DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
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KK/DGP 88/E-1

April 11, 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)
Kapolei Knolls Development - The Lusk Company
Tax Map Key 9-1-16: Por. 4

We are notifying you of our acceptance of the above as an adequate fulfillment of Chapter 343, HRS, and the EIS Rules.

The following unresolved issues are to be addressed prior to the subsequent zoning process:

1. Approval of a State Land Use District Boundary Amendment to redesignate the project site from the existing Agricultural District to an Urban District.

2. An on-site water master plan for the development approved by the Board of Water Supply. The applicant will coordinate the use or provision of off-site water facilities for the proposed development.

3. Highway improvement plans and programs as required by the City Department of Transportation Services and the State Department of Transportation.

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

5. A drainage plan approved by the Department of Public Works.

6. A park and recreation plan approved by the Department of Parks and Recreation.

These issues are discussed in the attached Acceptance Report. If there are any questions, please contact Keith Kurahashi of my staff at 527-6051.

Sincerely,

DONALD A. CLEGG
Chief Planning Officer

Attach.

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

Final Environmental Impact Statement

Kapolei Knolls

Honouliuli, Ewa District, Oahu, Hawaii

The Lusk Company March 1988

Prepared by Environmental Communications, Inc.

FINAL ENVIRONMENTAL IMPACT STATEMENT

KAPOLEI KNOLLS

Honouliuli, 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 1 8 1988
Date

TABLE OF CONTENTS

Section		Page
I.	SUMMARY	I-1
II.	PURPOSE	II-1
III.	PROJECT DESCRIPTION AND STATEMENT OF OBJECTIVES	III-1
	A. Location of the Proposed Project	III-1
	B. Existing Uses	III-1
	C. Project Description	III-1
	D. Statement of Objectives	III-4
	E. Project Phasing and Costs	III-4
IV.	ALTERNATIVES CONSIDERED	IV-1
	A. Proposed Use	IV-1
	B. Alternative Residential Uses	IV-1
	C. No Action	IV-1
V.	THE AFFECTED ENVIRONMENT	V-1
	A. Geographical Characteristics	V-1
	1. Topography	V-1
	2. Soils	V-1
	B. Hydrological Characteristics	V-1
	1. Surface Water and Drainage	V-1
	2. Flood Plain Management	V-2
	3. Wetlands Protection	V-2
	4. Coastal Zone Management	V-2
	C. Biological Characteristics	V-3
	1. Flora	V-3
	2. Fauna	V-4
	D. Historical and Archaeological Characteristics	V-5
	E. Existing Road Network and Traffic Conditions	V-6
	1. Roadway Systems	V-6
	2. Traffic Conditions	V-7
	F. Ambient Air Quality	V-8
	G. Ambient Noise Environment	V-9
	H. Infrastructure and Utilities	V-11
	1. Water Supply	V-11
	2. Sanitary Sewage Disposal	V-12
	I. Existing Public Facilities and Services	V-12
	1. Police Service	V-12
	2. Fire Protection	V-12
	3. Public Educational Facilities	V-13
	4. Recreational Facilities	V-13
VI.	RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS	VI-1
	A. Federal	VI-1
	B. State	VI-1
	1. Hawaii State Plan	VI-1

Table of Contents
(Continued)

Section		Page
	Section 226-5 Objectives and Policies for Population	VI-1
	Section 226-6 Objectives and Policies for the Economy in General	VI-2
	Section 226-7 Objectives and Policies for the Economy-Agriculture	VI-2
	Section 226-12 Objectives and Policies for the Physical Environment Scenic, Natural Beauty, and Historic Resources	VI-2
	Section 226-13 Objectives and Policies for the Environment-Land, Air, Water Quality	VI-3
	Section 226-15 Objectives and Policies for Facility Systems-Solid and Liquid Wastes	VI-3
	Section 226-16 Objectives and Policies for Facility Systems-Water	VI-3
	Section 226-17 Objectives and Policies for Facility Systems Transportation	VI-4
	Section 226-18 Objectives and Policies for Facility Systems-Energy/Telecommunications	VI-4
	Section 226-19 Objectives and Policies for Socio-Cultural Advancement-Housing	VI-4
	Section 226-20 Objectives and Policies for Socio-Advancement-Health	VI-4
	Section 226-21 Objectives and Policies for Socio-Advancement-Education	VI-5
	Section 226-23 Objectives and Policies for Socio-Cultural Advancement-Leisure	VI-5
	Section 226-103(c)(1), (d)(1) Economic Priority Guidelines, "to promote continued viability of the sugar and pineapple industries"	VI-5
	Section 226-104 Population Growth and Land Resources Priority Guidelines	VI-6
	Section 226-106 Affordable Housing, Priority Guidelines for the Provision of Affordable Housing	VI-6
2.	State Functional Plan	VI-6
3.	State Land Use	VI-7
4.	H.R.S. Chapter 205-A Coastal Zone Management	VI-7
C.	City and County	VI-7
1.	General Plan of the City and County of Honolulu	VI-7
2.	Development Plan	VI-8
3.	City and County Zoning	VI-8
VII.	ANTICIPATED IMPACTS AND MITIGATIVE MEASURES	VII-1
A.	Impact on Geographical Characteristics	VII-1
B.	Impact on Hydrological Characteristics	VII-1
C.	Biological Impact	VII-3

