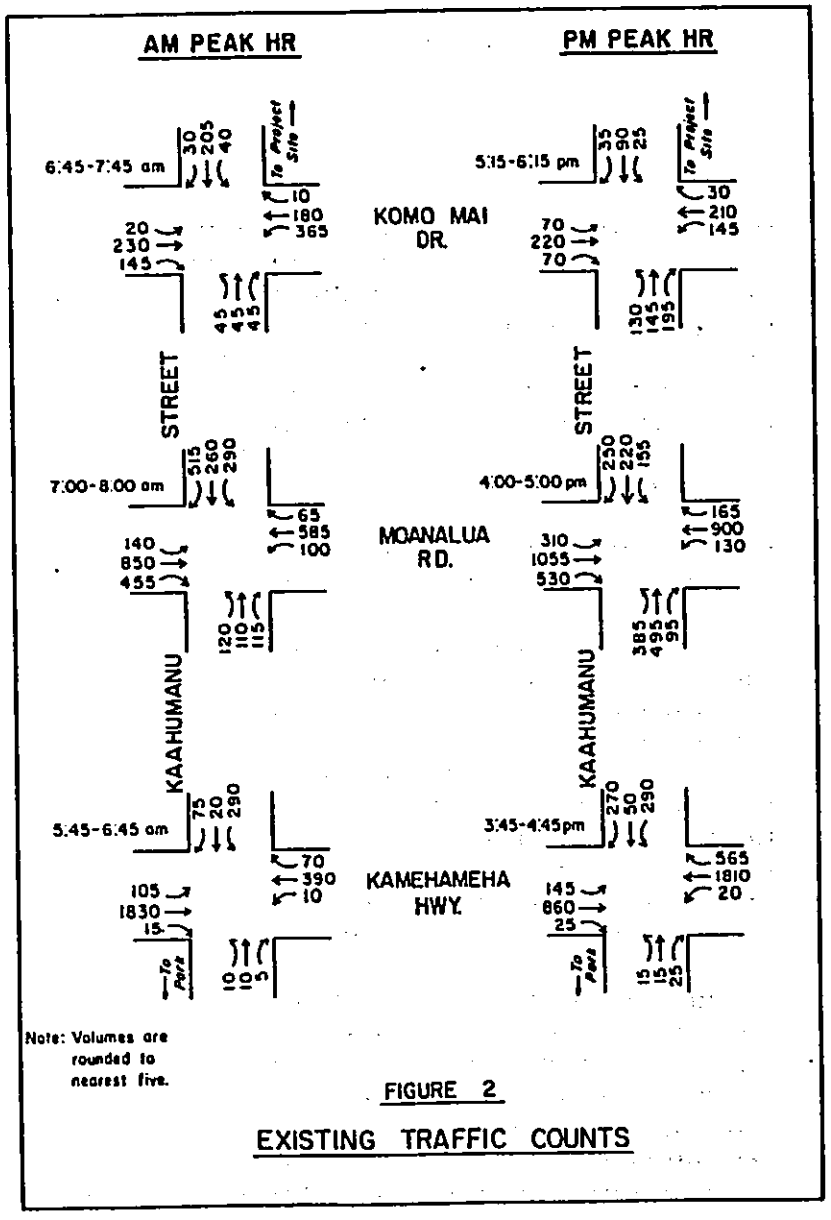
Kamehameha Highway is a primary arterial supplementing the H-1 freeway. East-west commuter flows are highly evident during the AM and PM periods. The neighboring commercial uses along this highway also contribute to the traffic flows, especially to the turning movement volumes at the intersections. The makai leg of the Kamehameha Highway intersection with Kaahumanu Street is the only vehicular access for the Blaisdell Park; the park access has single approach and departure lanes. The makaibound Kaahumanu Streeet approach designates a separate left turn, a through-left turn option and a channelized right turn lane. In this vicinity, Kamehameha Highway has three travel lanes in each direction. Double left turn lanes are provided at the kokoheadbound approach and a single left turn lane has been striped for the eastbound approach. A bus stop exists on the near side of each Kamehameha Highway approach.

Existing Traffic Conditions

Manual traffic counts and observations taken during the latter part of October 1987 serve as the basis of this discussion on the existing traffic conditions. Figure 2 presents the existing traffic volumes from the manual counts. The AM and PM peak hour differed with each intersection; the roadways that carry regional traffic tended to have its peak hour at an earlier time than roadways serving mostly local traffic.

The signalized intersections were analyzed by the operational methodology described in the 1985 Highway Capacity Manual[1]. The results of the analysis are given in Table 1. Levels of Service are defined in the appendix.

The two-phase traffic signal at the intersection of Komo Mai Drive and Kaahumanu Street is highly responsive to the traffic demand, as indicated by the high Level of Service A during both AM and PM peak hours.



Note: Volumes are rounded to nearest five.

FIGURE 2

EXISTING TRAFFIC COUNTS

Table 1

EXISTING TRAFFIC ANALYSIS

	AM Peak Hour		PM Peak Hour	
	v/c	LOS	v/c	LOS
Komo Mai Drive/Kaahumanu Street				
Kokoheadbound	0.28	A	0.47	A
Ewabound	0.22	A	0.39	A
Maukabound	0.20	A	0.29	A
Makaibound	0.55	B	0.23	A
Overall Intersection	—	A	—	A
Moanalua Road/Kaahumanu Street				
Kokoheadbound				
Left	0.43	E	0.73	E
Through-Right	0.74	D	0.79	D
Ewabound				
Left	0.30	D	0.30	D
Through-Right	0.58	D	0.81	D
Maukabound				
Left	0.29	D	0.81	E
Through-Right	0.14	D	0.52	D
Makaibound				
Left	0.68	E	0.32	D
Through-Right	0.64	D	0.45	D
Overall Intersection	—	D	—	D
Kamehameha Highway/Kaahumanu Street				
Kokoheadbound				
Left	0.18	D	0.31	D
Through-Right	0.92	C	0.38	A
Ewabound				
Left	0.03	D	0.08	D
Through-Right	0.24	B	1.04	D
Maukabound	0.05	C	0.13	C
Makaibound	0.30	C	0.44	C
Overall Intersection	—	C	—	C

Abbreviations:
v/c - volume-to-capacity ratio
LOS - Level of Service

At the Moanalua Road intersection with Kaahumanu Street, the traffic signal provides a protected phase (separate from the opposing through movement) for the left turn movements. The results of the analysis show Level of Service E for left turns from the kokoheadbound, maukabound and makaibound approaches, indicating that these movements incur long delays. Field observations note that the delays are due to the long signal cycle lengths and that the left turn movements receive adequate green time, as confirmed by the volume-to-capacity ratios which are less than 1.00.

The Level of Service D condition reported for the Moanalua Road intersection (overall) is generally reflective of actual operating conditions at this intersection; waiting vehicles tended to clear during the next green phase. However, during the AM peak hour, the maukabound left turn and the makaibound right turn movements were impeded by the queue of vehicles in the Moanalua Road left ewabound lane desiring to enter the H-1 freeway kokoheadbound on-ramp at Waiau Interchange. The number of vehicles that could enter the left ewabound lane is constrained as the queue from the on-ramp backs up to the Kaahumanu Street intersection. The length of the queue affects travel patterns and alternative routes, such as Moanalua Road and Kamehameha Highway, provide some relief. The counts support the observation that Moanalua Road serves local and regional traffic needs as large traffic volumes were nearly equal among the intersection approaches.

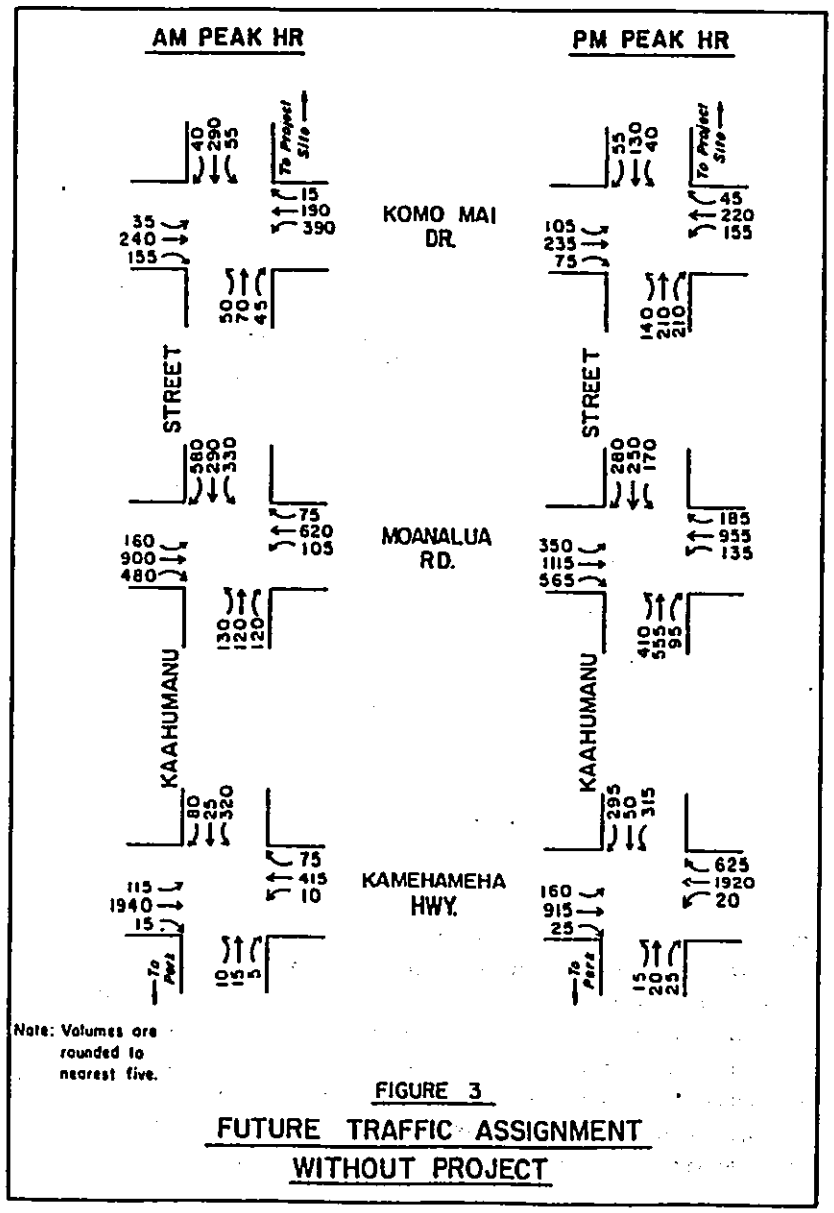
At the Kamehameha Highway/Kaahumanu Street intersection, Kamehameha Highway left turns have leading protected phases, while all vehicles from the Kaahumanu Street and Blaisdell Park approaches must execute their movements in the same signal phase. For this intersection, the analysis tends to result in levels of service that were higher than observed for the through traffic on Kamehameha Highway. The traffic signals along Kamehameha Highway are not coordinated, which contributes to the poor progression along this corridor. As a result, many of the platoons from downstream intersections are caught by the red phase at this intersection, while portions of the green phase remain underutilized.

FUTURE CONDITIONS WITHOUT THE PROJECT

Future conditions refer to the year 1993, when Wailuna IV is projected to be completed and occupied. Traffic volumes were increased by six percent and the traffic from the Wailuna third increment was also included. The future traffic assignment is given in Figure 3 and represents future conditions without the project. The results of the analysis are reported in Table 2.

The analysis of future conditions indicate that the service level would drop to Level of Service E for the ewabound approach left turn at the Moanalua Road/Kaahumanu Street intersection in the AM peak hour and for the ewabound through-right turns at Kamehameha Highway/Kaahumanu Street intersection during the PM peak hour. Volume-to-capacity ratios would increase; however, the Levels of Service for the other movements and the overall intersection would remain the same.

The poor levels of service and relatively low volume-to-capacity ratios suggest that signal timing adjustments and coordination of the many traffic signals in the area could decrease delays and improve traffic flow. An evaluation of signal system operation may be necessary to determine which adjustments would result in improved operations.



Note: Volumes are rounded to nearest five.

FIGURE 3

FUTURE TRAFFIC ASSIGNMENT
WITHOUT PROJECT

Table 2

FUTURE CONDITIONS WITHOUT THE PROJECT
ANALYSIS SUMMARY

	AM Peak Hour		PM Peak Hour	
	v/c	LOS	v/c	LOS
Komo Mai Drive/Kaahumanu Street				
Kokoheadbound	0.33	A	0.52	A
Ewabound	0.24	A	0.42	A
Haukabound	0.22	A	0.39	A
Makaibound	0.65	B	0.36	A
Overall Intersection	—	A	—	A
Moanalua Road/Kaahumanu Street				
Kokoheadbound				
Left	0.49	E	0.82	E
Through-Right	0.79	D	0.84	D
Ewabound				
Left	0.32	E	0.32	D
Through-Right	0.62	D	0.87	D
Haukabound				
Left	0.30	D	0.86	E
Through-Right	0.16	D	0.59	D
Makaibound				
Left	0.77	E	0.36	D
Through-Right	0.72	D	0.50	D
Overall Intersection	—	D	—	D
Kamehameha Highway/Kaahumanu Street				
Kokoheadbound				
Left	0.20	D	0.34	D
Through-Right	0.98	C	0.40	A
Ewabound				
Left	0.03	D	0.08	D
Through-Right	0.25	B	1.12	E
Haukabound	0.06	C	0.14	C
Makaibound	0.37	C	0.46	C
Overall Intersection	—	C	—	D

Abbreviations:
v/c - volume-to-capacity ratio
LOS - Level of Service

PROJECT TRAFFIC IMPACTS

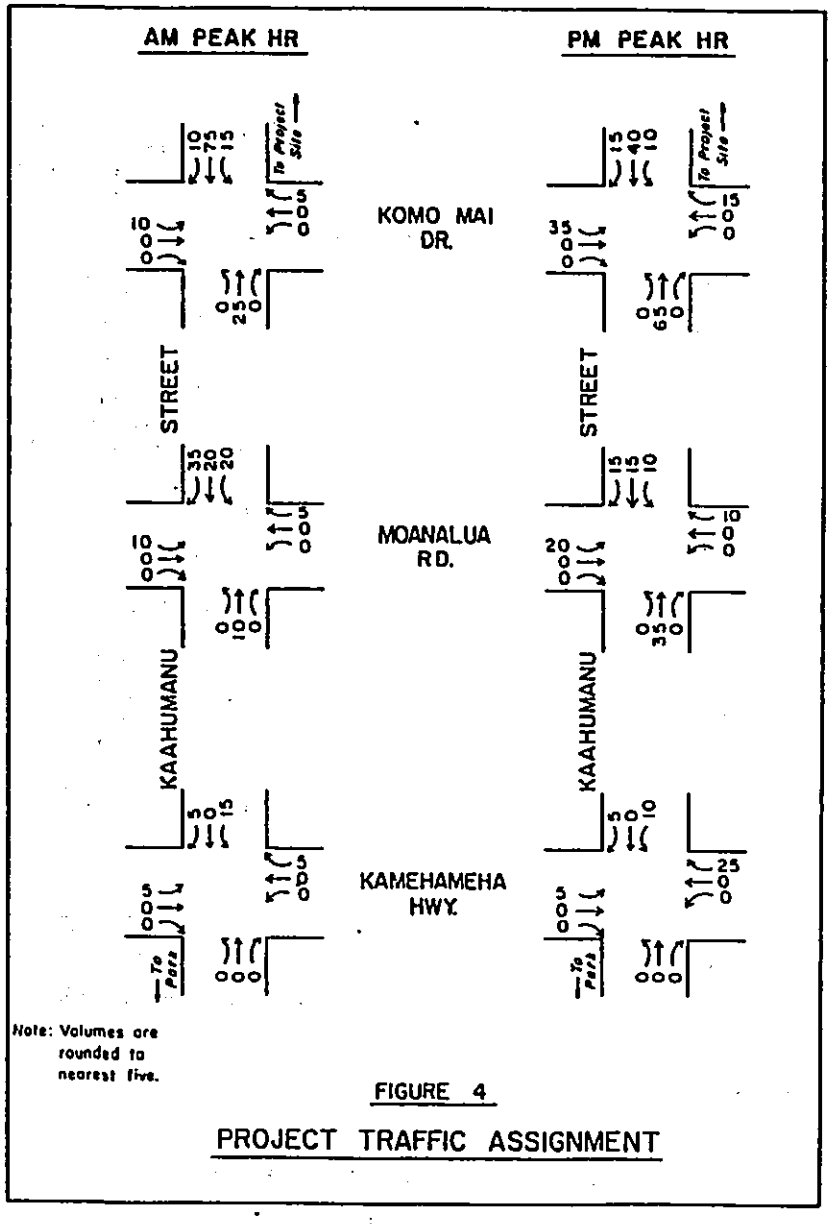
The number of vehicles expected to be generated by the 180 single-family dwelling unit project are based on rates compiled by the Institute of Transportation Engineers[2]. The trip rates and the project vehicular generation is given in Table 3. The study assumed the Wailuna IV traffic would have similar travel patterns to the existing development. The existing turn volumes at the intersections were utilized as indicators of direction and distribution of travel; these volumes also take into account the circuitous and alternative routing to the regional system that exists in this area. The project traffic assignment is shown in Figure 4.

Table 3

TRIP GENERATION

	Rates	Vehicles
Daily	10.0	1,800 vpd
AM Peak Hour		
Enter	0.21	38 vph
Exit	0.55	99 vph
PM Peak Hour		
Enter	0.63	113 vph
Exit	0.37	67 vph

Abbreviations:
vpd - vehicles per day
vph - vehicles per hour

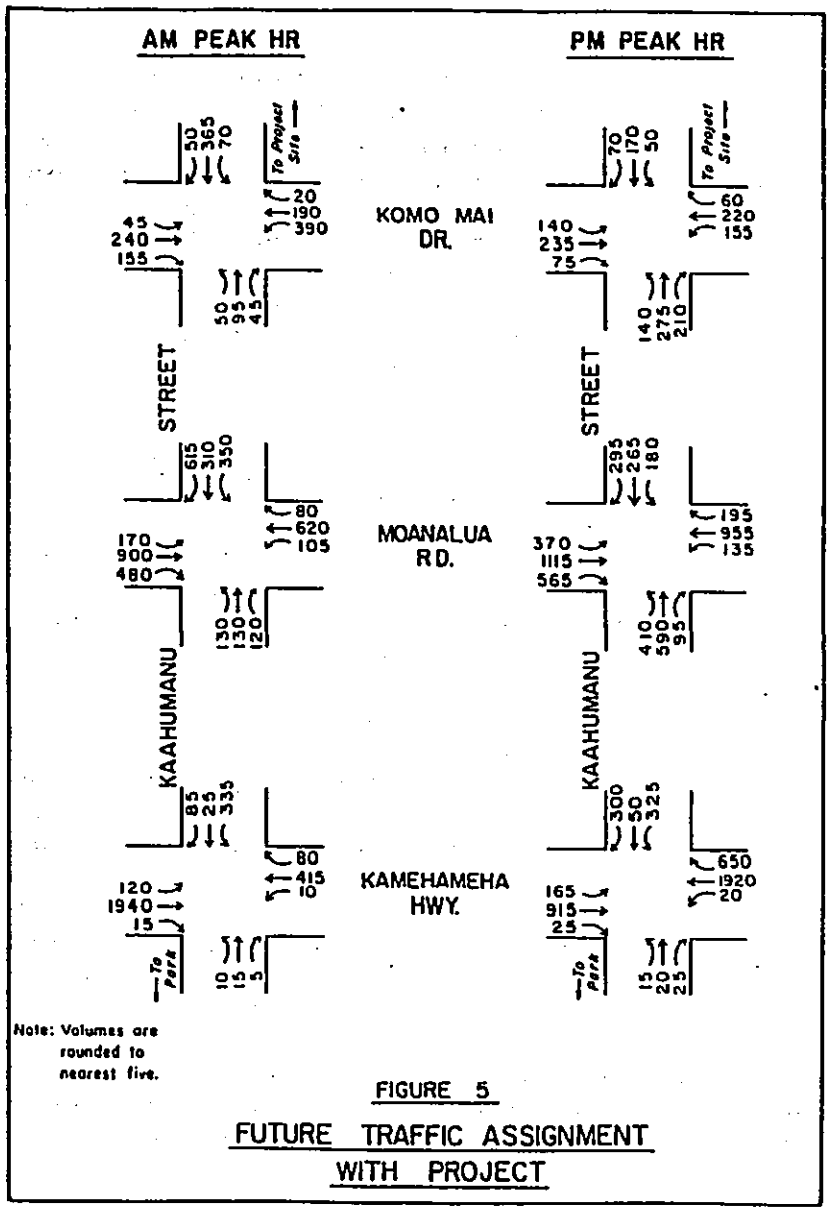


Note: Volumes are rounded to nearest five.

FIGURE 4

PROJECT TRAFFIC ASSIGNMENT

Figure 5 provides the future traffic assignment with the project and Table 4 presents the analysis summary. With the proposed project, volume-to-capacity ratios would increase. At the intersection of Moanalua Road and Kaahumanu Street, makaibound through-right movements would experience Level of Service E conditions in the AM peak hour. However, the overall intersection Levels of Service would not change. No mitigation measures would be needed at the three Kaahumanu Street intersections to accommodate project traffic. As noted previously, improved traffic flow could result from changes in signal operation.



Note: Volumes are rounded to nearest five.

FIGURE 5

FUTURE TRAFFIC ASSIGNMENT WITH PROJECT

Table 4

FUTURE CONDITIONS WITH THE PROJECT
ANALYSIS SUMMARY

	AM Peak Hour		PM Peak Hour	
	v/c	LOS	v/c	LOS
Komo Mai Drive/Kaahumanu Street				
Kokoheadbound	0.36	A	0.55	A
Ewabound	0.26	A	0.43	A
Maukabound	0.23	A	0.52	A
Makaibound	0.71	B	0.50	A
Overall Intersection	—	A	—	A
Moanalua Road/Kaahumanu Street				
Kokoheadbound				
Left	0.52	E	0.87	E
Through-Right	0.79	D	0.84	D
Ewabound				
Left	0.32	E	0.32	D
Through-Right	0.62	D	0.88	D
Maukabound				
Left	0.30	D	0.86	E
Through-Right	0.17	D	0.62	D
Makaibound				
Left	0.82	E	0.38	D
Through-Right	0.77	E	0.53	D
Overall Intersection	—	D	—	D
Kamehameha Highway/Kaahumanu Street				
Kokoheadbound				
Left	0.21	D	0.35	D
Through-Right	0.98	C	0.40	A
Ewabound				
Left	0.03	D	0.08	D
Through-Right	0.25	B	1.13	E
Maukabound	0.06	C	0.14	C
Makaibound	0.39	C	0.47	C
Overall Intersection	—	C	—	D

Abbreviations:
v/c - volume-to-capacity ratio
LOS - Level of Service

REGIONAL IMPACTS

The proposed project would add traffic to the regional highway system. Comparisons of the project-generated traffic to existing volumes in the area and on the H-1 Freeway were used to indicate the magnitude of this increase.

The total peak hour volume of traffic crossing an imaginary line, or screenline, east of Kaahumanu Street was used for the first comparison. Komo Mai Drive, the H-1 Freeway, Moanalua Road and Kamehameha Highway all cross this screenline. In the AM peak hour, the 1987 eastbound traffic totaled over 13,000 vehicles per hour (vph) across the Kaahumanu-east screeenline. Westbound traffic in the AM peak hour was nearly 5,400 vph. The proposed project would add 84 vph eastbound and 22 vph westbound to these volumes, or 0.6% and 0.4%, respectively. In the PM peak hour, 1987 volumes were 12,000 vph westbound and 7,300 vph eastbound. The project traffic volumes of 73 vph westbound and 44 vph eastbound would each be 0.6% of existing volumes.

The traffic increases on the H-1 Freeway is projected to be 36 vph eastbound in the AM peak hour, or 0.4% of the existing traffic on H-1. PM peak hour increase in the westbound direction is projected to be 21 vph, or 0.3% of existing traffic. These increases compare to an average annual increase of traffic on H-1 of 15% (AM eastbound) and 10% (PM westbound) over the last two years. Improved transit service to Leeward and Central Oahu could decrease the rate of growth of traffic volumes in this area.

The State Department of Transportation (SDOT) has plans to add a sixth lane in each direction on H-1 between the Waiau and Halawa Interchanges. The added eastbound lane is expected to improve the merging condition at Waiau Interchange, thereby easing congestion and decreasing delays on the approaches to the on-ramp to Honolulu. A project to interconnect the traffic signals and to improve traffic flow on Kamehameha Highway has also been proposed by the SDOT. The City and County of Honolulu Department of Public Works is planning to widen a portion of Moanalua Road to relieve congestion near Aiea town. These improvements will increase regional capacity to serve the increasing traffic demand; as noted above, less than one percent of the demand would be due to the proposed project.

CONCLUSIONS AND SUMMARY

Traffic on the local roadways and regional highway system would increase with the proposed project, but the project-generated traffic would not have a significant effect on traffic conditions. The demand-actuated traffic signals should be able to adjust the green time for the demand volumes at each phase; the local intersections would have sufficient capacity to accommodate the expected increases. Furthermore, while the project would contribute traffic to the regional system, its impact would amount to less than one percent of existing traffic volumes.

REFERENCES

1. Transportation Research Board, National Research Council, Highway Capacity Manual, Special Report 209, Washington, D.C., 1985.

2. Institute of Transportation Engineers, Trip Generation, Third Edition, Washington, D.C., 1982.

APPENDIX

The 1985 Highway Capacity Manual defines six Levels of Service, labelled A through F, from the best to worst condition. Level of Service for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. For signalized intersections, the Operational Analysis measures signal operations by two separate indicators, volume-to-capacity (v/c) ratios and Level of Service (LOS). The v/c ratios provide a comparison of the flow rate to its theoretical capacity. Levels of Service are determined by the average length of delay in seconds. These two indicators do not necessarily correlate to each other, however, Levels of Service more strongly correlate to the delays experience by drivers. Characteristics of each level of service for signalized intersections are described below.

LEVEL OF SERVICE A: This level describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LEVEL OF SERVICE B: This level describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

LEVEL OF SERVICE C: This level describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

LEVEL OF SERVICE D: This level describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At Level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LEVEL OF SERVICE E: This level describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LEVEL OF SERVICE F: This level describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

APPENDIX D

Air Quality Study
For The Proposed Wailuna IV Residential Development
Waiau, Oahu, Hawaii

by

Barry D. Root

November 30, 1987

AIR QUALITY STUDY

FOR THE

PROPOSED WAILUNA IV RESIDENTIAL DEVELOPMENT

WAIAU, OAHU, HAWAII

Prepared by

Barry D. Root
Kaneohe, Hawaii

November 30, 1987

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FIGURE

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SUMMARY

1. The proposed Wailuna IV residential development involves site preparation and construction of 180 single-family dwelling units at the mauka end of Kaahumanu Street in Waiau on leeward Oahu.

2. Present air quality in the project area is estimated to be fair since nearby long term monitoring stations have consistently been recording airborne particulate and sulfur dioxide levels that are within allowable State of Hawaii Air Quality Standards, but vehicular emissions during peak period traffic conditions may be creating "hot spots" near major intersections where carbon monoxide levels could exceed allowable State of Hawaii air quality standards under especially unfavorable meteorological dispersion conditions.

3. There will be short term dust emissions during the construction phase of the development. Adequate control measures such as periodic watering and landscaping exist to limit the scope of this impact, but special care will have to be exerted to insure that nearby residents are not subjected to excessive levels of particulate pollution from construction activities.

4. Indirect air quality impacts are expected to result from new demands for electrical energy. This impact is most likely to occur in the vicinity of existing or new power plants such as the Kahe Plant on the Waianae coast and the HPOWER and other proposed new coal-fired plants in Campbell Industrial Park where increased levels of particulates and sulfur dioxide can be expected. Maximum use of solar energy designs in project development can at least partially mitigate the magnitude of this impact. In the future, new methods of generating electrical power such as wind or ocean thermal energy conversion may eventually also play a mitigative role in this regard.

5. Traffic generated by Wailuna IV will increase emissions of carbon monoxide and nitrogen dioxide in the project area. Detailed carbon monoxide modeling carried out for three critical intersections indicates that State of Hawaii Air Quality Standards could be exceeded near the intersections of Kaahumanu Street with Moanalua Road and Kamehameha Highway under present peak hour traffic conditions and worst case meteorological dispersion conditions. By 1993, the anticipated project completion date, decreased carbon monoxide emissions from individual vehicles coupled with a relatively low traffic growth rate in this area will yield projected worst case levels at these two interesections that are lower than present levels, but still higher than allowable standards, with or without the additional traffic from Wailuna IV. The regional scale air pollution impact of Wailuna IV traffic is estimated to be minimal.

1. PROJECT DESCRIPTION

The proposed Wailuna IV residential development involves site preparation and construction of 180 single-family dwelling units at a site just beyond the mauka end of Kaahumanu Street in Waiau, Oahu, as shown in Figure 1. The site is presently undeveloped and access would require construction of an extension to Kaahumanu Street. The first two increments of the Wailuna project have been completed and are occupied. The third increment is currently under construction. Wailuna IV is expected to be completed in 1993.

The purpose of this study is to describe existing ambient air quality in the project area and to estimate the magnitude and potential impact of any increase in air pollutant concentrations resulting from actions related to the proposed project. Mitigative measures and considerations are also discussed as appropriate.

2. AIR QUALITY STANDARDS

State of Hawaii and National Ambient Air Quality Standards (AQS) have been established for six classes of pollutants as shown in Table 1. An AQS is a pollutant concentration not to be exceeded over a specified sampling period which varies for each pollutant depending upon the type of exposure necessary to cause adverse effects. Each of the regulated pollutants has the potential to cause some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration.

National AQS have been divided into primary and secondary levels. Primary AQS are designed to prevent adverse health impacts while secondary AQS refer to welfare impacts such as decreased visibility, diminished comfort levels, damage to vegetation, animals or property, or a reduction in the overall aesthetic quality of the atmosphere. State of Hawaii AQS have been set at a single level which is in some cases significantly more stringent than the lowest comparable national limit. In particular, the State of Hawaii one hour standard for carbon monoxide is four times more stringent than the National standard.

National AQS are based on 40 CFR (Code of Federal Regulations) Part 50, while State of Hawaii AQS are set in Chapter 11-59, Hawaii Administrative Rules. This chapter was amended in 1986 to make Hawaii AQS for particulates and sulfur dioxide essentially the same as National limits.

3. PRESENT AIR QUALITY

A summary of air pollutant measurements from State of Hawaii long term monitoring stations located nearest to the project is presented in Table 2. Data from several different sampling stations are included in the tabulation.

Particulate measurements are from Pearl City, about 3 miles southwest of the project site. Sulfur dioxide concentrations were also monitored at the Pearl City location until 1985. Sulfur dioxide data for 1985 and 1986 is from Barbers Point, about 13 miles southwest of Wailuna.

During 1981 carbon monoxide was measured at Fort DeRussy in Waikiki (about 11 miles southeast of the project), and in 1982 and 1983 carbon monoxide was monitored at Leahi Hospital in Kaimuki, about 13 miles southeast of the project. Carbon monoxide readings from 1984 onward are from the Department of Health building in urban Honolulu, about 10 miles southeast of Wailuna.

Ozone levels were also measured at the Department of Health building until December 1980, when the monitor was relocated to Sand Island (about 8 miles southeast of the project site). During 1981 nitrogen dioxide was also monitored at the Sand Island location, but all nitrogen dioxide monitoring has since been discontinued. Lead measurements are taken at the Department of Health building on South Beretania Street.

From the data presented in Table 2 it appears that State of Hawaii ambient air quality standards for particulates, sulfur dioxide, nitrogen dioxide, and lead are currently being met at nearest monitoring stations to the project site.

On the other hand, carbon monoxide and ozone readings from urban Honolulu indicate that allowable State of Hawaii standards for these vehicle-related air pollutants are being violated at a rate of about one to three times a year. Ozone is an indicator of the formation of photochemical pollutants in the air, a condition which tends to develop if the air mass over the islands has been fairly stable with little wind flow for a period stretching over several days.

Concentrations of carbon monoxide are more directly related to vehicular emissions and tend to be highest during periods of rush hour traffic. Carbon monoxide would thus be the pollutant most likely to cause difficulty in meeting allowable Air Quality Standards as a result of new residential development in leeward Oahu.

4. DIRECT AIR QUALITY IMPACT OF PROJECT CONSTRUCTION

During the site preparation and construction phases of this project it is inevitable that a certain amount of fugitive dust will be generated. Field measurements of such emissions from apartment and shopping center construction projects has yielded an estimated emission rate of 1.2 tons of dust per acre of construction per month of activity. This figure assumes medium level activity in a semi-arid climate with a moderate soil silt content. Actual emissions of fugitive dust from this project can be expected to vary daily depending upon the amount of activity and the moisture content of exposed soil in work areas.

One major generator of fugitive dust is heavy construction equipment moving over unpaved surfaces. This problem can be substantially mitigated by completing and paving roadways and work areas as early in the development process as possible. Because of the close proximity of existing residences in previous Wailuna increments, dust control will have to be an item of special concern. Frequent trade wind showers and establishment of a regular watering schedule to limit dust emissions should reduce fugitive dust emissions from the construction of Wailuna IV to acceptable levels, but if such measures do not prove to be sufficiently effective, erection of temporary dust catching barriers might be necessary.

Heavy construction equipment will also emit some air pollutants in the form of engine exhausts. The largest equipment is usually diesel-powered. Carbon monoxide emissions from large diesel engines are generally about equal to those from a single automobile, but nitrogen dioxide emissions from this type of engine can be quite high. Fortunately, nitrogen dioxide emissions from other sources in the area should be relatively low and the overall impact of pollutant emissions from construction equipment should be minor compared to levels generated on nearby streets.

5. AIR QUALITY IMPACT OF INCREASED ENERGY UTILIZATION

Estimating about 1500 square feet average size for the 180 planned residential units yields a total floor space of about 270,000 square feet. Energy consumption rates at the power plant for all-electric single-family dwellings are about 100,000 BTU per square foot, which would create a requirement for over 27 billion BTU of energy per year at the power plant, or about 4,600 barrels of oil if the demand were to be met totally by burning fuel oil.

New energy requirements could be reduced somewhat by the installation of solar water heating for all units at the time of construction, but this particular site is frequently cloudy and windy, thus reducing the potential energy savings that could be gained from solar systems. It is also possible that the new demand could be met by means other than burning fuel oil. Generation of electrical energy by wind power and by using ocean thermal energy conversion are two such possibilities. In fact, an operating wind farm has been developed on the north shore of Oahu.

For the immediate term, however, Hawaiian Electric has decided that purchasing power from new coal-fired plants to be located in Campbell Industrial Park would be the most economical course of action for meeting future energy demands. The new HPOWER garbage-to-energy plant is also slated for construction in Campbell Industrial Park.

The indirect energy-related impact of Wailuna IV would thus most likely be an increase in sufur dioxide and particulates in the vicinity of the Kahe Power Plant on the Waianae coast and in the vicinity of these new power plants in Campbell Industrial Park.

6. INDIRECT AIR QUALITY IMPACT OF INCREASED TRAFFIC

Once construction is completed, Wailuna IV will not in itself constitute a major direct source of air pollutants, but by serving as an attraction for increased motor vehicle traffic in the area the project must be considered to be a potentially significant indirect air pollution source.

Motor vehicles, especially those with gasoline-powered engines, are prodigious emitters of carbon monoxide. Motor vehicles also emit some nitrogen dioxide and those burning fuel which contains lead as an additive contribute some lead particles to the atmosphere as well. The major control measure designed to limit lead emissions is a Federal law requiring the use of unleaded fuel in most new automobiles. As older cars are removed from the vehicle fleet lead emissions should continue to fall. In fact, effective January 1, 1986, the Federal Environmental Protection Agency has revised the allowable lead amount in gasoline to 0.1 gram per gallon. At the beginning of 1985 the standard was 1.1 grams per gallon. The EPA is also advocating a total ban on lead in gasoline to take effect as early as 1988. Existing lead controls seem to have produced desired results in the Honolulu area, however, since reported lead levels at the DOH building were 0.0 micrograms per cubic meter over the last three quarters of 1986.

Federal control regulations also call for increased efficiency in removing carbon monoxide and nitrogen dioxide from vehicle exhausts. By the year 1995 carbon monoxide emissions from the Oahu vehicle fleet then operating should be about one third less than the amounts now emitted. At present, however, no further reductions in vehicular emissions have been mandated for years following 1995, and increases in traffic levels after 1995 will result in directly proportional increases in vehicle-related pollutant emissions.

7. CARBON MONOXIDE DIFFUSION MODELING

In order to evaluate the air quality impact of projected increases in traffic associated with Wailuna IV a detailed carbon monoxide modeling study was carried out. The study was designed to yield carbon monoxide concentration values which could be compared directly to allowable State and National Ambient Air Quality Standards.

Three critical receptor sites near the major intersections along Kaahumanu Street were selected for analysis. The traffic study for the project indicated that these intersections would be likely to have various degrees of increased traffic following Wailuna IV development. For sites 1 and 2, near the Komo Mai Drive and Moanalua Road intersections, peak rush hour traffic occurs in the morning, but for site 3, near the Kamehameha Highway intersection, peak rush hour traffic occurs in the late afternoon.

Modeling was performed for a string of receptor sites located 3 meters from the edge of the roadway in each case and results of highest computed peak hour values are shown in Table 3. Locations of receptor sites are indicated on Figure 1. Of the three sites, only Site 3 represents a location where a person might reasonably be expected to spend an hour in the "ambient air" during peak hour traffic conditions since this site contains outdoor tables for a fast food restaurant.

Computations were made for current peak hour conditions and for 1993 (after project completion). Calculations for 1993 included peak hour traffic volume scenarios with and without Wailuna IV. Volume projections for 1993 without Wailuna IV do include projected traffic from the previously approved Wailuna III increment now under construction. All three intersections currently have demand actuated signal lights.

Using 1986 vehicle registration figures for Oahu, the existing peak hour vehicle mix in the project area is estimated to be 91.9% light duty gasoline-powered vehicles, 4.2% light duty gasoline-powered trucks and vans between 6000 and 8500 pounds, 0.5% heavy duty gasoline-powered vehicles, 0.5% diesel-powered automobiles, 0.1% diesel-powered light duty trucks, 1% diesel-powered trucks and buses, and 1% motorcycles. These percentages agree well with traffic counts at the Komo Mai Drive intersection during morning rush hour on Wednesday, October 28, 1987. The same vehicle mix was assumed for 1987 and 1993 emission rate calculations.

Average vehicle speeds were assumed to be 1 mph upstream from red signals and 15 mph downstream from signals or turns. An ambient temperature of 58 degrees F was assumed to simulate a cold winter morning for Site 1 and 2 calculations, while 68 degrees was used for late afternoon peak hour conditions at Site 3.

Vehicle operating characteristics were computed assuming that 20.6 percent of vehicles equipped with catalytic converters and 20.6 percent of vehicles without catalytic converters would be operating in the "cold start" mode and 27.3 percent of all vehicles would be operating in the hot start mode. The EPA computer model MOBILE3 was run using the above parameters to produce vehicular carbon monoxide emission estimates for each of the years studied. National averages for "mis-fueling" rates were assumed.

The EPA computer model HIWAY 2 was used to calculate carbon monoxide concentrations at each of the selected critical receptor sites for each scenario studied. Stability category 6 was used for determining diffusion coefficients for Sites 1 and 2. This stability category represents the most stable (least favorable) atmospheric condition that would be likely to occur in a suburban area such as this during the period within one hour following sunrise. Stability category 4 was used for site 3 since this is the most stable category that can be used for daytime computations.

To simulate worst case wind conditions a uniform wind speed of one meter per second was assumed with the worst case wind direction determined by the traffic loading at each intersection. For each receptor site concentrations were computed at a height of 1.5 meters in order to estimate levels that would exist within the normal human breathing zone.

Background contributions of carbon monoxide from sources or distant roadways not directly considered in the analysis were assumed to be zero in order to more clearly indicate the impact of project-related traffic. In fact, background levels at these locations could be as high as one milligram per cubic meter in both 1987 and 1993.

Results of the peak hour carbon monoxide study are presented in Table 3. Present peak hour carbon monoxide levels under the worst case assumptions used here are higher than the allowable State of Hawaii one hour AQS at Sites 2 and 3. Estimated peak hour values for 1993 are somewhat lower, but still above the State standard for Sites 2 and 3 with or without the additional traffic from Hailuna IV. For Site 1 all scenarios are within acceptable limits whether traffic from the proposed project is included in the computations or not. All of the estimated peak hour worst case carbon monoxide concentrations are well within the National one hour carbon monoxide limit.

Eight hour carbon monoxide levels are estimated by multiplying the peak hour values by a "meteorological persistence factor" of 0.6 which is recommended in EPA modeling guidelines to account for the fact that average one hour traffic volumes over an eight hour period are lower than peak hour volume and the fact that meteorological dispersion conditions are more variable (and hence more favorable) over an eight hour period than they are for a one hour period. Multiplying projected peak hour carbon monoxide levels by this factor yields the values that are shown in Table 4 for Site 3. For Sites 1 and 2, the assumption of stability category 6 is not valid for daytime hours, and peak hour values were recomputed for stability category 4 before application of the eight hour persistence factor.