Table of Contents
(Continued)

Section		Page
D.	Historical and Archaeological Impact	VII-4
E.	Social and Economic Impacts	VII-4
	1. Demographic Impact	VII-4
	2. Economic Impact	VII-4
	3. Housing Impact	VII-5
F.	Agricultural Impact	VII-6
	1. Agricultural Ratings	VII-6
	2. Potential Agricultural Uses	VII-7
	3. Agricultural Impact	VII-9
G.	Impact on Traffic Conditions	VII-9
H.	Impact on Air Quality	VII-11
	1. Short Term Direct and Indirect Impacts of Project Construction	VII-11
	2. Long Term Direct Impact	VII-12
	3. Long Term Indirect Impact of Project-Related Traffic	VII-12
	4. Regional Considerations	VII-13
	5. Mitigative Measures	VII-14
I.	Impact on the Noise Environment	VII-14
J.	Impact on Infrastructure and Utilities	VII-16
	1. Storm Drainage System	VII-16
	2. Water Supply	VII-16
	3. Sanitary Sewage Disposal	VII-17
K.	Impact on Public Facilities and Services	VII-18
	1. Police Services	VII-18
	2. Fire Protection	VII-18
	3. Public Educational Facilities	VII-18
	4. Recreational Facilities	VII-18
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	VIII-1
IX.	ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED	IX-1
X.	SUMMARY OF UNRESOLVED ISSUES	X-1
XI.	LIST OF ORGANIZATIONS AND AGENCIES CONSULTED AND LIST OF PREPARERS	XI-1
XII.	COMMENTS AND RESPONSES	XII-1
XIII.	LIST OF ORGANIZATIONS AND AGENCIES CONSULTED DURING THE DEIS CONSULTATION PERIOD AND LIST OF PREPARERS	XIII-1
XIV.	COMMENTS AND RESPONSES	XIV-1

LIST OF FIGURES

Figure		Page
1	Conceptual Development Plan	III-2
2	Location Map	III-3
3.	Runoff Area Map	V-2
4.	Existing Water System	V-13
5.	Sewage System	V-15
6.	Development Plan Land Use Map	VI-9

APPENDICIES

Appendix	
A	Traffic Impact Study - Parson Brinkerhoff Quade & Douglas, Inc.
B	Air Quality Study - Barry D. Root
C	Noise Impact Study - Y. Ebisu & Associates
D	Storm Water Runoff - Gordon L. Dugan, Ph.D.
E	Demographic, Economic and Housing Impacts - Environment Capital Managers, Inc.
F	Agricultural Significance - Evaluation Research Consultants

I. SUMMARY

CHAPTER 343, HRS
FINAL ENVIRONMENTAL IMPACT STATEMENT

Type of Action:	Applicant
Project Name:	Kapolei Knolls
Project Description:	The proposed project involves the construction of approximately 500 single-family residential units and all appurtenant infrastructure on about 79.5 acres. These "market housing" units are expected to provide for the demands of the proposed Kapolei Town Center.
Project Location:	Makai of the Makakilo Community between the H-1 Freeway and Farrington Highway, 1150 to 4550 feet, east of Makakilo Drive at Honouliuli, Ewa, Oahu.
Tax Map Key:	9-1-16: Por. 4
Area:	79.5 Acres
Existing Use:	Sugar cane and brush lands
Landowner:	The Estate of James Campbell
State Land Use Classification:	Urban and Agricultural

Development Plan Land Use Map:	Agriculture
Development Plan Public Facilities:	Farrington Highway Widening
Zoning:	AG-1 Restricted Agricultural
Applicant:	The Lusk Company
Agent:	Community Planning, Inc.
Accepting Authority:	Department of General Planning City and County of Honolulu
Contact Person:	Environmental Communications, Inc. Attention: F. J. Rodriguez P. O. Box 536 Honolulu, Hawaii 96809 Phone: 521-8391

Summary:

The proposed project involves the construction of approximately 500 single-family residential units and all appurtenant infrastructure on about 79.5 acres. These "market housing" units are expected to provide for the demands of the newly proposed Kapolei Town Center. The 1,100 square foot units, including garages, will be sited on 5,000 square foot minimum residential lots. Typical units which will consist of 3 bedrooms and 2 baths or 4 bedrooms and 2 1/2 baths will be sold at average sale prices of $160,000, 1987 market value.

The project site currently consists of sugar cane lands with relatively flat topography. Agricultural use of the site has rendered it relatively clear of heavy vegetation and topographic variations. The proposed use will involve site clearing and grading, however, no major topographic changes are expected.

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. Agricultural use of the site makes the presence of any rare or endangered species of fauna or wildlife unlikely. This 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 rules and regulations of the Office of Environmental Quality Control. It has been determined that an environmental impact statement is required pursuant to Chapter 200, Title 11, Administrative Rules, Subchapter 5(b).

The inital action required for this project involves a Development Plan amendment from Agriculture to Residential use. The document will be reviewed by the City and County Department of General Planning.