For the 1987 scenario, worst case traffic and meteorological assumptions indicate that the Hawaii eight hour standard could be exceeded at Sites 2 and 3, and probably at Site 1 as well if background levels are considered. Projected eight hour levels are within the less stringent National limit at all three locations, but the projected value for the Moanalua Road intersection is very close to the National Standard.

It is important to note that the worst case conditions studied here have a relatively low probability of occurrence. The combination of wind speed and direction used in the computations for Sites 1 and 3 occur annually during the morning rush hour on the order of 6 to 8 days per year. When the wind blows from a northerly direction it usually blows at higher speeds than one meter per second. With windspeeds of two meters per second, for example, computed carbon monoxide concentrations would be half the values shown in Table 3. For Site 3, the peak hour worst case wind direction and speed combination required to yield highest carbon monoxide concentrations would occur less than once per year. Furthermore, the light wind speeds needed to produce the worst case values shown here would be most likely to occur in conjunction with highly variable wind directions rather than the steady conditions assumed in the calculations.

In computing eight hour carbon monoxide estimates the EPA-suggested factor of 0.6 appears to be reasonable for the case of urban Honolulu in terms of average one and eight hour concentrations. The State Department of Health just recently started to report eight hour concentrations in annual measurement summaries. For the DOH building, the 1986 average of daily peak hour levels was 2.2 milligrams per cubic meter, while the average daily eight hour value was 1.4, yielding an eight hour factor of 0.63. But the highest reported one hour average was 13.5 milligrams per cubic meter, while the highest eight hour value was only 4.7, yielding a relationship between maximum values of just 0.35. If this factor were to be used to convert one hour worst case estimates into worst case eight hour values, only Site 2 would be higher than the State of Hawaii eight hour AQS.

8. REGIONAL CONSIDERATIONS

Aside from the potential indirect air quality impacts along Kaahumanu Street studied in detail in the carbon monoxide modeling section, there are potential regional scale impacts to be considered as well. Carbon monoxide computations carried as part of air quality impact studies for other projects in the leeward Oahu area have indicated potentially high levels of carbon monoxide along the H-1 corridor between Pearl City and Aloha Stadium. Morning peak hour concentrations on the order of the National one hour limit of 40 milligrams per cubic meter have been computed for worst case conditions. Any project in the leeward area which has the potential to increase traffic levels along this corridor can only serve to exacerbate this situation.

Wailuna IV is projected to add just 36 vehicles to this H-1 corridor during the morning rush hour. This represents about 0.4% of the existing traffic on the corridor. In terms of carbon monoxide, the peak hour contribution of Wailuna IV under worst case conditions would thus be less than 0.2 milligrams per cubic meter. During the last two years, eastbound traffic along this portion of the H-1 freeway has been increasing at an annual rate of 15%, yielding potential annual increments of nearly 6 milligrams per cubic meter to worst case carbon monoxide levels along the corridor. The potential regional air pollution impact of traffic from Wailuna IV thus appears to be relatively small.

9. MITIGATIVE MEASURES

A. SHORT TERM

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

B. LONG TERM

Once completed, Wailuna IV would be expected to have little direct impact on ambient air quality. Indirect air quality impacts are expected because of the new electrical power requirements of the proposed project. These requirements can be reduced somewhat by planning and implementing solar energy design features to the maximum extent possible.

Other indirect long term air quality impacts are expected in those areas where traffic congestion can potentially be worsened by the addition of vehicles traveling to and from Wailuna IV. Project developers have no control over the emission levels of individual vehicles, but the total number of Wailuna-bound vehicles could conceivably be reduced by provision of a park ride facility or participation in any other regional traffic-limiting strategies developed by governmental traffic planners. The only other logical way to mitigate potential air pollution impacts associated with Wailuna IV would be to reduce the size and scope of the project to produce fewer peak hour vehicle trips.

Because the stringent national vehicular emissions reduction program now being pursued is entirely the product of ever changing government regulations, it is always possible that economic conditions or other factors could lead to an early abandonment of this program. If that were to occur, then the projected pollutant levels presented in this study could be too optimistic. On the other hand, this analysis did not consider the possibility that technological innovation may lead to new vehicular power systems that produce few or none of the currently regulated atmospheric pollutants.

For the benefit of future residents of Wailuna IV it is also noted that tall, dense vegetation can provide some screening of residential areas from larger airborne particulates generated along roadways. It is thus recommended that wherever possible such vegetative cover be included in landscaping plans with plantings occurring as early in the development process as practicable.

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1. U.S. ENVIRONMENTAL PROTECTION AGENCY, User's Guide to MOBILE3: Mobile Source Emissions Model, June, 1984.

2. U.S. ENVIRONMENTAL PROTECTION AGENCY, User's Guide to HIWAY 2, A Highway Air Pollution Model, May, 1980.

3. U.S. ENVIRONMENTAL PROTECTION AGENCY, Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9: Evaluating Indirect Sources, January, 1975, revised September, 1978.

4. CALIFORNIA DEPARTMENT OF TRANSPORTATION, Energy and Transportation Systems, December, 1978.

5. PARSONS BRINKERHOFF QUADE & DOUGLAS, INC., Traffic Impact Study for Wailuna IV, November, 1987. DRAFT.

TABLE 1

SUMMARY OF HAWAII AND NATIONAL AMBIENT AIR QUALITY STANDARDS
(Micrograms per Cubic Meter)

POLLUTANT	SAMPLING PERIOD	AMBIENT AIR QUALITY STANDARDS NATIONAL Primary	NATIONAL Secondary	HAWAII
Particulates	Annual Geometric Mean	75	60	60
	Maximum 24-Hour Average	260	150	150
Sulfur Dioxide	Annual Arithmetic Mean	80	--	80
	Maximum 24-Hour Average	365	--	365
	Maximum 3-Hour Average		1300	1300
Nitrogen Dioxide	Annual Arithmetic Mean		100	70
Ozone	Maximum 1-Hour Average		240	100
Carbon Monoxide	Maximum 8-Hour Average	10		5
	Maximum 1-Hour Average	40		10
Lead	Calendar Quarter	1.5		1.5

Notes: 1. Carbon monoxide standards are in milligrams per cubic meter.
2. National standards based on 40 CFR Part 50; Hawaii standards based on Title 11, Administrative Rules, Chapter 59.

TABLE 2

SUMMARY OF AIR POLLUTANT MEASUREMENTS AT NEAREST MONITORING STATIONS

POLLUTANT	1980	1981	1982	1983	1984	1985	1986
PARTICULATE MATTER							
No. of Samples	60	59	53	55	56	47	60
Range of Values	22-93	19-71	19-54	17-57	16-45	16-62	17-65
Average Value	36	34	31	30	28	35	29
No. of Times State AQS Exceeded	0	0	0	0	0	0	0
SULFUR DIOXIDE							
No. of Samples	52	56	43	49	42	50	57
Range of Values	<5-15	<5-<5	<5-10	<5-<5	<5-<5	<5-25	<5-10
Average Value	<5	<5	<5	<5	<5	<5	<5
No. of Times State AQS Exceeded	0	0	0	0	0	0	0
CARBON MONOXIDE							
No. of Samples		286	311	173	318	342	348
Range of Values		1.2-13.8	0-4.6	0-8.6	.6-10.9	0-10.4	.2-13.5
Average Value		5.1	1.2	2.3	2.4	1.5	2.2
No. of Times State AQS Exceeded		13	0	0	1	1	3
OXIDANT (OZONE)							
No. of Samples	295	314	335	349	296	341	346
Range of Values	10-84	10-104	0-151	0-123	0-104	8-198	10-88
Average Value	48	37	32	46	44	43	39
No. of Times State AQS Exceeded	0	1	2	2	1	3	0
OTHERS:		NITROGEN DIOXIDE				LEAD	
No. of Samples		46			54	58	57
Range of Values		6-77			0-1.8	0-.3	0-.2
Average Value		25			0.3	0.1	0
No. of Times State AQS Exceeded.		0			0	0	0

NOTES: See text for locations of monitoring stations. Carbon monoxide is reported in milligrams per cubic meter; other pollutants in micrograms per cubic meter. Carbon monoxide and ozone are daily peak one hour values; lead is quarterly; other pollutant values are for a 24 hour sampling period.

SOURCE: State of Hawaii Department of Health

TABLE 3

RESULTS OF PEAK HOUR CARBON MONOXIDE ANALYSIS
(Milligrams Per Cubic Meter)

SITE	LOCATION	RUSH HOUR	WIND DIR	FREQ (days /yr)	YEAR/SCENARIO 1987	1993 WITHOUT PROJ	1993 WITH PROJ
1	Kaahumanu Street & Komo Mai Drive	AM	NW	7.7	8.6	7.7	9.2
2	Kaahumanu Street & Moanalua Road	AM	NE	6.6	21.0	17.4	18.1
3	Kaahumanu Street & Kamehameha Highway	PM	SE	0.7	14.0	11.4	11.6

STATE OF HAWAII AQS: 10
NATIONAL AQS: 40

Notes: See Figure 1 for location of critical receptor sites.
See text, Section 7, for models and assumptions used for producing these estimates.

TABLE 4

RESULTS OF EIGHT HOUR CARBON MONOXIDE ANALYSIS
(Milligrams Per Cubic Meter)

SITE	LOCATION	YEAR/SCENARIO 1987	1993 WITHOUT PROJ	1993 WITH PROJ
1	Kaahumanu Street & Komo Mai Drive	4.4	4.0	4.8
2	Kaahumanu Street & Moanalua Road	10.9	9.0	9.4
3	Kaahumanu Street & Kamehameha Highway	8.4	6.8	7.0

STATE OF HAWAII AQS:	5
NATIONAL AQS:	10

Notes: See Figure 1 for location of critical receptor sites.
See text, Section 7, for models and assumptions used for producing these estimates.

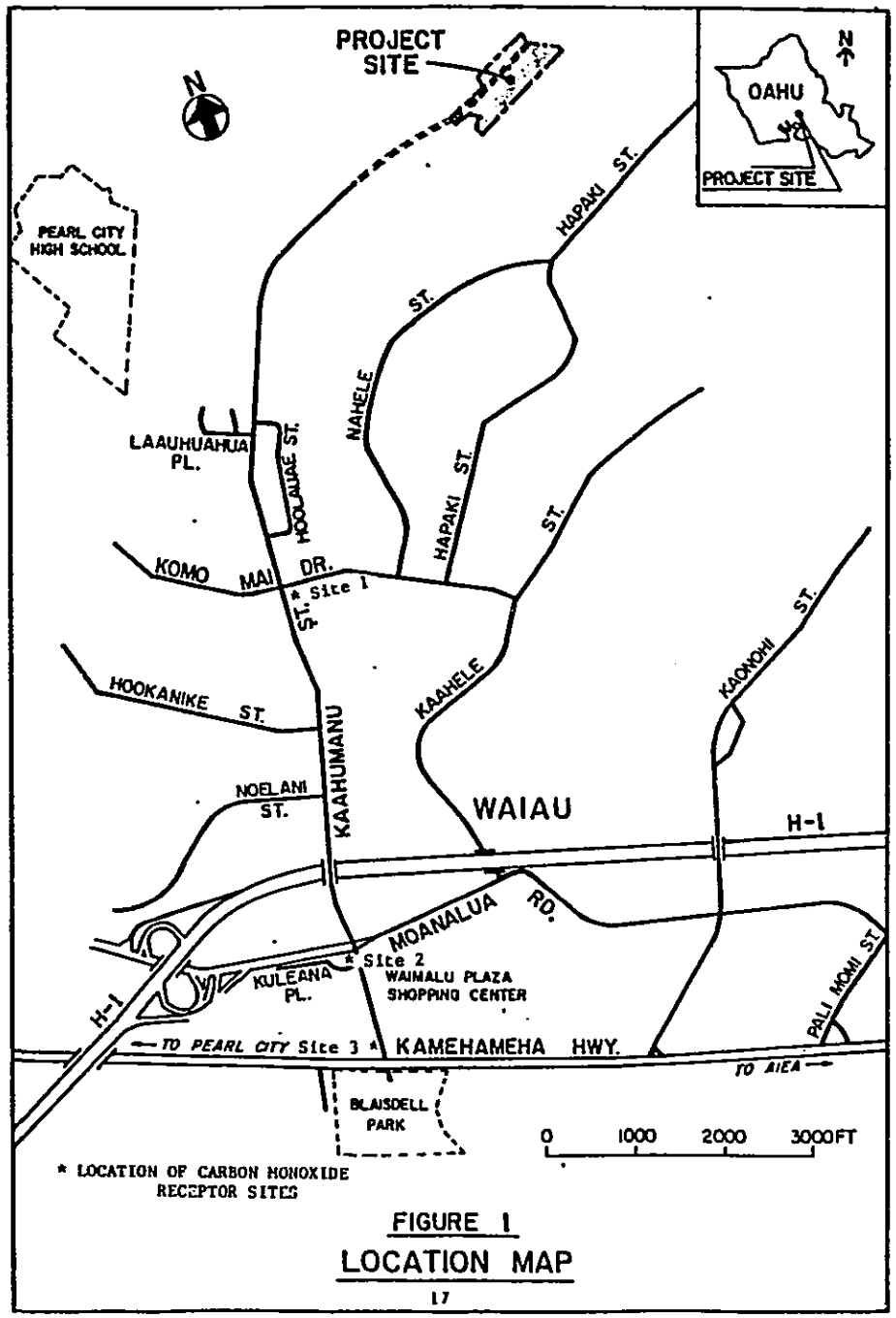

FIGURE 1
LOCATION MAP

APPENDIX E

Traffic Noise Study
For The Proposed Wailuna IV Project

by

Y. Ebisu & Associates

November, 1987

TRAFFIC NOISE STUDY
FOR THE PROPOSED
WAILUNA IV PROJECT

PREPARED FOR
ENVIRONMENTAL COMMUNICATIONS, INC.

BY
Y. EBISU & ASSOCIATES

NOVEMBER, 1987

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I. SUMMARY

The existing and projected traffic noise levels in the vicinity of the proposed Wailuna IV project at the north end of Kaahumanu Street, Waiau, Oahu were evaluated for their relationship to current FHA/HUD noise standards. Additionally, the traffic noise level increases along the street expected to service the project were calculated. Following completion of the project, increases in traffic noise of 0.1 to 1.2 Ldn units are predicted to occur as a result of project traffic. This level of increase should not generate adverse noise impacts on existing noise sensitive properties which front Kaahumanu Street.

Traffic noise levels in the immediate vicinity of the project entrance are expected to be at a level of 58.3 Ldn units at 50 FT setback distance from the centerline of Kaahumanu Street. Because this level is below current FHA/HUD noise standards special sound attenuation measures will probably not be required for the new units of the Wailuna IV project.

II. PURPOSE

The purposes of this study were to evaluate the future traffic noise impacts which may result from the proposed Wailuna IV development at the north end of Kaahumanu Street at Waiau, Oahu, and to determine if noise attenuation measures are required to comply with FHA/HUD regulations within the proposed development (Reference 1). Recommendations for the implementation of noise mitigation measures were also to be provided as required.

III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

The noise descriptor currently used by FHA/HUD to assess environmental noise in general is the Day-Night Average Sound Level (Ldn). This descriptor incorporates a 24-hour average of instantaneous A-Weighted sound levels as read on a standard Sound Level Meter. The minimum averaging period for the Ldn descriptor is 24 hours (by definition). 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 more complete list of noise descriptors is provided in APPENDIX B to this report.

TABLE 1, derived from Reference 2, 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. Residences 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, residences which are located within interior lots are usually exposed to lower noise levels of 60 Ldn or less.

For the purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 Ldn or less is considered acceptable. This standard is applied nationally (see Reference 1), 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 does not eliminate all risks of noise impacts. For these reasons, and as recommended in Reference 3, a lower level of 55 Ldn is considered

TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION
(RESIDENTIAL LAND USE)

Noise Exposure Class	Day-Night Sound Level	Equivalent Sound Level	Federal Standard (1)
Minimal Exposure	Not Exceeding 55 Ldn	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But Not Above 65 Ldn	Above 55 Leq But Not Above 65 Leq	(2) Acceptable
Significant Exposure	Above 65 Ldn But Not Above 75 Ldn	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 Ldn	Above 75 Leq	Unacceptable

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 2.

as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. 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.

On Oahu, State and County noise regulations exist, and are enforced whenever noise emissions from noise sources exceed specified noise levels and cause complaints from neighboring properties. State Department of Health (DOH) and City and County of Honolulu Land Use Ordinance (LUO) noise regulations are expressed in maximum allowable property line limits rather than Ldn (see References 6 and 8). The DOH noise limits for residential properties are 55 dBA during the daytime period and 45 dBA during the nighttime period. The LUO noise limits are expressed differently as Octave Band limits, but are approximately equal to 56 dBA during the daytime and 53 dBA during the nighttime periods. The DOH and LUO property line limits for residential properties are approximately equivalent to 55 Ldn and 59 Ldn, respectively. The property line limits of both the DOH and LUO regulations (References 6 and 8) are not applicable to motor vehicle noise on public roadways, but are applicable to stationary noise sources such as air conditioning equipment, stereos, etc. Motor vehicle noise limits are regulated separately by Reference 7, which limits the maximum noise emissions of individual motor vehicles rather than the cumulative total traffic noise levels along public roadways.

IV. GENERAL STUDY METHODOLOGY

Traffic noise predictions were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (Reference 4). Existing and projected traffic data at the major intersections of Kaahumanu Street were obtained from the traffic study for the project (Reference 5). For noise modeling purposes, average traffic volumes on the street segments examined were obtained by averaging the traffic volumes at their respective intersection end points.

Existing traffic noise measurements along Kaahumanu Street were made on November 11, 1987 to calibrate the noise prediction model, and to refine predictions of future traffic noise levels. Existing and future traffic noise levels were computed using the AM and PM peak hour traffic volumes contained in Reference 5. Additionally, existing and future setback distances from the centerline of Kaahumanu Street to the 60, 65, and 70 Ldn iso-noise contour lines were also calculated for the worst case condition of unobstructed line of sight to the traffic lanes. The required setback distance to the future 65 Ldn contour line were used to determine the necessity of noise abatement measures for project compliance with FHA/HUD noise standards.

V. EXISTING TRAFFIC NOISE ENVIRONMENT

TABLE 2 presents the results of the noise measurements at Sites A and B along Kaahumanu Street. FIGURE 1 shows the locations of the 2 measurement sites in relationship to the project site. Agreement between measured and predicted traffic noise levels at Sites A and B were good for a modeled average speed of 35 MPH, and for modeled hard ground conditions between the receptor and the traffic lanes.

TABLE 3 presents the AM and PM peak hour traffic volumes, speeds, and mix assumptions for the existing period, with computed hourly equivalent noise levels (Leq) at 50 FT distance from the centerlines of the Kaahumanu Street sections which will service project traffic. Calculated Ldn at 50 FT distance from the roadway's centerline are also shown in the same table. For those homes which benefit from the shielding effects of existing walls along Kaahumanu Street, the existing traffic noise levels at these residences are probably 5 to 10 Ldn units less than the values shown in TABLE 3. The existing setback distances of the 60, 65, and 70 Ldn contours from the centerline of the street for various street segments from the project site to Kamehameha Highway are shown in TABLE 4 for worst case, unobstructed line of sight conditions. Existing traffic noise levels are in the FHA/HUD "Acceptable, Moderate Exposure" category at residences fronting Kaahumanu Street and north of Komo Mai Drive. Also in the "Acceptable" category are those residences fronting Kaahumanu Street and south of Komo Mai Drive which are shielded from traffic noise by 6 FT high walls. Those residences which are not shielded by walls and which are within the setback distances to the existing 65 Ldn contours indicated in TABLE 4 are in the FHA/HUD "Normally Unacceptable, Significant Exposure" category.

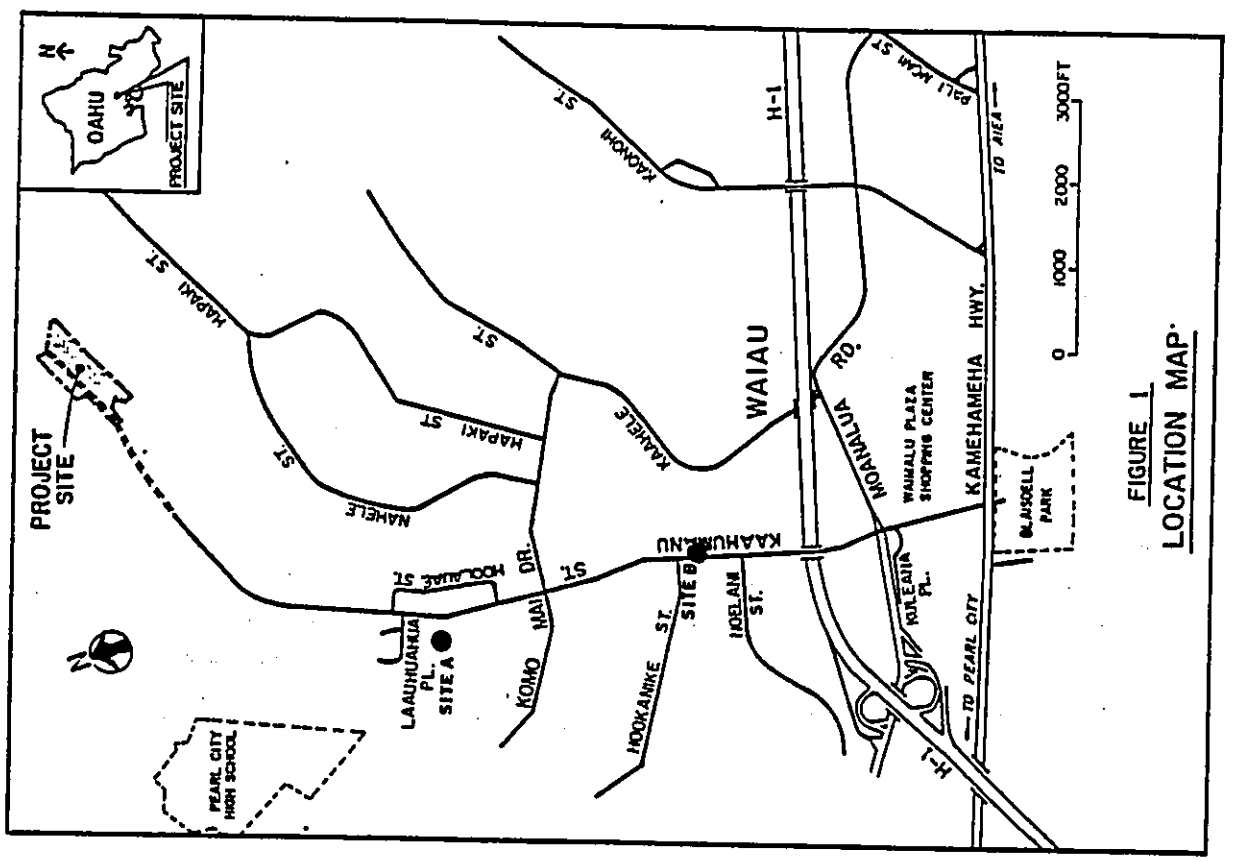

FIGURE 1
LOCATION MAP

TABLE 2

NOVEMBER 11, 1987 TRAFFIC NOISE MEASUREMENTS

	Location	Time of Day (HRS)	Ave.Speed (MPH)	---Hourly Traffic Volume--- Auto	Med.Truck	Heavy Truck	Measured Leq (dB)	Predicted Leq (dB)
1.	SITE A In parking lot next to park near corner of Laauhuahua Pl. and Kaahumanu St.	1550 TO 1700	35	224	0	0	58.2	57.4
2.	SITE B On east sidewalk on Kaahumanu St. near Hookanike St. intersection.	1705 TO 1805	35	920	10	10	66.1	66.9

TABLE 4

EXISTING AND FUTURE DISTANCES TO 60, 65, AND 70 Ldn CONTOURS

KAAHUMANU STREET SECTION	60 Ldn SETBACK (FT) EXISTING	60 Ldn SETBACK (FT) FUTURE	65 Ldn SETBACK (FT) EXISTING	65 Ldn SETBACK (FT) FUTURE	70 Ldn SETBACK(FT) EXISTING	70 Ldn SETBACK(FT) FUTURE
North	74	143	23	45	7	14
Middle	221	272	70	86	22	27
South	297	333	94	105	30	33
At Project	N/A	34	N/A	11	N/A	3

Notes:

1. North section of Kaahumanu Street is just north of Komo Mai Drive.
2. Middle section of Kaahumanu Street is between Komo Mai Drive and Moanalua Rd.
3. South section of Kaahumanu Street is between Moanalua Road and Kamehameha Hwy.
4. All setback distances are to the roadway centerlines. Setback distances are for unobstructed line-of-sight conditions, under hard ground conditions.

TABLE 3

WAILUNA IV PROJECT
EXISTING (1987) TRAFFIC NOISE LEVELS

KAAHUMANU STREET SEGMENT	SPEED MPH	VEHICLE MIX (%) A/MT/HT	AM PEAK VPH	AM PEAK LEQ(50') IN DB	PM PEAK VPH	PM PEAK LEQ(50') IN DB	LDN(50')
North	35	98/1/1	350	61.2	395	61.7	61.7
Middle	35	98/1/1	1,115	66.2	1,185	66.5	66.5
South	35	98/1/1	865	65.1	1,595	67.7	67.7

Notes:

1. North section of Kaahumanu Street is just north of Komo Mai Drive.
2. Middle section of Kaahumanu Street is between Komo Mai Drive and Moanalua Road.
3. South section of Kaahumanu Street is between Moanalua Road and Kamehameha Highway.
4. Along Kaahumanu Street, Ldn assumed to be equal to PM Peak Hour Leq(h).
5. Excess ground attenuation coefficient assumed to be zero.

VI. PROJECTED TRAFFIC NOISE ENVIRONMENT AND IMPACTS

Predictions of future traffic noise levels along the Kaahumanu Street sections expected to service the project site were made (see TABLE 5) using the traffic volume projections of Reference 5. Projected increases in peak hour traffic volumes attributable to the project are small (less than 8 percent) south of Komo Mai Drive and large (greater than 30 percent) north of Komo Mai Drive. Projected increases in traffic noise levels attributable to the project are also small (less than 0.3 Ldn) south of Komo Mai Drive, and moderately significant (greater than 1.2 Ldn) north of Komo Mai Drive.

South of Komo Mai Drive, where existing traffic noise levels are high, project related traffic is predicted to increase current noise levels by 0.1 to 0.3 Ldn by the Year 1993, and non-project traffic is predicted to increase current noise levels by 0.4 to 0.6 Ldn units. Because computed traffic noise increases associated with project traffic are very small, the proposed project is not expected to generate significant traffic noise impacts along the sections of Kaahumanu Street south of Komo Mai Drive.

North of Komo Mai Drive, project related traffic is predicted to increase current noise levels by 1.2 to 58.3 Ldn by the Year 1993, and non-project traffic is predicted to increase current noise levels by 1.7 Ldn. The larger increase of 58.3 Ldn is expected to occur in the now vacant lands adjacent to the project site. The increases in traffic noise levels are predicted to be moderately significant. However, because of the low volumes of existing traffic to the north of Komo Mai Drive, total traffic noise levels after project completion are not expected to exceed 65 Ldn at 50 FT setback distance from the centerlines of the north sections of Kaahumanu Street between Komo Mai Drive and the project entrance. At the project entrance, predicted traffic noise levels at 50 FT setback from the centerline of Kaahumanu Street are expected to be 58.3 Ldn, and in the "Acceptable, Moderate Exposure" category. For these reasons, project related

TABLE 5

WAILUNA IV PROJECT
FUTURE (1993) TRAFFIC NOISE LEVELS

KAAHUMANU STREET SEGMENT	SPEED MPH	VEHICLE MIX (%) A/MT/HT	AM PEAK VPH	AM PEAK LEQ(50') IN DB	PM PEAK VPH	PM PEAK LEQ(50') IN DB	LDN(50') IN DB
North	35	98/1/1	645	63.8	765	64.6	64.6
Middle	35	98/1/1	1,378	67.1	1,460	67.4	67.4
South	35	98/1/1	968	65.6	1,784	68.2	68.2
At Project	35	98/1/1	140	57.2	180	58.3	58.3

Notes:

1. North section of Kaahumanu Street is just north of Komo Mai Drive.
2. Middle section of Kaahumanu Street is between Komo Mai Drive and Moanalua Road.
3. South section of Kaahumanu Street is between Moanalua Road and Kamehameha Highway.
4. Along Kaahumanu Street, Ldn assumed to be equal to PM Peak Hour Leq(h).
5. Excess ground attenuation coefficient assumed to be zero.

traffic is not expected to generate significant noise impacts along the north section of Kaahumanu Avenue.

VII. RECOMMENDED NOISE MITIGATION MEASURES

Because traffic volume and noise level increases along Kaahumanu Street are predicted to be small or result in total noise levels below FHA/HUD standards, traffic noise mitigation measures are not necessary for mitigating noise impacts which might have resulted from project traffic.

Short term construction noise impacts from construction vehicles and on-site activities may occur with projects of this type. However, State Department of Health permit procedures such as those contained in Reference 6 and applicable to construction activities would be applicable to this project, and if followed, should minimize noise impacts resulting from on site construction activities.

A. REFERENCES

(1) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B," U.S. Department of Housing and Urban Development, July 12, 1979.

(2) "Guidelines for Considering Noise in Land Use Planning and Control," Federal Interagency Committee on Urban Noise, June 1980.

(3) "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," Environmental Protection Agency, EPA 550/9-74-004), March 1974.

(4) Barry, T. and J. Reagan, "FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108, Federal Highway Administration, Washington, D.C., December 1978.

(5) Parsons, Brinckerhoff Quade & Douglas, Inc., "Traffic Impact Study - Wailuna IV," November, 1987

(6) "Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu," Hawaii State Department of Health, November 6, 1981.

(7) "Title 11, Administrative Rules, Chapter 42, Vehicular Noise Control for Oahu," Hawaii State Department of Health, November 6, 1981.

(8) "Land Use Ordinance (Ordinance No. 86-96)," Department of Land Utilization, City and County of Honolulu, October 22, 1986.

HNA

TEXT

APPENDIX B.
EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the L_{Cdn} with the L_{Adn}.

Although not included in the tables, it is also recommended that "L_{PFI}" and "L_{EPN}" be used as symbols for perceived noise levels and effective perceived noise level, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

> The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, L_{eq} is designated the "equivalent sound level". For L_d, L_n, and L_{dn}, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristic of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, dBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (L_{PN} was found to be 75 dB. L_{PN} = 75 dB.) This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., decl).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighted Loss of Hearing" (PHL_x) shall be used consistent with CHARA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

TABLE I: A-Weighted Recommended Descriptor List

Item	Symbol
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(y)}$
12. Sound Exposure Level	L_{SE}

(1) 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., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine.)

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TABLE II: Recommended Descriptor List

ITEM	A-WEIGHTING	ALTERNATIVE(1) A-WEIGHTING	OTHER WEIGHTING (2)	UNWEIGHTED
1. Sound (Pressure) (3) Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level Over Time(T) (4)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.
(2) Only B-weighting shown. Applies also to C,D,E,..... weighting.
(3) The term "pressure" is used only 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., could be specified as $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine)).

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APPENDIX F

Wailuna IV
Demographic, Economic and Housing Impacts

by

Environment Capital Managers, Inc.

December 1987

ENVIRONMENT CAPITAL MANAGERS INC.

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WAILUNA IV

DEMOGRAPHIC, ECONOMIC AND HOUSING IMPACTS

Prepared for: Lusk Hawaii
98-1910 Kaahumanu Street
Pearl City, Hawaii 96782

December 1987

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WAILUNA IV
Demographic, Economic and Housing Impacts

INTRODUCTION

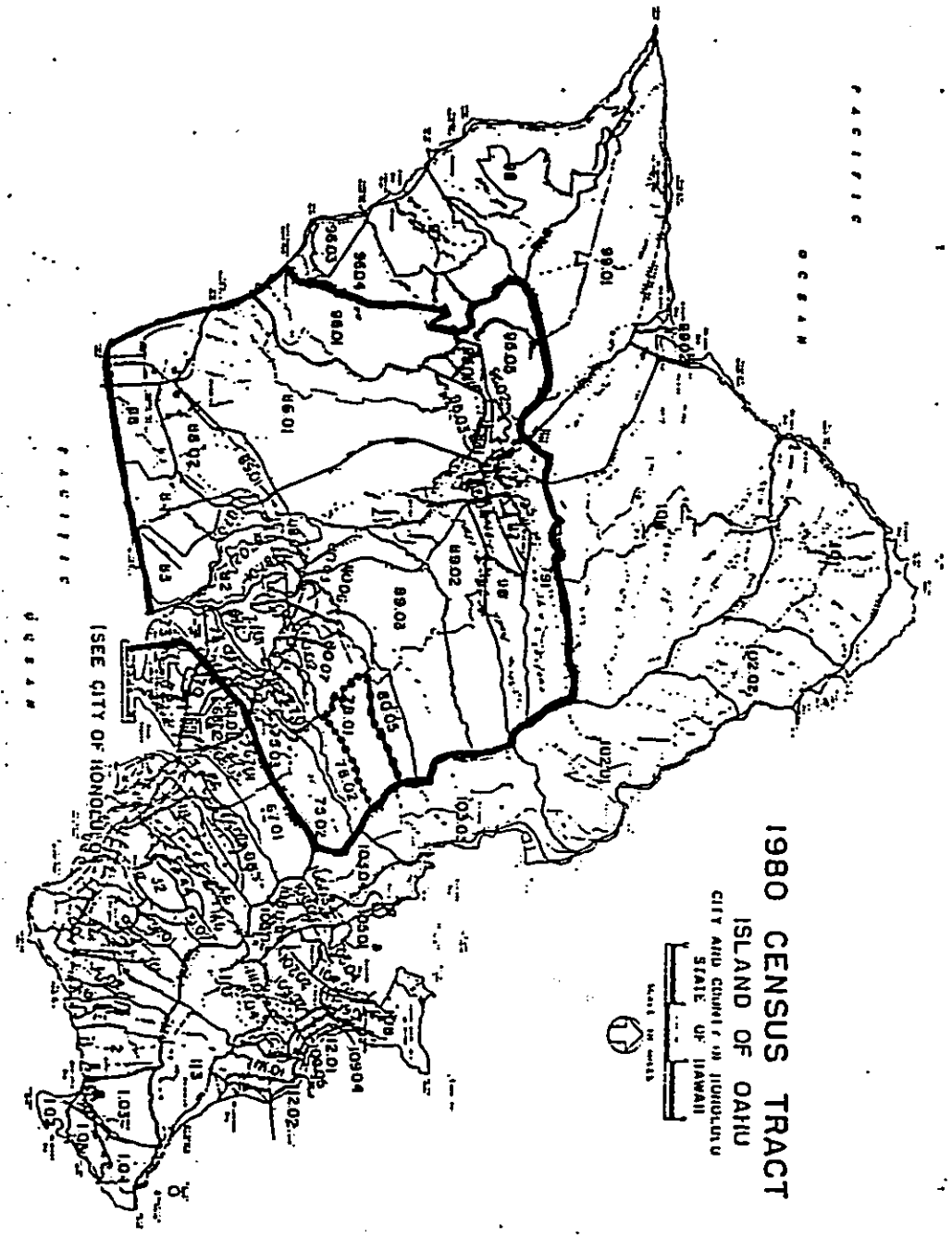
Lusk Hawaii, developers of Wailuna I, II, III wishes to rezone approximately 26 acres of land from conservation to urban. This area will be used to construct approximately 180 residential units. The objective of this study is to provide an impact analysis for the proposed Wailuna IV Urban Development project, the fourth and final phase, located in Waiau, Ewa, Oahu (TMK: 9-8-02: por. 3), with respect to demographic, economic and housing impacts for incorporation into an application for Development Plan Amendment and an Environment Impact Statement of the proposed project.

The proposed development will consist of single-family units. For the purpose of this study, the general market area for the development will include the island of Oahu, which is identical with the Honolulu Standard Metropolitan Statistical Area (SMSA). However, the primary market area will include the specific Honolulu Development Plan Areas:

Primary Market Area

Primary Urban Center (PUC)	Census Tracts 73-82
Ewa	Census Tracts 83-86
Central Oahu	Census Tracts 87-95

The proposed project is contained within Census Tract 78.01 and Census Neighborhood 021.



INTENDED MARKET

For the proposed project, the intended market will include buyers of 180 residential units comprised of largely single-family detached dwelling units. The units, projected for occupancy by 1993, will be of 3 bedroom/2 baths and 4 bedroom/2-½ baths.

Based on the types and price range of the housing units proposed by Lusk Hawaii, the intended market would be comparable to that of Wailuna II and III, excluding the townhouse buyers. At the current average price of $160,000.00, in 1987 dollars, for the single-family units, the potential buyers would probably be "step-up" buyers with dual wage-earners, small, combined households or the "starterfamily" types, and upgrading from their current residential or apartment units. The head of household will also tend to be around 35 to 45 years of age.

For the "affordable" housing units proposed to meet the City's minimum affordable housing requirements, the target market would probably be comparable to the Wailuna I and II townhouse buyers. The developer will provide the required number of affordable units in accordance with governmental requirements.

DEMOGRAPHIC IMPACTS

Residential Population

Population Growth

Compared with the State's overall resident population growth between 1920 to 1980, the Ewa Judicial District has outpaced the State by over one-and-one-half percent annually.

Oahu's average annual growth rate was about 3.1 percent over the 1920 to 1980 period. In contrast, the Ewa Judicial District was estimated to yield a 3.9 percent annual growth rate. However, where Oahu's growth rate slowed from a 1920-1930 average of 5.1 percent to 1.9 percent between 1970-1980, the Ewa Judicial District gained momentum, yielding a 2.8 percent growth rate over the 1920-1930 period to a 3.7 percent rate between 1970-1980, peaking to 5.4 percent between the 1950-1970 period. The resident population counts for the Census years 1920 - 1980 is presented below:

Resident Population

Year	State	Oahu	Ewa District
1920	255,881	123,496	19,406
1930	368,300	202,887	25,507
1940	422,770	257,696	30,602
1950	499,794	353,020	46,691
1960	632,772	500,409	78,666
1970	769,913	630,528	132,299
1980	964,691	762,565	191,051

Within the primary market area, Census Tracts 73-95, the overall growth rates ranged from 4.1 percent to 4.8 percent over the 1950-1980 period. For the Primary Urban Center section of the primary market area, the population growth slowed from a 1950-1960 rate of 5.5 percent to a 2.0 percent growth rate during the 1970-1980 decade. For both Ewa and Central Oahu, the growth paths slowed from a high of 6.3 percent and a 6.1 percent, respectively, to a moderate 3.9 percent and 3.5 percent. During the 1970-1980 period, however, the rate picked up to a 4.2 percent and 4.1 percent, respectively. The primary market area's resident population for census years 1950 to 1980 is given below:

Primary Market Area Population

Year	Census Tract 73-82	Ewa	Central Oahu
1950	28,646	8,958	26,451
1960	48,974	16,449	47,838
1970	77,961	24,087	67,580
1980	95,405	36,255	100,953

Resident Population Projections

Between 1980 to 2005, the State Department of Planning and Economic Development estimated that the City and County of Honolulu's (congruent with the Island of Oahu) resident population would grow at an average annual rate of 0.9 percent.

The table below indicates that the Development Plan Area's Primary Urban Center (Census Tracts 5 to 81) is predicted to grow at a rate of 0.4 percent per annum -- approximately one-half the rate of growth for Oahu's resident population. Ewa, in contrast, is predicted to exhibit a phenomenal growth in excess of four times that of Oahu's rate. This is principally due to the planned development of the Second Urban Center.

Resident Population Projections

Year	Primary Urban Center	Ewa	Central Oahu	Oahu Total
1985	440,201	36,845	116,839	815,300
1990	457,769	47,617	123,108	859,300
1995	467,500	64,499	127,640	896,900
2000	472,892	71,842	134,851	925,700
2005	480,008	83,096	139,849	954,500

The three areas will account for over 78 percent of the expected growth on the island of Oahu to the year 2005, with Central Oahu accounting for over 16 percent, Ewa over 33 percent and the Primary Urban Center 29 percent.

An alternative 5-year forecast based on data provided through CACI, Fairfax, VA., of the three areas indicates that the Ewa Development Plan Area will exhibit the largest growth through 1992, both in absolute population and households. The alternative 5-year forecasts are provided below:

Resident Population Projections

DP Area	1987	1992	Annual Growth
Census Tracts 73-82	92,400	98,000	1.2%
Ewa	41,900	45,500	1.7%
Central Oahu	112,800	119,800	1.2%
Oahu	829,500	865,100	0.8%

In a similar manner, household growth within these areas are provided:

Household Projections

DP Area	1987	1992	Annual Growth
Census Tracts 73-82	25,800	27,600	1.4%
Ewa	10,600	11,600	1.7%
Central Oahu	29,800	31,900	1.4%
Oahu	254,000	266,900	1.0%

Character or Culture of the Neighborhood

Age Distribution

Based on the 1980 Census, the population age mix of the neighborhood in which the project is located was generally younger than the general population of Oahu. The 1980 age distribution is provided below:

Age of Population

Age Range	Neighborhood 021	Oahu
Under 5	8.42%	7.89%
5 - 19	29.26	24.26
20 - 29	16.38	21.68
30 - 59	40.30	35.18
60 - 74	4.53	8.44
75 and over	1.11	2.55

The median age of persons residing in the neighborhood was 27.6 years, as compared to 28.1 years for Honolulu County.

For the various Development Plan Areas, the age distribution forecasts by CACI, Fairfax, VA. are as follows:

Age of Population Forecast

	Census Tract 73 - 82		Ewa		Central Oahu		Oahu	
Age	1987	1992	1987	1992	1987	1992	1987	1992
0-4	7.8%	7.6%	10.4%	10.1%	9.8%	8.7%	7.7%	7.1%
5-11	10.7	10.4	13.6	13.3	13.1	12.9	10.2	10.2
12-16	8.4	7.5	9.8	8.9	8.4	8.6	7.2	6.9
17-21	8.7	7.9	9.3	8.9	10.1	10.2	8.9	8.4
22-29	14.3	13.5	14.5	13.8	15.0	12.7	14.2	12.5
30-44	25.4	24.5	25.1	24.0	24.6	25.1	24.6	25.1
45-54	11.2	13.2	8.6	11.1	8.1	10.2	9.5	11.3
55-64	8.0	8.4	4.9	5.6	5.9	6.0	8.6	8.1
65+	5.4	6.9	3.9	4.3	4.9	5.7	9.2	10.4
Median Age	30.0	31.9	25.8	27.1	26.5	28.1	31.2	32.9

This age distribution forecast indicates that although the general population mix will age similar to Honolulu County as a whole, the primary market area, especially the Ewa and Central Oahu ares will tend to retain relatively younger populations.

Ethnic Distribution

The ethnic composition of the neighborhood was dominated by the "Asian and Pacific Islander" group, based on the 1980 Census. The 1980 distribution is summaried below:

Ethnic Distribution

Ethnic Group	Neighborhood 021	Oahu
White	10.83%	33.10%
Black	.92	2.21
American Indian, Eskimo and Aleut	.13	.28
Asian and Pacific Islander	76.67	59.86
Other	3.45	4.54

The "Caucasian" or "White" ethnic group was the next dominant group. In comparison with Oahu, the ethnic group dominance was smaller, but not magnitude of the two major groups was much closer on the Oahu-wide basis.

Household Size

Census Tract 78.01 containing the subject property had an average household size of 3.51 persons. Neighborhood 021 had an average of 3.82 persons per household according to the 1980 Census. By comparison, the 1980 Oahu average was 3.15 persons per household. The overall distribution of persons per household is detailed below:

Distribution of Household Size

	Neighborhood 021	Oahu
1 person	4.99%	17.20%
2 person	17.23	26.30
3 person	21.74	19.07
4 person	28.27	17.94
5 person	16.14	9.87
6 or more persons	11.63	9.61

The significantly lower percentage of single person households can be attributed to the nature of the housing units within the area.

The average household size is expected to decline by as much as 0.2 percent per annum over the 1987 to 1992 period according to the CACI data. The Census Tracts 73 - 82 have an estimated average household size of 3.49 persons in 1987, declining to 3.46 persons by 1992. Ewa is not expected to noticebly change from its current 1987 estimated 3.86 persons per household. Central Oahu will decline to 3.53 persons per household in 1992, from 3.55 persons in 1987. The Oahu average will shift from a 3.12 persons per household in 1987, to a somewhat similar 3.10 household size in 1992.

Family Income

In 1979, more than two-thirds of the families living within the Census Neighborhood 021, had incomes between $20,000 and $49,999. In comparison, less than 50 percent of the Oahu's families had incomes within that range. The general distribution is provided below:

Family Income

	Neighborhood 021	Oahu
Under $20,000	24.10%	41.30%
$20,000 - $49,999	67.39	48.83
$50,000 or more	8.51	9.87

Due to the housing types and prices within that area, one would expect that the moderate income families would be attracted to this area.

The forecast of median family incomes by CACI of Fairfax, VA. for the various Development Plan Areas included in the primary market area indicates a real growth of 1.6 to 1.9 percent per annum between 1987 and 1992 with a Oahu-wide average of 1.8 percent per annum. The Census Tract 73-82 are estimated to gain an average of $3,700 per family between 1987 and 1992, to yield an annual family income in 1992 of $43,600 in constant 1987 dollars. Ewa is expected to gain an average of $2,400 per family for an annual median family income of $31,400 in 1992. Central Oahu is forecasted to gain over $3,200 from the current 1987 annual median family income of $32,200. Overall, Oahu's family is predicted to increase their real incomes an average of $3,200 to a 1992 annual average family income of $38,100.

Impact Assessment

The proposed project will cause the in-migration of approximately 180 new households, or 450-500 persons. Based on the buyer profile of the Wailuna II and Wailuna III projects, the majority of these households will be from other parts of the island. The project will have the effect of raising the overall average family income within the area, while lowering the average household size, but will not be significant due to the proposed 180 units.

Overall, the addition of the proposed 180 new homes and households is not expected to have a significant impact on the area. The general population levels already expected in the area will not be impacted by the additional 450-500 new individuals, nor will be character of the neighborhood will change significantly.

ECONOMIC IMPACTS

Economic Growth

Overview of the Economy

Federal expenditures have dominated Hawaii's economy since Statehood in 1959. However, in 1974, tourism overtook Federal spending to become Hawaii's and Oahu's leading industry. Historically, Federal spending has been a stabilizing factor and tourism providing the economy with real growth in output, employment and income.

Sugar and pineapple still continue to be a dominant force in the agricultural products export industry. However, eroding market shares in the international markets are taking its toll on these two agricultural product groups. The combined effects of sugar and pineapples's diminishing roles in the economy and the somewhat volatile nature of the tourism ihdustry have given greater impetus for State and Local policymakers to diversify the economy much more than it has in the past. As such, diversified agriculture and manufacturing have been gaining ground in relative importance. Other ventures such as the film industry, high technology, and aquaculture may play a much larger role in sustaining and enhancing the area's real growth prospects.

In 1985, Hawaii's total personal income rose to $14.6 billion over 1984's figure of $13.7 billion, for a 6.4 percent increase. In comparison, the Consumer Price Index showed a 2.4 percent increase over this same period, indicating a real gain in personal income of about 4 percent.

In 1987, the U.S. economy showed a relatively strong second quarter growth of 2.5 percent. Hawaii's economy is expected to have a moderate growth, but not at the 1986 pace. Based on current economic trends, Hawaii's job market is expected to expand at an annual rate of 3 percent.

Hawaii's Economy by Major Sectors

Visitor Industry. For the first half of 1987, the Hawaii Visitors Bureau (HVB) estimated that 4,212,000 visitors arrived in Hawaii, representing a 2.7 percent increase over the same period in 1986. Of these visitors,

over 72 percent consisted of westbound passengers. However, this total represented a 1.1 percent decline over the 1986 westbound traffic. The strength of the visitor industry came from the eastbound traffic, which increased by over 14 percent. The general visitor arrival trend is depicted below:

Visitor Arrivals to Hawaii

Year	Total Arrivals	Westbound	Eastbound
1980	3,934,504	3,046,132	888,372
1981	3,934,623	2,974,791	959,832
1982	4,242,925	3,278,525	964,400
1983	4,367,880	3,395,880	972,000
1984	4,855,580	3,721,380	1,134,200
1985	4,884,110	4,256,390	1,175,500
1986	5,606,980	4,256,390	1,350,590
1987(7 mos)	4,212,000	3,036,990	1,029,700

One reason for the increased eastbound demand can be attributed to the favorable exchange rates being exploited by eastbound travellers, particularly the Japanese. The rise in the value of the Japanese yen against the U.S. dollar, effectively lowered the cost of travel services for the Japanese visitors to Hawaii.

On the other hand, for the Westbound visitors, the rising cost of air travel, primarily due to increases in the cost of fuel, hotel room rates and cost of other services, significantly raised the cost of travel services in general.

Since travel to Hawaii is largely a discretionary purchase for both Westbound and Eastbound travellers, the continued strength of the tourist market will be eased on the strength of the households' discretionary income. For Westbound travellers, the gain in real disposable-discretionary incomes will largely dictate future travel plans to Hawaii. For Eastbound travellers, a combination of real disposable-discretionary incomes gains, as well as favorable exchange rates will dominate the travel decision.

Federal Government. Federal expenditures in Hawaii have been a major force in providing a stable economic base, with the military playing a significant role. According to the Bank of Hawaii, the total Federal expenditures grew at a average annual rate of 3.6 percent, between 1980 and 1986. Over this same period, defense

expenditures grew at an average annual rate of 5.4 percent and non-defense spending grew at 0.9 percent per annum. The annual expenditures from 1980 to 1986 are shown below:

Federal Expenditures
($ millions)

Year	Defense	Non-Defense	Total Federal
1980	1,399.2	1,907.9	3,307.1
1981	1,520.0	2,140.8	3,331.7
1982	1,820.0	2,366.7	4,156.7
1983	2,028.7	2,442.3	4,451.0
1984	2,062.9	2,278.8	4,341.7
1985	2,159.5	2,408.5	4,568.0
1986(est)	2,025.5	2,206.0	4,231.5

Although the absolute expenditures are relatively constant over the 1980 to 1986 period, the contribution of those dollars to the overall State's Gross Product has steadily declined since 1983, as shown below:

Federal Expenditures vs. Gross State Product
($ millions)

Year	Federal Expenditures	Gross State Product	Pct. of Gross State Product
1980	3,307.1	11,878.3	27.8
1981	3,661.7	12,980.4	28.2
1982	4,156.7	13,474.9	31.1
1983	4,451.0	14,835.9	30.0
1984	4,341.7	15,710.9	27.6
1985	4,568.0	16,678.8	27.4
1986	4,231.5	17,800.0	23.8

Agriculture. Annual Sugar and pineapple production, which was once second only to Federal expenditures, has been steadily declining over the last decade. According to Bank of Hawaii data, since 1980, sugar production declined from 1.1 million tons to 1.0 million tons, with employment dropping from 3,817 to 2,771. The pineapple industry had a similar profile, with reduction in tonnage from 556,000 in 1980, to 441,000 in 1985. Due to lower labor costs outside the U.S., both sugar and pineapple are turning to increasing mechanization by modernization of these industries, in an attempt to remain competitive in the world markets through increases in productivity and lower

costs. However, the likelihood of sugar and/or pineapple to regain its dominance is poor.

In an effort to promote the continued existence of the agriculture industry in Hawaii, the diversified agriculture sector has gained impetus, although small in absolute value. Bank of Hawaii data indicates that of the various components of the diversified agriculture sector, the floriculture industry, comprising cut flowers, foliage and other nursery products, generated over 20 percent of the 1985 sales, amounting to $44.2 million. Livestock products contributed over 30 percent to the total value of diversified agriculture's cash receipts in 1985.

A summary of agriculture's contribution to the State's Gross Product is presented below:

Revenue from Agriculture
($ Thousands)

Year	Sugar	Pineapple	Diversified Agriculture	
			Livestock	Crops
1980	594,100	229,200	80,693	91,712
1981	327,900	220,600	87,573	104,684
1982	351,500	207,300	77,774	104,605
1983	410,200	219,000	85,522	115,624
1984	393,500	249,500	86,201	118,187
1985	344,400	222,500	81,852	133,095
1986	359,700	241,400	230,000 (prelim)	

Construction. Construction in Hawaii by the Bank of Hawaii shows that total construction in Hawaii rose by about 26 percent in 1986, as measured by taxable completions. The strength of the construction industry seems to be gaining more momentum. From 1983, there have been a steady growth in authorizations (building permits issued) for both the State and Oahu, as shown in below:

Construction on Oahu and Statewide
($ Thousands)

Year	Oahu Authorizations			State
	Private	Government	Total	Total
1980	688,300	57,264	745,564	1,536,555
1981	488,614	61,639	550,253	1,283,376
1982	453,905	39,233	493,138	1,123,144

1983	347,768	62,998	410,765	1,045.600
1984	413,342	60,600	473,942	1,180,019
1985	498,216	121,472	619,688	1,358,390
1986	575,669	98,479	674,148	1,777,212

Although government authorizations seemed to provide a major stimulus to the industry since 1985, private authorization have been growing a health 18 percent since 1983.

For the period between 1986 to 1990, the State Department of Planning and Economic Development estimates that construction will remain strong, with over $3.1 billion in major construction activity within Oahu. A summary of major construction activity in terms of project costs is given below:

Construction Projections
($ Thousands)

Period	Total Oahu	Total State
1985-1990	3,181,208.8	5,242,810.0
1991-1995	1,061,067.0	1,879,600.0
1996-2000	579,600.0	914,100.0
2001-2005+	340,300.0	340,300.0

As other new construction projects enter into its planning stages, the strength of the industry should continue to fare well. However, the actual outcomes will be dictated by the stability of both the national and local economies.

Forecast

Hawaii's growth rate between 1960 and 1980 averaged 5.3 percent per annum. DPED's Series M-F projects the Gross State Product (GSP) to grow from $12.1 billion in 1985, to $20.2 billion in 2005, in constant 1980 dollars. This would result in an average annual rate of 2.6 percent between 1985 to 2005. This growth rate is expected to be strongest within the 1985 to 1990 period, at a 3.0 percent annual growth rate. The growth is expected to slow down to a 2.0 percent average annual rate between the years 2000 to 2005, yielding an increase in GSP at $1.9 billion, in constant 1980 dollars.

The State DPED Series M-F projections estimates that in 1985, personal income will be $8.9 billion, in constant 1980 dollars. In 1990, personal income will increase to $10.1 billion. Over this same period, per capita personal income is estimated at $10,917 and $11,781, respectively.

Employment

Historically, the civilian employment on Oahu has increased, but at a decreasing rate since 1980. Between 1975 and 1980, employment increased by 16 percent. Between 1980 and 1985, employment increased by only 5.3 percent. Currently, job growth on Oahu has slowed to about 3 percent per annum. The employment trend since 1980 is given below:

Total Employment

Year	Oahu	State
1980	322,500	418,000
1981	328,500	427,000
1982	328,600	430,000
1983	336,550	442,000
1984	338,050	445,000
1985	343,300	454,000
1986	351,400	447,000

Oahu's principal employer is the services industry which provided 92,350 jobs in 1986, followed by the retail and wholesale trade sector which provided 91,750 jobs. In particular, the retail trade, along with the service sector, has benefited enormously from the economic growth which Hawaii has had over the past two years.

The public sector, which includes Federal, State and Local governments, provided an annual average of 79,200 jobs on Oahu in 1986, of which the State provided over 49 percent of the total followed by the Federal government with about 39 percent. The local government, over the period 1980 to 1986, had a relatively stable job count, averaging about 9,500 jobs per year.

A profile of the major employing sectors on Oahu between 1980 and 1986 as provided by the State Dept. of Labor and Industrial Relations is summarized below:

Employment By Sector on Oahu

Year	Services	Trade	Government	Other
1980	79,300	87,600	75,550	90,600
1981	81,450	87,300	75,400	88,150
1982	79,200	86,050	76,550	83,900
1983	82,250	86,300	77,450	84,100
1984	84,550	89,600	77,800	82,450
1985	87,300	91,900	79,000	84,100
1986	92,350	91,750	79,200	87,350

In 1987, preliminary estimates by the Hawaii Department of Planning and Economic Development, Research and Economic Analysis Division, indicated that there were 356,400 jobs on Oahu. The State's Series M-F projections for the City and County of Honolulu, indicates that by the year 2005, there will be a total of approximately 448,400 civilian jobs on Oahu. Of these total jobs, the above major employing sectors are projected to provide the following number of jobs:

Employment By Sector on Oahu

Year	Services	Trade	Government	Other
1990	91,200	102,300	82,100	96,600
1995	97,900	110,000	85,200	101,500
2000	102,800	115,500	87,800	105,100
2005	106,500	119,700	90,600	107,100

The unemployment rate is expected to average about 5.5 percent per annum to the year 2005 period. Currently, Oahu's unemployment rate stands at 4.3 percent, down from the same period last year of 5.1 percent.

Government Revenues from the Project

Typically, State and Local governments can expect to gain financially from a new residential development. For the State, general excise tax revenues from construction and from home sales would provide substantial short-term revenues. Income tax revenues generated due to construction activities and construction workers' salaries are additional revenue sources.

For the City and County of Honolulu, the primary source of revenue would be in the form of additional or increased property taxes, due to the increased values to the property upon reclassification, rezoning, and construction. This would be a long-term source of additional revenue.

Based on various assumptions made regarding the proposed project, the approximate government revenue effects of the development can be made. The assumptions are:

1. The effective average sales revenues generated by the proposed project will be $160,000 per unit, in 1987 dollars.
2. Construction and infrastructure costs for the development will average about $100,000 per unit.
3. Direct labor costs would be about one-third of sales revenues.
4. The average absorption rate for residential sales will be 80 units per year.

Using these assumptions, a magnitude-of-order estimate of the total revenues that could potentially accrue to the state and local governments were calculated and summarized below:

General Excise Taxes
- Construction.....$0.72 million
- Residential Sales..... 0.12 million
- Personal Consumption..... 0.22 million

Income Taxes
- Corporate
  - Construction..... 0.06 million
  - Residential Sales..... 0.18 million
- Personal..... 0.65 million

In total, it is estimated that during the construction period, approximately $2.0 million in additional short-term revenues would accrue to the State of Hawaii and the City and County of Honolulu, that could be attributed to the development of the proposed residential project. Over the longer-term period, real property tax revenues will

contribute approximately $190,000 per year in constant dollars.

Impact Assessment

The current trends and projections indicate that the economy of Hawaii and the City and County of Honolulu should fare well in the future. This implies that the employment picture will remain favorable for the existing and projected labor force.

The project will contribute approximately $18 million in private authorizations over a 2 year period. It will also provide short-term employment to approximately 50 persons in the construction services (management, clerical, etc.) fields.

HOUSING IMPACTS

Housing Supply and Demand

Housing Supply

Construction actively over the next 3-5 years should provide a continued supply of new residential units, especially the larger, 2-bedroom and over, units. However, the total supply will be constrained by existing public policies and regulations, and the conditions of the financial marketplace. In particular, the City and County of Honolulu's General Plan and Development Plan will have a significant impact on the limits to growth of residential units.

Despite mortgage rate improvements during the previous year, the Bank of Hawaii's Construction in Hawaii 1987, reported that authorizations of new single family units decreased by approximately 12.5 percent between 1985 and 1986. In contrast, authorizations of new multi-family units increased by about 14.9 percent over this same period. Residential authorizations in 1986, in both single and multifamily units totalled 4,212. This represented a 0.1 percent decrease over the 1985 period. From 1980 to 1986, authorizations of new single family units dipped during the 1981-1982 recession period. However, new multi-family units authorizations have been relatively constant, as presented below:

Residential Authorizations

	Units		Value ($000)	
Year	Single-Fam.	Multi-Fam.	Single-Fam.	Multi-Fam.
1980	1,650	3,411	87,045	224,294
1981	768	1,915	55,330	135,341
1982	891	2,585	53,209	116,923
1983	1,562	1,280	107,494	65,442
1984	2,199	1,054	154,437	41,656
1985	2,313	1,905	156,783	89,318
1986	2,024	2,188	162,160	105,840

Construction trends indicate that on the average, smaller size units are being built. In 1980, the average single-family house was 1,291 square feet. In 1986, this average fell to 1,191 square feet. For multi-family units,

the average unit size was 1,190 square feet in 1980. In 1986, the average size fell by 332 square feet to 858 square feet.

The average price of the single-family units increased from $131,693 in 1980, to $156,189 in 1986. The average price for the multi-family units rose from $93,428 in 1980, to $108,656 in 1986. In 1982, the average multi-family dwelling unit peaked at $114,669. These trends can be clearly seen below:

Average Size and Price of Units

	Single-Family		Multi-Family	
Year	House (sq.ft.)	Price ($)	Living Area (sq. ft.)	Price ($)
1980	1,291	131,693	1,190	93,428
1981	1,389	157,026	1,215	103,310
1982	1,232	137,267	1,198	114,669
1983	1,173	135,357	740	85,064
1984	1,261	140,700	720	81,373
1985	1,263	147,093	773	93,737
1986	1,191	156,189	858	108,656

Average single-family housing prices rose at an average annual rate of 2.9 percent. Multi-family unit prices increased at an average annual rate of 2.5 percent.

The annual Oahu housing survey conducted by the Federal Home Loan Bank of Seattle and the U. S. Postal service yielded an overall vacancy rate of 1.3 percent for March 1980. For March 1983, this survey revealed an identical rate of 1.3 percent for Oahu.

Housing Demand

One of the primary components of housing demand is the household formation rate and household size. A comparison of the 1970 and 1980 Census data on household formation for Oahu indicates that single-member households, although less than 20 percent of the total households, is increasing at a much faster rate. Single-member households, over this ten-year period, grew at an average annual rate of 7.7 percent. In contrast, multiple-member households grew at an average annual rate of 3.4 percent.

This faster rate of increase in single-member households, plus the later age of marriages, later age of family formations and Oahu's aging population are also reflected in the decrease in persons per household. In 1970, the average number of persons per household was 3.57 persons. In 1980, the average decreased to 3.14 persons per household. In 1983, DPED estimated that Statewide, the average persons per household was 3.13 persons.

If the current trend toward declining household size continues through the next decade, then the demand for housing will largely consist of smaller units. In addition, if housing prices, vis-a-vis rental housing, continues to outpace total household incomes, then the smaller housing unit demand will favor moderate- to high-rise residential developments.

In 1970, 45 percent of all occupied housing units were owner-occupied. This proportion increased in 1980 to 49.9 percent. Owner-occupied housing units grew at an average rate of 4.5 percent annually, while renter-occupied units grew at a more modest rate of 2.5 percent.

With the favorable interest rates of the previous year, and the continuation into the first half of 1987, the level of mortgage activity increased significantly. However, this has slowed as interest rates have increased.

Within the immediate area of the proposed project, described as Census Tract 78.01, through data from CACI, Fairfax, VA., two major market segments comprising the potential housing demand can be identified. These are the "Upper-middle income, high value suburbs, mostly professional" group and the "Young, mobile households in multi-unit housing".

Within the "Upper-Middle Income, High Value Suburbs, Mostly Professional" segment, two sub-segments can be identified in this area. The first contain "primarily young and middle-aged families with pre-teen and teenage children". Their annual household incomes exceed $35,000 with significant numbers of households with incomes greater than $50,000. The housing in the area is relatively new and of high value. About 17 percent of the households are included in this first sub-segment.

The second sub-segment consists of middle-aged households with young children. Their household incomes are

slightly less than the first sub-segment, with their incomes concentrated in the $25,000 to $50,000 range. Again, the home values are high and of recent vintage. Approximately 42 percent of the households in this census tract fall in this category.

Comprising over 41 percent of Census tract 78.01, the "Young, Mobile Households in Multi-Unit Housing" segment contains the extremes of young households and older households, with few middle aged persons and children. Their annual incomes tend to exceed $50,000. The adults in the area tend to be well educated, primarily in the professional and managerial occupations.

The Housing Market

The following listing by the Bank of Hawaii's Construction in Hawaii of existing inventory residential developments from 1982 to 1986, indicates a variety of factors are interacting with the supply and demand conditions within the primary market area:

Single Family Residential Developments

Project/Developer	House Area (sq.ft)	Units Sold	Price Range
Palehua Heights II			
Finance Realty Co.	1,350	8 (1982)	$134,500-150,000
		28 (1983)	117,000-194,900
		6 (1984)	115,000-200,216
		4 (1985)	153,000-265,000
		9 (1986)	151,000-273,892
Palehua Heights III			
Finance Realty Co.	1,350	4 (1984)	141,000-170,000
		15 (1985)	141,800-212,200
		22 (1986)	154,900-188,581
Village Park			
Waitec Development	1,000	78 (1982)	108,000-145,000
		150 (1983)	112,000-120,000
		149 (1984)	112,500-134,000
	1,200	250 (1985)	120,000-130,000
	1,300	294 (1986)	129,000-144,000
Puahi in Waipio			
Gentry-Waipio	1,280	50 (1982)	105,000-145,000

Mililani Town			
Mililani Town	925-1,300	203 (1982)	97,200-178,200
	915-1,415	224 (1983)	104,200-191,800
	1,300	315 (1984)	113,745-198,900
	1,200	474 (1985)	113,745-279,500
	1,000	520 (1986)	118,700-202,000
Royal Summit			
Horita Homes	1,700	115 (1982)	67,500-300,000
		54 (1983)	188,500-290,000
	1,500	48 (1984)	n.a. -290,000
	(lots)	160 (1985)	97,500-105,700
Ahikoe			
Finance Realty	1,008	16 (1983)	122,847-136,700
		10 (1984)	123,000-135-639
		20 (1985)	123,000-138,947
		8 (1986)	127,500-138,000
Laulea, Nohea & Kaulana			
Gentry Pacific	1,220	280 (1983)	115,000-160,000
Nohea			
Gentry-Waipio	1,200	154 (1984)	112,000-160,000
Kaulana			
Gentry-Waipio	1,200	224 (1984)	117,000-162,000
Luana			
Gentry-Waipio	1,200	53 (1984)	117,000-162,000
Ke Kumulani			
Blackfield-Lusk	1,205	42 (1984)	140,000-180,000
		62 (1985)	140,000-170,000
	1,200	65 (1986)	135,000-170,000
Heights at Wailuna			
Lusk Hawaii	n.a.	31 (1985)	149,000-189,000
	1,300	56 (1986)	153,000-207,000
Colony Ridge			
Finance Realty	1,594	52 (1986)	140,000-186,055
Ho-o Kumu			
Palisades Venture	1,100	12 (1986)	127,800-130,000
Nahalekeha			
Lear Siegler	1,596	29 (1986)	235,000-315,000

Multi-Family Residential Developments

Project/Developer	Living Area (sq.ft)	Units Sold	Price Range
Kuola (Waipio)			
Gentry-Waipio	750	50 (1982)	79,000- n.a.
		18 (1984)	81,000- 88,000
Kuola, Ihona & Hikino			
Gentry-Waipio	600	200 (1983)	49,000- 83,000
Wailuna			
John D. Lusk & Son	1,391	48 (1982)	110,000-147,000
	1,400	24 (1983)	130,000-159,000
	1,375	36 (1984)	132,000-165,000
College Gardens			
Lear Siegler	840	105 (1983)	78,000- 92,150
Palehua Villas			
Finance Realty	800	22 (1984)	78,700-104,200
		15 (1985)	78,700-105,000
		32 (1986)	78,700-110,600
Palehua Nani			
Finance Realty	1,142	9 (1984)	99,400-124,800
		6 (1985)	75,500-124,800
		36 (1986)	75,700-124,000
Palehua View Estates			
Finance Realty	1,257	1 (1984)	135,000
		1 (1985)	117,000
		1 (1986)	117,600
Ihona			
Gentry-Waipio	500	132 (1984)	50,000- 69,000
Hikino & Pulua			
Gentry-Waipio	n.a.	124 (1984)	50,000- 88,000
Alii Plantation			
Lear Siegler	900	105 (1985)	89,000-102,900
Mililani Terrace Apartments			
Mililani Town	537	60 (1984)	55,000- 68,400
	723	53 (1985)	55,000- 68,400
		133 (1986)	n.a.

Manana Garden Apartments			
Manana Assoc. (HHA)	616	n.a.	n.a.
Newtown Meadows			
Venture Fifteen	985	122 (1986)	105,500-117,500
Crosspointe			
Gentry-Halawa Park	750	215 (1986)	81,000-130,000

As can be seen from the above listing, there is an adequate demand for residential units within the average $160,000 price range of the proposed development. Some 1047 single family units were sold in the market area in 1986.

In general, the net demand for additional housing will increase through the year 2005. Projections made by the City and County of Honolulu's Department of General Planning were used to estimate the net demand for housing through the year 2005. The results indicate a Oahu-wide shortfall of housing units of 46,000 units by the year 2005, as shown below:

Housing Demand and Supply Projections
(Thousand of Units)

	1985	1990	1995	2000	2005
Oahu					
Demand	271.4	292.1	309.9	324.9	338.8
Supply	264.3	272.5	281.6	289.1	292.4
Net Deficit	7.1	19.6	28.3	35.8	46.4
Primary Urban Center					
Demand	163.1	172.7	178.1	181.4	185.1
Supply	159.7	164.4	168.2	171.4	172.4
Net Deficit	3.4	8.3	9.9	10.0	12.7
Ewa					
Demand	9.6	13.8	21.3	25.3	30.9
Supply	9.2	11.9	16.9	20.9	22.9
Net Deficit	0.4	1.9	4.4	4.4	8.0
Central Oahu					
Demand	31.0	33.6	35.4	38.5	40.5
Supply	29.7	29.7	29.8	29.9	29.9
Net Deficit	1.3	3.9	5.6	8.6	10.6

Primary Market Area					
Demand	40.6	47.4	56.7	63.8	71.4
Supply	38.9	41.6	46.7	50.7	52.8
Net Deficit	1.7	5.8	10.0	13.1	18.6

The general conclusion to be drawn is that additional housing within the primary market area is needed. The market should absorb the additional housing units proposed by the developer.

Affordable Units

On the demand side, the single-digit interest rates in 1986 provided the means for a greater number of families to purchase their homes or to "step-up" to a larger home. However, the "affordability gap" continued to be a major obstacle for many households. It is this group that have income too high to qualify for public assistance and too low to purchase outright at market rates.

The principal reason is the ever-growing divergence between average mortgage payments, driven by housing costs and interest rates, and average family incomes. From 1980, average prices of residential units increased between 2.5 to 2.9 percent per year. Assuming this rate of increase continues and that Oahu's median family incomes will rise by 1 to 2 percent per year, the "affordability gap" will continue to widen.

However, examination of projected household income growth distribution reveals that possibly a greater number of households may realize higher real incomes within "affordable" ranges. This idea can be illustrated by the projected growth from CACI of Fairfax, VA. of household incomes between 1987 to 1992, as shown below:

Growth Rates of Household Incomes, 1987-1992

Income Range	PUC	Ewa	Central Oahu	Oahu
Less than $10,000	- 1.3%	- 1.7%	- 2.1%	- 1.4%
$10,000 - $14,999	- 3.2	- 2.5	- 2.4	- 2.0
$15,000 - $24,999	- 1.8	- 0.3	0.7	- 0.5
$25,000 - $34,999	0.7	1.1	0.9	0.5
$35,000 - $49,999	- 0.3	2.1	0.1	0.3

$50,000 - $74,999	3.1	7.3	4.4	3.1
$75,000 and up	11.5	18.9	12.5	7.6
Median Income	1.8	1.6	1.9	1.6

As seen, the $50,000+ households indicate significant advances keeping pace with rising housing prices.

When considering the availability of rental housing as a viable substitute for owner-occupied housing the availability of the rental housing stock is decreasing. The conversion of rental units to condominiums during the late 1970s and early 1980s, combined with the increasing disincentives towards the private construction or rental units, have created a shortage of rental housing. This has increased the upward pressures on rental prices and increased the marginal disutility for rental, infavor of owner-occupied units. This has increased the latent demand for owner-occupied housing.

From the supply side, the decreasing rate of growth of the housing stock on Oahu will contribute to the rising housing prices, as buyers "bid up" the existing inventory of available homes. Therefore, increasing the supply of all housing types will be critical is maintaining an inventory of affordable housing.

Thus, affordable housing will probably be possible only through multi-family residential developments. This is principally due to the restrictive nature of urban land availability.

Impact Assessment

Based on the ability of Lusk Hawaii to develop and sell Wailuna I, II, and III, and the foregoing housing impact analysis, there is an adequate potential market for the proposed residential units. These proposed units will alleviate the pent-up demand for housing in the upper moderate income to high income brackets. The "affordable" units that will be built as part of the City's requirements will address some of the housing demand of moderate income families. The effective buying power of this group will be heavily dependent upon the economy's ability to support a higher real wage level, while maintaining a moderate growth in the cost of living.

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APPENDIX A

DEMOGRAPHIC FORECAST REPORTS

1980 Census, 1987 Update and 1992 Forecasts

Census Tract 73-82
Ewa
Central Oahu
Oahu

Source: CACI, Fairfax, VA, Pacific Economic Systems Consultants, and Environment Capital Managers.

CT 73-82 PRIMARY URBAN CTR	1980 CENSUS	1987 UPDATE	1992 FORECAST	1987-1992 CHANGE	ANNUAL GROWTH
POPULATION	82947	92437	97993	5556	1.2%
HOUSEHOLDS	22750	25798	27625	1827	1.4%
FAMILIES	20113	22344	23681	1337	1.2%
AVG HH SIZE	3.54	3.49	3.46	-0.03	-0.2%
AVG FAM SIZE	3.80	3.78	3.76	-0.01	-0.1%
TOT INC (MIL$)	633.8	1045.7	1215.1	169.4	3.0%
PER CAPITA INC $	7641 $	11312 $	12400 $	1088	1.9%
AVG FAM INC $	28544 $	41569 $	45112 $	3543	1.6%
MEDIAN FAM INC $	26731 $	39924 $	43647 $	3723	1.8%
AVG HH INC $	27861 $	40533 $	43984 $	3451	1.6%
MEDIAN HH INC $	25859 $	38603 $	42139 $	3536	1.8%

	1980 CENSUS	%	1987 UPDATE	%	1992 FORECAST	%
HOUSEHOLD INCOME						
$ 0- 9999	2546	11.2	1370	5.3	1296	4.7
$ 10000-14999	2805	12.3	1567	6.1	1335	4.8
$ 15000-24999	5524	24.3	4332	16.8	3961	14.3
$ 25000-34999	5402	23.7	4097	15.9	4244	15.4
$ 35000-49999	4717	20.7	6383	24.7	6275	22.7
$ 50000-74999	1455	6.4	6029	23.4	7040	25.5
$ 75000 UP	301	1.3	2020	7.8	3484	12.6
AGE DISTRIBUTION						
0- 4	6784	8.2	7240	7.8	7446	7.6
5-11	10401	12.5	9881	10.7	10188	10.4
12-16	7985	9.6	7808	8.4	7306	7.5
17-21	8169	9.8	8079	8.7	7791	7.9
22-29	12784	15.4	13226	14.3	12240	12.5
30-44	20022	24.1	23458	25.4	24034	24.5
45-54	8487	10.2	10349	11.2	12937	13.2
55-64	5289	6.4	7362	8.0	8262	8.4
65+	3028	3.7	5034	5.4	6759	6.9
AVERAGE AGE	29.2		31.9		33.5	
MEDIAN AGE	27.6		30.0		31.9	
RACE DISTRIBUTION						
WHITE	27602	33.3	28741	31.1	28630	29.2
BLACK	1810	2.2	2057	2.2	2258	2.3
OTHER	53535	64.5	61639	66.7	67105	68.5

CT 83-86 ENA	1980 CENSUS	1987 UPDATE	1992 FORECAST	1987-1992 CHANGE	ANNUAL GROWTH
POPULATION	36234	41911	45515	3604	1.7%
HOUSEHOLDS	9139	10639	11590	952	1.7%
FAMILIES	8329	9555	10345	790	1.6%
AVG HH SIZE	3.87	3.86	3.86	-0.01	-0.0%
AVG FAM SIZE	4.08	4.06	4.09	0.03	0.0%

TOT INC (MIL$)		192.3	335.0	401.3	66.3	3.7%
PER CAPITA INC	$	5306	$ 7993	$ 8817	$ 824	2.0%
AVG FAM INC	$	20990	$ 31375	$ 34469	$ 3094	1.9%
MEDIAN FAM INC	$	19281	$ 28991	$ 31400	$ 2409	1.6%
AVG HH INC	$	21038	$ 31490	$ 34625	$ 3135	1.9%
MEDIAN HH INC	$	19485	$ 29257	$ 31699	$ 2442	1.6%

	1980 CENSUS	%	1987 UPDATE	%	1992 FORECAST	%
HOUSEHOLD INCOME						
$ 0- 9999	1693	19.5	859	8.1	788	6.8
$ 10000-14999	1412	16.5	1116	10.5	985	8.5
$ 15000-24999	3661	33.5	2273	21.4	2242	19.3
$ 25000-34999	1443	21.3	2516	23.7	2657	22.9
$ 35000-49999	854	9.3	2489	23.4	2756	23.8
$ 50000-74999	169	1.8	1187	11.2	1691	14.6
$ 75000 UP	7	0.1	198	1.9	471	4.1
AGE DISTRIBUTION						
0- 4	3926	10.8	4346	10.4	4576	10.1
5-11	5459	15.1	5712	13.6	6035	13.3
12-16	3745	10.3	4098	9.8	4067	8.9
17-21	3817	10.5	3911	9.3	4049	8.9
22-29	5970	16.5	6059	14.5	6302	13.8
30-44	7998	22.1	10499	25.1	10917	24.0
45-54	2635	7.3	3620	8.6	5068	11.1
55-64	1580	4.4	2048	4.9	2549	5.6
65+	1104	3.0	1618	3.9	1952	4.3
AVERAGE AGE	26.0		28.1		29.3	
MEDIAN AGE	23.6		25.8		27.1	
RACE DISTRIBUTION						
WHITE	15210	42.0	16810	40.1	17397	38.2
BLACK	753	2.1	907	2.2	1036	2.3
OTHER	20271	55.9	24194	57.7	27082	59.5

CT 87-95 CENTRAL OAHU	1980 CENSUS	1987 UPDATE	1992 FORECAST	1987-1992 CHANGE	ANNUAL GROWTH
POPULATION	100953	112779	119789	7019	1.2%
HOUSEHOLDS	26182	29780	31943	2163	1.4%
FAMILIES	22966	25783	27501	1718	1.3%
AVG HH SIZE	3.58	3.55	3.53	-0.02	-0.1%
AVG FAM SIZE	3.87	3.85	3.83	-0.01	-0.1%
TOT INC (MIL$)	603.7	1017.3	1195.8	178.4	3.3%
PER CAPITA INC	$ 5980	$ 9021	$ 9982	$ 961	2.0%
AVG FAM INC	$ 23706	$ 35052	$ 38363	$ 3311	1.8%
MEDIAN FAM INC	$ 21247	$ 32168	$ 35407	$ 3239	1.9%
AVG HH INC	$ 23060	$ 34162	$ 37435	$ 3273	1.8%
MEDIAN HH INC	$ 20186	$ 30788	$ 33886	$ 3098	1.9%

	1980 CENSUS	%	1987 UPDATE	%	1992 FORECAST	%
HOUSEHOLD INCOME						
$ 0- 9999	5877	22.4	3031	10.2	2728	8.5
$ 10000-14999	3950	15.1	3624	12.2	3215	10.1
$ 15000-24999	5998	22.9	5594	18.8	5784	18.1
$ 25000-34999	5264	20.1	4562	15.3	4776	15.0
$ 35000-49999	3776	14.4	6449	21.7	6497	20.3
$ 50000-74999	1095	4.2	4999	16.8	6201	19.4
$ 75000 UP	221	0.8	1520	5.1	2741	8.6
AGE DISTRIBUTION						
0- 4	11144	11.0	11693	9.6	10358	8.7
5-11	12664	12.5	14829	12.1	15401	12.9
12-16	8002	7.9	9491	8.4	10337	8.6
17-21	12919	12.8	11426	10.1	12174	10.2
22-29	18935	18.8	16872	15.0	15223	12.7
30-44	20349	20.2	27727	24.6	30075	25.1
45-54	7684	7.6	9128	8.1	12185	10.2
55-64	5215	5.2	6694	5.9	7169	6.0
65+	4041	4.0	5510	4.9	6860	5.7
AVERAGE AGE	27.1		29.1		30.4	
MEDIAN AGE	24.1		26.5		28.1	
RACE DISTRIBUTION						
WHITE	33168	32.9	35123	31.1	35395	29.5
BLACK	6518	6.5	7281	6.5	7993	6.6
OTHER	61267	60.7	70366	62.4	76501	63.9

Oahu	1980 CENSUS	1987 UPDATE	1992 FORECAST	1987-1992 CHANGE	ANNUAL GROWTH
POPULATION	762565	829466	865072	35606	0.8%
HOUSEHOLDS	230214	253960	266908	12948	1.0%
FAMILIES	176916	192004	200255	8251	0.8%
AVG HH SIZE	3.15	3.12	3.10	-0.02	-0.1%
AVG FAM SIZE	3.69	3.68	3.67	-0.01	-0.0%
TOT INC (MIL$)	5733.4	9069.9	10267.9	1198.0	2.5%
PER CAPITA INC	$ 7519	$ 10862	$ 11800	$ 938	1.7%
AVG FAM INC	$ 27030	$ 38359	$ 41277	$ 2918	1.5%
MEDIAN FAM INC	$ 23579	$ 34840	$ 38087	$ 3247	1.8%
AVG HH INC	$ 24905	$ 35477	$ 38245	$ 2768	1.5%
MEDIAN HH INC	$ 21128	$ 31298	$ 33948	$ 2650	1.6%

	1980 CENSUS	%	1987 UPDATE	%	1992 FORECAST	%
HOUSEHOLD INCOME						
$ 0- 9999	47659	20.7	29467	11.6	27525	10.3
$ 10000-14999	32194	14.0	24586	9.7	22243	8.3
$ 15000-24999	55459	24.1	47200	18.6	46126	17.3
$ 25000-34999	41693	18.1	40853	16.1	41394	15.7
$ 35000-49999	33468	14.5	49127	19.3	49902	18.7

$ 50000-74999	14577	6.3	41189	16.2	47925	18.0
$ 75000 UP	5163	2.2	21543	8.5	31142	11.7
AGE DISTRIBUTION						
0- 4	60154	7.9	63773	7.7	61473	7.1
5-11	79949	10.5	84265	10.2	88527	10.2
12-16	61184	8.0	59472	7.2	59675	6.9
17-21	81602	10.7	73900	8.9	72438	8.4
22-29	127615	16.7	117539	14.2	108296	12.5
30-44	156822	20.6	204125	24.6	217252	25.1
45-54	74775	9.8	78562	9.5	97860	11.3
55-64	65096	8.5	71556	8.6	69771	8.1
65+	55368	7.3	76274	9.2	89780	10.4
AVERAGE AGE	31.7		33.8		34.9	
MEDIAN AGE	28.1		31.2		32.9	
RACE DISTRIBUTION						
WHITE	252455	33.1	263690	31.8	263368	30.4
BLACK	16843	2.2	19056	2.3	20851	2.4
OTHER	493267	64.7	546720	65.9	580853	67.1

IMPORTANT: 1. HOUSEHOLD INCOME INCLUDES THE INCOME OF FAMILIES AND UNRELATED INDIVIDUALS. HOUSEHOLD INCOME IS THE TOTAL AVAILABLE INCOME FOR THE AREA.
2. INCOME FIGURES ARE EXPRESSED IN CURRENT DOLLARS FOR 1980 AND 1987. 1992 FIGURES ARE EXPRESSED IN 1987 DOLLARS.

 DATE 10/16/87

APPENDIX B

ACORN HOUSEHOLD PROFILE REPORT

Census Tract 78.01 and Oahu

Source: CACI, Fairfax, VA,

ACORN HOUSEHOLD PROFILE REPORT
CENSUS TRACT 78.01

ACORN TYPE	ACORN DESCRIPTION	HOUSEHOLDS 1987	%
A 1	ESTABLISHED SUBURBS	0	0.0
A 2	NEWER SUBURBS	0	0.0
A 3	OLDER FAMILIES. HIGHER DENSITY	0	0.0
B 4	NEWER SUBURBS. VERY HIGH INCOME	740	16.5
B 5	OLDER FAMILIES POST-WAR SUBURBS	0	0.0
B 6	YOUNG FAMILIES. HIGH MOBILITY	1876	41.8
B 7	FAMILIES WITH OLDER CHILDREN	0	0.0
E 8	MIDDLE INCOME. BLUE COLLAR	0	0.0
C 9	UPPER-MID INC HIGH RENT/VALUE CONDO	1868	41.8
C 10	YOUNG ADULTS. MID & LOWER/MID INCOME	0	0.0
C 11	COLLEGE UNDERGRADUATES	0	0.0
C 12	COLLEGE AREAS. OLDER STUDENTS	0	0.0
D 13	HIGHRISE AREAS	0	0.0
D 14	OLDER. MID-RISE AREAS	0	0.0
E 15	LOWER-MIDDLE INCOME, BLUE COLLAR	0	0.0
E 16	YOUNG HISPANICS. SOUTHWESTERN STATES	0	0.0
E 17	OLDER POPULATION, ETHNIC MIX	0	0.0
E 18	POOR FAMILIES, VERY OLD HOUSING	0	0.0
E 19	HISP AND BLACKS; MID-RISE, LOW RENT	0	0.0
F 20	LOWER-MID INCOME LOW VALUE HOUSE/APT	0	0.0
F 21	OLDER POPULATION, OLD RENTAL HOUSING	0	0.0
F 22	VERY POOR BLACKS; LOW RENT HOUSING	0	0.0
G 23	MIDDLE INCOME. HIGHER VALUE HOUSING	0	0.0
G 24	YOUNG FAMILIES	0	0.0
H 25	YOUNG MOBILE FAMILIES	0	0.0
H 26	FARMS & OLDER HOUSING	0	0.0
H 27	SEASONAL HOUSING AND FARMS	0	0.0
H 28	RURAL INDUSTRIAL	0	0.0
I 29	OLDER FAMS & RETIREES. HIGH MOBILITY	0	0.0
I 30	OLDER HOUSING	0	0.0
I 31	SMALL TOWNS	0	0.0
I 32	EASTERN EUROPEANS. NORTHEASTERN U.S	0	0.0
I 33	RURAL RETIREMENT AREAS	0	0.0
I 34	LOW VALUE VERY OLD HOUSING	0	0.0
J 35	SEASONAL HOUSING	0	0.0
J 36	MOBILE HOME AREAS	0	0.0
K 37	SELF EMPLOYED FARMERS	0	0.0
K 38	LARGE FARMS, LOW INCOME FARM WORKERS	0	0.0
L 39	LOW INCOME, POST-WAR HOUSING	0	0.0
L 40	POOR FAMILIES, HIGH UNEMPLOYMENT	0	0.0
L 41	SMALL FARMS	0	0.0
L 42	V.LOW INC BLACKS & WHITES, LRGE FAMS	0	0.0
M 43	MILITARY AREAS	0	0.0
M 44	INSTITUTIONS	1	0.0
		4485	

ACORN HOUSEHOLD PROFILE REPORT
Oahu

ACORN TYPE	ACORN DESCRIPTION	HOUSEHOLDS 1987	%
A 1	ESTABLISHED SUBURBS	1543	0.6
A 2	NEWER SUBURBS	4290	1.7
A 3	OLDER FAMILIES. HIGHER DENSITY	3869	1.5
B 4	NEWER SUBURBS. VERY HIGH INCOME	17245	6.8
B 5	OLDER FAMILIES POST-WAR SUBURBS	13758	5.4
B 6	YOUNG FAMILIES. HIGH MOBILITY	13462	5.3
B 7	FAMILIES WITH OLDER CHILDREN	12037	4.7
E 8	MIDDLE INCOME. BLUE COLLAR	14852	5.8
C 9	UPPER-MID INC HIGH RENT/VALUE CONDO	51716	20.4
C 10	YOUNG ADULTS. MID & LOWER/MID INCOME	8762	3.5
C 11	COLLEGE UNDERGRADUATES	592	0.2
C 12	COLLEGE AREAS, OLDER STUDENTS	1783	0.7
D 13	HIGHRISE AREAS	28516	11.2
D 14	OLDER, MID-RISE AREAS	2247	0.9
E 15	LOWER-MIDDLE INCOME. BLUE COLLAR	20881	8.2
E 16	YOUNG HISPANICS. SOUTHWESTERN STATES	0	0.0
E 17	OLDER POPULATION. ETHNIC MIX	5221	2.1
E 18	POOR FAMILIES. VERY OLD HOUSING	666	0.3
E 19	HISP AND BLACKS; MID-RISE, LOW RENT	0	0.0
F 20	LOWER-MID INCOME LOW VALUE HOUSE/APT	0	0.0
F 21	OLDER POPULATION. OLD RENTAL HOUSING	0	0.0
F 22	VERY POOR BLACKS; LOW RENT HOUSING	407	0.2
G 23	MIDDLE INCOME. HIGHER VALUE HOUSING	3086	1.2
G 24	YOUNG FAMILIES	11760	4.6
H 25	YOUNG MOBILE FAMILIES	0	0.0
H 26	FARMS & OLDER HOUSING	537	0.2
H 27	SEASONAL HOUSING AND FARMS	0	0.0
H 28	RURAL INDUSTRIAL	0	0.0
I 29	OLDER FAMS & RETIREES. HIGH MOBILITY	0	0.0
I 30	OLDER HOUSING	5450	2.1
I 31	SMALL TOWNS	729	0.3
I 32	EASTERN EUROPEANS. NORTHEASTERN U.S	0	0.0
I 33	RURAL RETIREMENT AREAS	0	0.0
I 34	LOW VALUE VERY OLD HOUSING	0	0.0
J 35	SEASONAL HOUSING	0	0.0
J 36	MOBILE HOME AREAS	0	0.0
K 37	SELF EMPLOYED FARMERS	0	0.0
K 38	LARGE FARMS, LOW INCOME FARM WORKERS	0	0.0
L 39	LOW INCOME, POST-WAR HOUSING	2284	0.9
L 40	POOR FAMILIES, HIGH UNEMPLOYMENT	0	0.0
L 41	SMALL FARMS	0	0.0
L 42	V.LOW INC BLACKS & WHITES, LRGE FAMS	7595	3.0
M 43	MILITARY AREAS	20492	8.1
M 44	INSTITUTIONS	14	0.0
		253966	

APPENDIX C

1980 CENSUS STATISTICAL SUMMARY

OF SELECTED VARIABLES

Variable	Census Tract 78.01	Census Neighborhood 021	Oahu	State of Hawaii
Resident Population	12,813	42,577	762,565	964,691
Number of Households	3,527	11,140	230,214	294,052
Average Number of Persons Per Household	3.51	3.78	3.15	3.15
Median Age (years)	28.0	27.6	28.0	28.3
Percent Foreign Born	11.8	12.2	14.8	14.2
Persons 25 and Over: Percent High School Graduate	89.0	81.9	75.5	73.8
Civilian Labor Force: Percent Unemployed	2.6	4.1	4.6	4.7
Median Family Income (1979 dollars)	31,326	30,031	23,556	22,751
Total Housing Units	3,625	11,368	252,038	334,235
Total Housing Units: Percent in 1-Unit Structures	75.7	80.2	47.1	51.7
Total Housing Units: Percent Vacant or Transient	2.6	2.0	8.2	11.4
Occupied Units: Percent Owner-Occupied	88.6	76.4	42.9	51.7
Occupied Units: Percent 1.01 or More Persons Per Room	11.5	13.5	15.5	15.3
Renter Occupied: Median Gross Rent (dollars)	500+	360	276	271

Source: Hawaii Department of Planning and Economic Development. Hawaii State Census Statistical Areas Committee. Census Tracts in Hawaii, 1937 - 1984. Report CTC-56. June 28, 1984

APPENDIX G

Environmental Aspects of Storm Water Runoff Wailuna IV Development

by

Gordon L. Dugan, Ph.D.
Environmental Consultant

ENVIRONMENTAL ASPECTS OF STORM WATER RUNOFF

WAILUNA IV DEVELOPMENT,
SOUTHERN OAHU, HAWAII

December, 1987

by

Gordon L. Dugan, Ph.D.
Environmental Consultant

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INTRODUCTION

The proposed 26 acre, 180 unit Wailuna IV Project, a mauka extension along Kuahuaanu Street of the present Wailuna Development, is located slightly over 2 miles in a northernly direction from East Loch, Pearl Harbor, as indicated in Figure 1. The drainage from the proposed site is a portion of the nearly 90 sq mi area that drains into Pearl Harbor; however, on a subdrainage basis 23 acres of the project site drains to Punanani Gulch while the remaining 3 acres drains to an unnamed gulch located on the ewa (west) side of the project. The tributary drainage areas to Punanani Gulch and the unnamed ditch at the project site are 1300 and 3000 acres, respectively, and both eventually drain to East Loch; Punanani Gulch via Waimalu Stream, and the unnamed ditch by a series of unlined and lined natural and engineered conveyance channels (Community Planning, Inc. 1987).

The proposed project site is situated within a former sugarcane field, where sugarcane culturing has been curtailed for nearly a decade, consequently the vegetation of the area is best described as consisting of grass (including wild sugarcane) and brush coverage, interspersed by trees. The elevation of the project site ranges from nearly 550 ft to approximately 750 ft. The median annually rainfall for the site is about 50 in. (Giambelluca et al. 1984). Two soil series are located within the project site; Manana and Helemano, with Manana, the more well-drained of the two, covering approximately three-quarters of the site. The relationship of these soil series to storm water runoff will be discussed in a later section of the report.

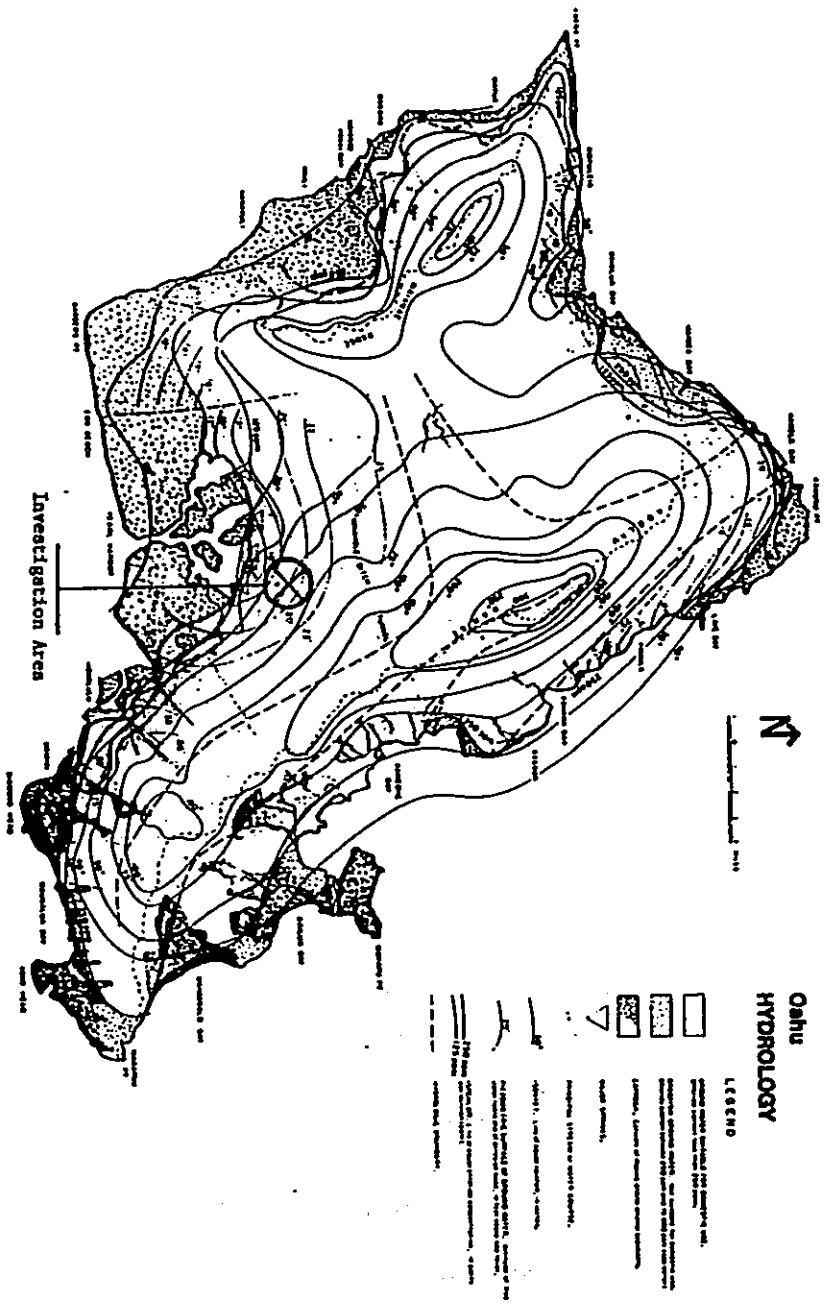

Figure 1. Hydrologic and Geologic Characteristics of Oahu
(Source: "2020 Plan," Board of Water Supply, City and County of Honolulu, 1971, PB. 13)

Associated with a development project such as is being herein proposed are alterations in surface water runoff resulting from modifying the existing ground condtions. Interest in these runoff changes is generally a result of concern over two factors—one, public safety, and two, environmental impact. The first factor requires the identification of changes in peak discharge rates, the magnitudes of which are necessary for designing adequate drainage structures to prevent flooding, while the second concern requires identification of changes in total runoff volume, as well as sediment, nutrient, and other constituent loads, and effects these will have on the ecosystem of the natural resource serving as the "sink". It is this second concern, environmental impact resulting from increased runoff volume and sediment and nutrients loads, and its probable effect on subsequent receiving waters (East Loch of Pearl Harbor) that is under study in the present investigation as herein reported.

PURPOSE AND SCOPE

The purpose of this study is to evaluate the environmental impact of the proposed 26 acre Wailuna IV Development as it relates to surface water runoff. From an assembledge of baseline hydrologic and water quality data, an estimate of the existing and projected volume and quality characteristics of surface water runoff will be made, along with an assessment of the environmental impact resulting from this runoff, in the form of written comments.

METHODOLOGY

The methodology used in this study consisted of assembling, analyzing, and interpreting existing data from federal, state, and county agencies, as well as from on-site surveys of field conditions.

Inasmuch as the scope of work consisted of estimating the alterations in volume and quality of surface water runoff resulting from the proposed project, it was necessary to identify those factors that affect runoff generation and runoff quality for both pre-and post-development conditions.

Methods currently available to estimate the surface water runoff volume from a specific storm event requires the determination of reasonable rainfall-runoff coefficients for varying magnitude and duration storms, and for different land managment, vegetation, soil, and soil moisture conditions, to name but a few hydrologic factors. In most practical situations, it is not considered feasible, due to the numerous influencing factors, to determine varying rainfall-runoff coefficients; rather, it is more practical for design and evaluation purposes to use a single coefficient for a particular land-use over a given rainfall intensity range. However, in order to circumvent a major portion of the unavoidable error created by using a constant rainfall-runoff coefficient, methods developed by the Hawaii Environmental Simulation Laboratory (HESL) of the University of Hawaii, (Lopez,1984: Lopez and Dugan, 1978) and the U.S. Soil Conservation Service (SCS)(1986), were utilized to determine representative storm water volumes under varying conditions.

The HESL method is based on the use of soil maps (Foote et al. 1972) and the incorporation of curve numbers from the U.S. SCS which were obtained from empirical data, including precipitation, soil and changing

soil moisture conditions, and vegetative cover information from the classification of thousands of soils throughout the nation. These soils were classified into four groups, labeled A, B, C, and D, with Class A having the highest water intake rates and Class D soils the lowest. The two soils series for the project, Manana and Helemano, are respectively classified as "B" and "C". The HESL method also included data derived from Hawaii and the rainfall-frequency for given recurrence and duration storms (Giambella et at. 1984). The rainfall recurrence interval storms chosen for evaluation purposes were 2, 10, 50, and 100 yr with 1 and 24 hr durations.

Once the increase in surface water runoff volume had been established, it was necessary to determine the runoff quality for pre- and-post-development conditions.

The quality parameters of stormwater runoff considered the most representative to identify potential changes under different land management practices (i.e. pre-and-post development conditions) are: total nitrogen; total phosphorus; and suspended solids (sediments). Unfortunately, there is no water quality data from the streams, principally intermittent, that are by or near the project site from representative drainage areas.

To circumvent the problem of determining representative nitrogen and phosphorus values in surface runoff, for comparative purposes, nitrogen and phosphorus values of 3.0 and 0.3 lb/acre-yr, respectively, were selected to represent pre-project (1987) development conditions. These values were derived from a compilation of data relating to nutrient outputs from rural and agricultural lands throughout the nation that were reported by Loehr (1972). To convert the output loads to concentration values the nitrogen and phosphorus values of 3.0 and 0.3 lb/acre-yr,

respectively, were divided by the median annual rainfall of 50 in. and a rainfall-runfall coeficient of 0.30 to result in concentration values of 0.88 and 0.09 mg/L, respectively, for pre-project development conditions. Suspended solid concentration values typically range from 1000 to 1500 mg/L or higher, but for conservative purposes a pre-project development value of 1000 mg/L was selected.

Quality data for stormwater runoff from developed areas are sparce, both locally and nationally. Loehr (1974) compiled urban stormwater runoff quality data collected from throughout the United States, as well as from a few international locations. As expected, the data are diverse. Locally, Fujiwara (1973) reported urban water quality data collected from storm drains in different land use drainage areas of Honolulu (residential, commercial and industrial), as shown in Table 2. These values compare favorably with similar situations from the continental U.S.

For the present study, the quality results of the storm waters from the Honolulu residential area of Table 2 for nitrogen, phosphorus, and suspended solids of 0.60, 0.57, and 250 mg/L, respectively, were used for the proposed project's full development conditions. Attention is likewise drawn to the heavy metal content of residential storm water runoff.

The aforementioned stormwater runoff constituent concentrations for nitrogen, phosphorus, and suspended solids for pre-development (1987) can then be applied to the pre-and-post runoff volumes to determine the projected sediment and nutrient loads from the project site.

Table 1

Representative Storm Water Quality Data for Honolulu [a](Fujiwara,1973)

	Residential[b]	Commercial[c]	Industrial[d]
Total Solids	511	278	246
Suspended Solids	252	142	12
COD	142	209	40
BOD	10	19	7
Dissolved Oxygen	7.1	5.7	6.7
NO_3-N	0.211	0.045	1.1
TKN	0.381	0.272	2.70
Total P	0.57	0.53	2.17
Ortho P	0.27	0.19	1.27
Grease	2.8	1919	2.2
Lead	0.407	0.987	1.657
Chromium	0.013	0.021	0.013
Zinc	0.512	0.792	0.729
Copper	0.036	0.036	0.021
Iron	0.377	0.295	0.049
Total Coliform	83,300	33,500	11,500
Fecal Coliform	1,965	463	580
Fecal Strep	6,393	7,900	7,350

[a]All units in mg/l except total coliform, fecal coliform, and fecal strep which are listed as No./100 ml

[b]Storm water samples collected on Aupuni Street near Nuhelewai Stream

[c]Storm water samples collected at Beretania Street between Maunakea

[d]Storm water samples collected near Iwilei and Pacific Streets

SURFACE WATER RUNOFF ALTERATIONS

Quantity

The estimated storm water runoff and constituent changes due to the proposed 26 acre Wailuna IV Development Project are shown in Table 2. The values presented, it must be emphasized, are for comparative purposes only, and are not intended to be representative of the accuracy implied by the practice of reporting results to one decimal place. This was done primarily for convenience of calculations and balancing. No attempt was made to compare these changes with contributions from its surrounding, or parent watershed areas, which would significantly negate apparent changes caused by the land use change within the project site.

As can be readily observed in Table 2, the storm water runoff volume for the Wailuna IV Development Project for the 2 yr, 1 hr duration storm for post (full) development conditions is about a magnitude greater than pre-developed (1987) conditions; however, as the storm duration and recurrence interval increases, this difference reduces down to approximately 1.4 times greater for the 100 yr, 24-hr storm. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs.

As would be generally anticipated, the greatest calculated incremental storm runoff volume resulted from the 100-yr storm with a 24-hr duration. The increased runoff from the project area will correspondingly result in less groundwater recharge within the site of the project; however, the annual evaporation rate at the project site is greater than the annual median rainfall, thus, groundwater recharge would only be expected during significant storm events. Nevertheless the total incremental volumes involved from the 26 acre site are relatively small (Table 2), consequently the resulting groundwater recharge is essentially negligible. These runoff

Table 2
Estimated Storm Water Runoff and Constituent Changes due to the Proposed Wailuna IV Development, Southern Oahu, Hawaii

Storm[a]			Storm Water Runoff												
			Hydraulic			Nitrogen[b]			Phosphorus[c]			Suspended Solids[d]		
Duration	Recurrence Interval	Quantity	Development		Δ	Development		Δ	Development		Δ	Development		Δ
			1987	Full		1987	Full		1987	Full		1987	Full	
hr	yr	in.	AF event	AF event	AF event	lb event	lb event	lb event	lb event	lb event	lb event	ton event	ton event	ton event
1	2	1.5	0.1	1.1	+ 1.0	0.2	1.8	+ 1.6	0.1	1.7	+ 1.6	0.14	0.37	+ 0.23
1	10	2.2	0.4	2.2	+ 1.8	1.0	3.6	+ 2.6	0.1	3.4	+ 3.3	0.54	0.75	+ 0.21
1	50	2.8	0.9	3.2	+ 2.3	2.2	5.2	+ 3.0	0.2	5.0	+ 4.8	1.22	1.09	- 0.13
1	100	2.9	1.0	3.4	+ 2.4	2.4	5.5	+ 3.1	0.2	5.3	+ 5.1	1.36	1.16	- 0.20
24	2	5.0	3.6	7.5	+ 3.9	8.6	12.2	+ 3.6	0.9	11.6	+ 10.7	4.90	2.55	- 2.35
24	10	8.3	9.0	14.3	+ 5.3	21.5	23.3	+ 1.8	2.2	22.2	+ 20.0	12.24	4.86	- 7.38
24	50	11.4	14.7	20.9	+ 6.2	35.2	34.1	- 1.1	3.6	32.4	+ 28.8	19.99	7.11	- 12.88
24	100	13.0	17.8	24.3	+ 6.5	42.6	39.7	- 2.9	4.4	37.6	+ 33.2	24.21	8.26	- 15.95

a) From "Rainfall Frequency for Oahu" (Giambelluca, et al. 1984).

b) Based on a nitrogen value of 0.88 mg/L for undeveloped (1987) conditions and 0.60 mg/L for full development.

c) Based on a phosphorus value of 0.09 mg/L for undeveloped (1987) conditions and 0.57 mg/L for full development.

d) Based on a suspended solids value of 1000 mg/L for undeveloped (1987) conditions and 250 mg/L for full development.

values (acre-ft/event) represent a volume of water and should not be confused with peak discharge rates which represent the maximum volume of storm water runoff discharge per unit of time (e.g., cfs). Peak discharge rates are required for engineering design or proposed drainage facilities and ascertaining the capacity of existing facilities, while total runoff volume provides a more realistic estimate of impact on water quality. Calculated peak discharge rates and the resulting flooded area for the streams or drainage courses within the project boundaries are usually determined from the City and County of Honolulu's Drainage Standards procedure (City and County of Honolulu, 1986)

Quality

Besides the changes in volume of storm water runoff, the quality of the various constituents being transported is of equal, if not more importance. However, estimates of water quality constituents resulting from significant storm water runoff that occurs at the most, only a few times a year, is very perplexing, especially since information on this subject essentially only became available at both the local and national level in the 1970's.

The summation of nitrogen, phosphorus, and suspended solids loads from both present 1987 and projected (full) residential development for storms of 1 and 24 hr duration at recurrent intervals of 2, 10, 50, and 100 years are shown in Table 2. The incremental changes per storm event for the present and projected development conditions for the various duration and recurrence interval storms indicate that from the least to the greatest amount of rainfall: nitrogen increases for the lower level storms, and then decreases at the higher level; phosphorus increases

for all storms, but the maximum incremental difference is calculated to be less than 38 lb; while suspended solids increases slightly for the lower level 1 hr duration storms and then notably decreases for the remaining higher level and duration storms.

The hydrologic and water quality aspects of the surface water runoff were only considered for the present and projected conditions. However, increases in constituent loads could result from construction activities, especially if a significant storm occurs during the interim period between earth moving operations or exposed soil conditions and soil stabilization completion. The impact of construction activities can be minimized by adhering to strict erosion control measures, as outlined in the City and County of Honolulu (1981) ordinance relating to grading, grubbing, and stockpiling.

Other water quality constituents of general concern include biocides and heavy metals. Typically, the biocides in general use tend to breakdown more readily in comparison to the more long lasting types of a few years ago; consequently, except for agricultural runoff, the types and concentrations are usually considered insignificant.

Heavy metals, on the other hand, do apparently increase somewhat as a result of urbanization. The possible long-term effect, if any, that the apparent slightly increased heavy metals have upon the biological life of the receiving waters (East Loch of Pearl Harbor) at the concentrations and especially at the very low loading rates expected is not presently well defined. However, a biological study of Pearl Harbor, conducted by the U.S. Navy in the early 1970's concluded that the heavy metal burden in Pearl Harbor was below the level of concern (even though that several

heavy metal sources that were discharging into Pearl Harbor at that time have since been eliminated) and that the major detriment to marine environment appeared to be silt (Evans et al., 1972). As previously noted in Table 2, the suspended solids load for all, except the lower level 1 hr storm events, are calculated to decrease.

SUMMARY AND CONCLUSIONS

The proposed 26 acre, 180 unit Wailuna IV Project, a mauka extension of the present Wailuna Development, is located slightly over 2 miles in a northerly direction from East Loch, Pearl Harbor, Southern Oahu. The proposed project site, situated within a former sugarcane field that has been fallow for over a decade, is presently covered with grass (including wild sugarcane) and brush, with an interspersion of trees. The elevation of the site ranges from nearly 550 ft to approximately 750 ft, while the median annual rainfall is about 50 in.

The purpose of this study is to evaluate the environmental impact of the proposed 26 acre project as it relates to surface water runoff. To this end the study identified changes in total runoff volumes, as well as sediment, nutrient, and other constituent loads, and what these potential changes are expected to have on the ecosystem of the natural resource serving as the "sink." The study does not directly relate itself to peak discharge rates resulting from storms, which are required for designing adequate drainage structures to prevent flooding and other excess storm water runoff related aspects. The storm water runoff from the project site, which includes a 1300 acre and 3000 acre tributary drainage area, eventually flows into East Loch of Pearl Harbor.

The methodology utilized in the evaluation of the environmental impact of storm water runoff from the project site consisted of the incorporation of methods developed by the Hawaii Environmental Simulation Laboratory of the University of Hawaii and the U.S. Soil Conservation Service soil maps, a rainfall frequency atlas, and derived storm water quality

constituent values. The rainfall recurrence interval storms chosen for evaluation purposes were 2, 10, 50, and 100 yr, with 1 and 24 hr durations. No attempt was made to compare the calculated changes with contributions from its surrounding or parent watershed areas, which would significantly negate apparent changes caused by the land use change within the project site.

The results of the storm water runoff volumes indicated that for the 2 yr recurrence interval 1 hr duration storm the full developed conditions are about a magnitude greater than present (1987) conditions; however, as the storm duration and recurrence interval increases, this difference reduces down to approximately 1.4 times greater for the 100 yr, 24 hr storm, which produced the greatest calculated incremental storm runoff volume. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs. The increased runoff from the project area will correspondingly result in less groundwater recharge within the site of the project; however, the annual evaporation rate at the project site is greater than the annual median rainfall, thus, groundwater recharge would only be expected during significant storm events. Nevertheless, the total incremental volumes involved from the 26 acre site are relatively small (Table 2), as expected, consequently the resulting groundwater recharge is essentially negligible.

Besides the changes in volume of storm water runoff, the quality of the various constituents being transported is of equal, if not more importance. The incremental changes per storm event for the present (1987) and full developed project conditions for the various duration and recurrence interval storms indicate that from the least to the greatest amount of rainfall: nitrogen increases for the lower level storms, and then

decreases at the higher level storms; phosphorus increases for all storms, but the maximum incremental difference is calculated to be less than 38 lb; while suspended solids increases slightly for the 2 and 10 yr recurrence interval 1 hr duration storms and then notably decreases for the remaining 1 and 24 hr storms.

The foregoing hydrologic and water quality aspects were only considered for the present and projected full developed conditions. However, increases in constituent loads could result from constructions activities, especially if a significant storm occurs during the interim period between exposed and stabilized soil conditions. Thus, to limit these potential increases it is imperative that strict erosion control measures be adhered to.

Other water quality constituents of general concern include biocides and heavy metals. Typically, the biocides in general use tend to breakdown more readily in comparison to the more long lasting types in past decades. Consequently, except for runoff from agricultural land operations the types and concentrations are usually considered insignificant. Heavy metals, on the other hand, do apparently increase somewhat as a result of urbanization; however, a biological study of Pearl Harbor conducted by the U.S. Navy in the early 1970's concluded that the heavy metal burden in Pearl Harbor was below the level of concern (even though that several heavy metal sources that were discharging into Pearl Harbor at that time have since been eliminated), and the major detriment to the marine environment appeared to be silt. As previously noted, the suspended solids load for all, except the lower level 1 hr storm events, are calculated to decrease.

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APPENDIX H

Preliminary Geotechnical Assessment
Wailuna IV

by

Harding Lawson Associates
Engineers and Geoscientists

Harding Lawson Associates

February 19, 1988

09560,009.06

Lusk Hawaii Builders
98-1910 Kaahumanu Street
Pearl City, Hawaii 96782

Attention: Mr. Brian Yahata

Gentlemen:

Preliminary Geotechnical Assessment
Wailuna IV
Waiau, Hawaii

INTRODUCTION

This letter presents the results of our preliminary geotechnical assessment of the site for a residential development, Wailuna IV. The site is located on a ridge above previously-constructed residential projects by the same developer. Conceptual designs include extensive grading for roadways and building pads. The major grading work will involve cutting higher areas and filling a 50-foot-deep gulch that crosses the center of the site.

The purpose of our assessment was to identify geotechnical engineering concerns that could limit development or should be addressed during design. The scope of our services included reviewing conceptual development plans prepared by the Project Civil Engineer and performing a geologic reconnaissance of the site. Our geologist visited the site on February 4, 1988.

SITE AND SOIL CONDITIONS

The site is a relatively flat area on the crest of a ridge on the southern flank of the Koolau Mountain Range of Oahu. There are major drainages in deep gulches on either side of the site. Within the site is a small gulch with a drainage area that roughly coincides with the area to be developed. Slopes range from about 10 percent in the flat areas on the ridge tops to about 50 percent on the sides of the gulches.

There is a paved road along the highest ridge on the northern edge of the site.

The site is covered by various types of vegetation including grasses, bushes, shrubs, and large trees. The rock beneath the site is basaltic lava of the Koolau Volcanic series. The original slopes of the volcano are reflected by the flat parts of the ridges. The gulches were formed by stream flow on the slopes. The rock has been subjected to weathering and there is a mantle of residual soil at the ground surface underlain by soil that displayed the relict structure of the rock. Soil with the parent rock's structure is known as saprolite. The residual soil observed at the site is about 1/2 to 1 foot thick. The saprolite is probably many hundreds of feet thick and underlain by less-weathered rock.

We collected samples of the residual soil at the site and performed Atterberg limits tests for classification purposes. According to the Unified Soil Classification System, the soil is a silt (ML) and (MH), similar to soils encountered in the previous developments. The test results are shown on Plate 1.

According to the Soil Conservation Service,* the soils are in the Manana and Helemano Soil Series. These soils are in Soil Erosion Resistance Groups II and I,** respectively, which are the least erodible of the four groups. Soils on steep slopes are more erodible because of higher runoff velocity.

From our experience in adjacent areas, the soils and saprolite are stiff to very stiff in their natural condition and have moderate to high shear strength and low to moderate expansion potential. During our reconnaissance, no evidence

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* Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, August 1972.

** Erosion and Sediment Control Guide for Hawaii, U.S.D.A. Soil Conservation Service, March 1987.

of slope instability was observed on either natural slopes or cut slopes by the sides of roadways.

DISCUSSION AND CONCLUSIONS

Based on our preliminary study, we conclude that the proposed development is feasible from a geotechnical standpoint. Concerns regarding erosion, stability and expansion potential can be mitigated using currently accepted design practices, as discussed below:

Erosion

By filling the gulch in the central part of the site and limiting new cut/fill slope inclinations, steep slopes will be eliminated from the site. Site grading will direct surface waters away from slope faces and concentrated flows will be carried in lined drainage channels. These measures will mitigate erosion concerns. A related concern is that there will be increased runoff below the site; we understand that the runoff can be carried by established drainage systems.

Stability

By cutting the higher area and filling low areas, overall slope stability will be increased by the planned grading. Keying, benching and subdrainage of sidehill fills are the accepted practices for providing stable fills. Subdrains will also be installed in drainage courses to increase slope stability. Cut and fill slope inclinations will be limited based on the results of future test borings and laboratory testing of soil samples. If cut slopes reveal seepage or other adverse conditions, additional drains or other features can be installed.

Expansion Potential

This concern can be mitigated by proper moisture control during grading, and by using less expansive soils in the upper few feet below final grade. If highly expansive areas are encountered at final grade, the upper few feet can be removed and replaced with compacted fill of low expansion potential.

From the point of view of soil properties related to engineering, the proposed site is similar to the adjacent projects at lower elevations on the ridge. Harding Lawson Associates (HLA) has performed similar grading work in the previous phases of Wailuna II and III. To date, these adjacent projects have performed as planned. Recent problems in other areas of Oahu were caused mainly by factors which are not present at Wailuna IV. For example, the recent storm damage in Hawaii Kai was in a valley area subject to large, concentrated runoff flows, while Wailuna IV is located near the top of a ridge where the watershed area is relatively small. Also, the movements in Manoa occur in weak, saturated "Adobe Clay" soils which are not found at Wailuna.

Continuous soil engineering observation during construction is important to mitigate the above concerns and to check for unanticipated conditions. As for the previous Wailuna developments, we will provide soil engineering services on a daily basis during construction to observe geotechnical aspects of the work and provide consultation, as necessary.

If you have questions or comments regarding our assessment, we will be pleased to discuss them.

Sincerely yours,

HARDING LAWSON ASSOCIATES

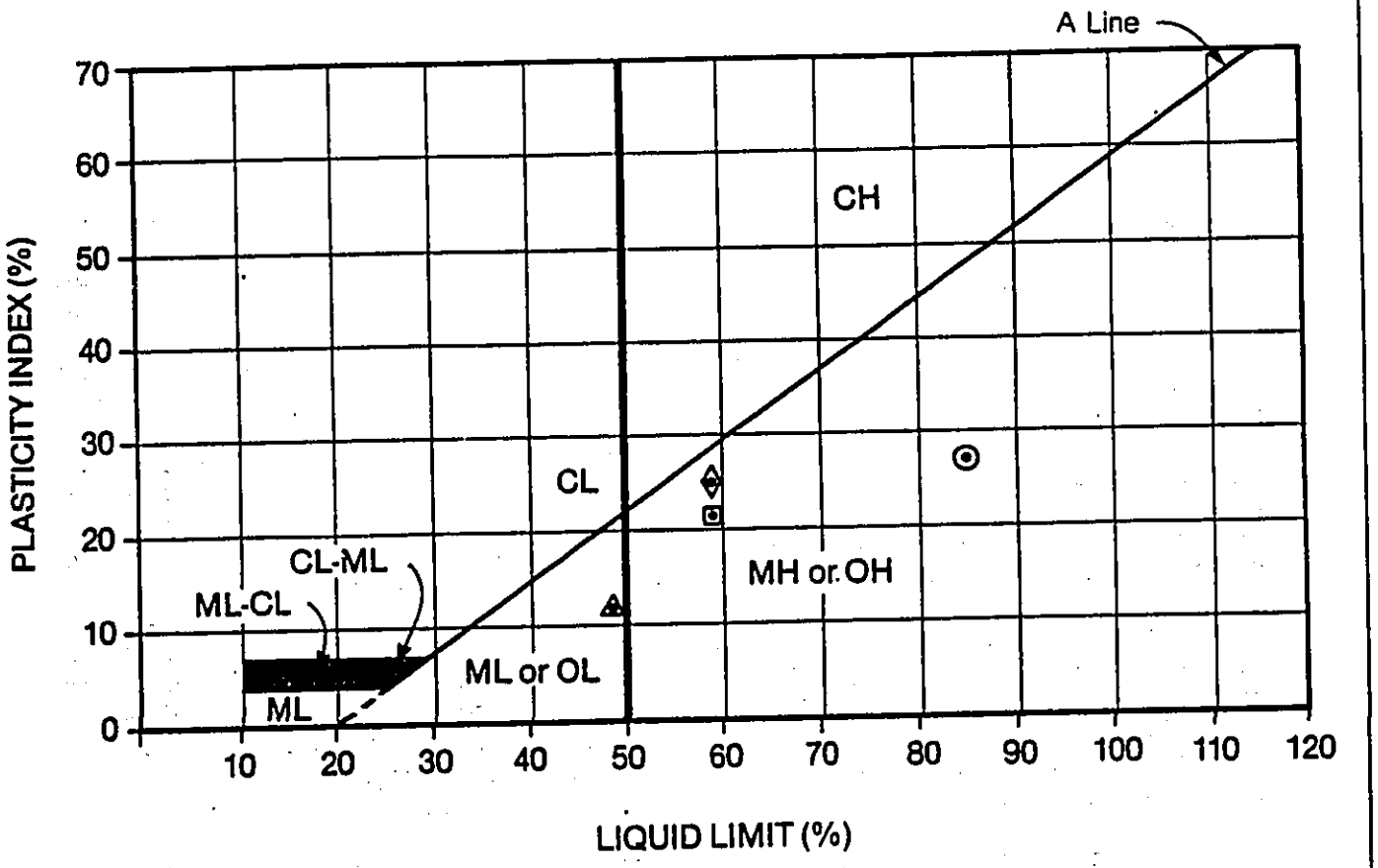
George R.S. Hou
Civil Engineer, P.E. 5104

GEORGE R.S. HOU
REGISTERED
PROFESSIONAL
ENGINEER
No. 5104
State of Hawaii, U.S.A.

RLS/GTSH/CPM/all:ASSESSMENT
THIS WORK WAS DONE BY ME
OR UNDER MY SUPERVISION
Attachment: Plate 1

cc: Community Planning, Inc./Mr. Bernard Kea

Reference: ASTM D 423, 424



Symbol	Source	Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	1	RED BROWN SILT (MH)	28.8	85	27	- -
▲	2	BROWN SILT (ML-OL)	33.8	49	13	- -
◆	3	DARK BROWN SILT (MH-OH)	27.5	59	25	- -
▣	4	RED BROWN SILT (MH-OH)	31.3	59	21	- -

HLA

Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Plasticity Chart
Wailuna IV
Waiau, Hawaii

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
gwl	9560,009.06	GH	2/11/88		

REF. TO "EWA CHURCH" △
WATERLINE PURPOSES
TRUE NORTH
SLOPE LEGEND
0 - 10 %
10 - 20 %
20 - 30 %
30 % and Over
WAILUNA IV
TOPOGRAPHIC SURVEY
PORTION OF REMAINDER LOT 4
AT WAIAU, EWA, OAHU, HAWAII
SCALE: 1 IN=100 FT.
F.B. NOS. 807, 809 & 814
BENCH MARK REFERRED
TO "K-1" "+" ON SMH RIM
ELEV. = 589.12
SEE F.B. 807 : 10
104 - 001