The purpose of the environmental impact statement is to provide information to public officials and members of the community on the nature of the subject action; to assess existing environmental conditions of the property and surrounding areas; to evaluate potential impacts that may result from development of the project and to propose mitigating measures for those impacts; and to consider alternatives to the proposed action.

III. PROJECT DESCRIPTION AND STATEMENT OF OBJECTIVES

A. Location of the Proposed Project

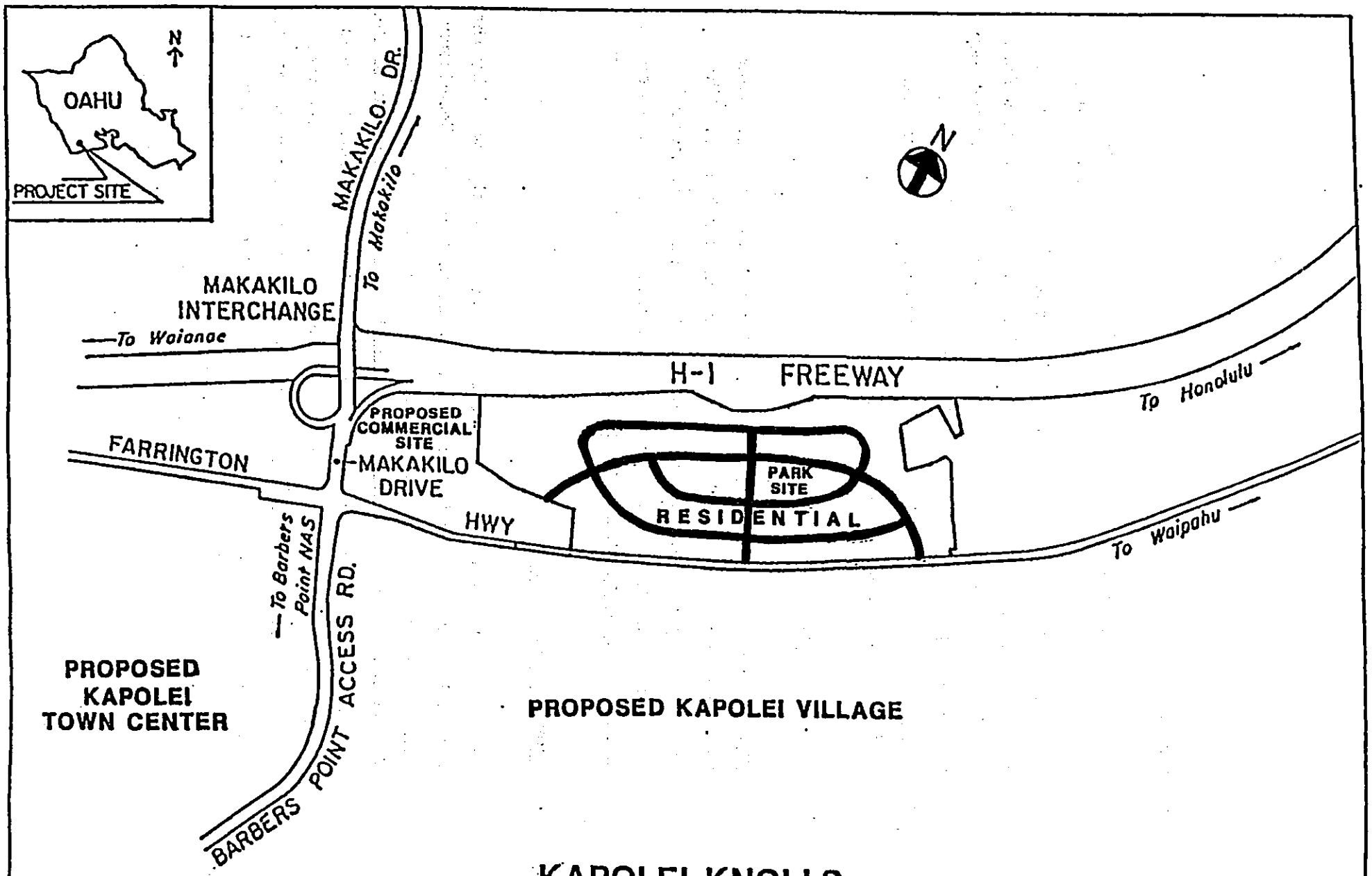
The proposed Kapolei Knolls project is located on the southwest side of the Island of Oahu, approximately 22 miles west of the primary urban center of Honolulu. The site is located near the center of the Ewa Plain, north of Naval Air Station, Barbers Point (NAS BP) and south of the Makakilo residential community between Interstate Highway H-1 and Farrington Highway. The site is identified as TMK: 9-1-16: Por. 4 and consists of approximately 79.5 acres (Figures 1 & 2).

B. Existing Uses

The majority of the project site currently consists of sugar cane lands which are scheduled to be harvested in March 1988. The proposed Kapolei Town Center and Kapolei Village are located adjacent to the Kapolei Knolls site and similarly consist of lands leased to the Oahu Sugar Company.

C. Project Description

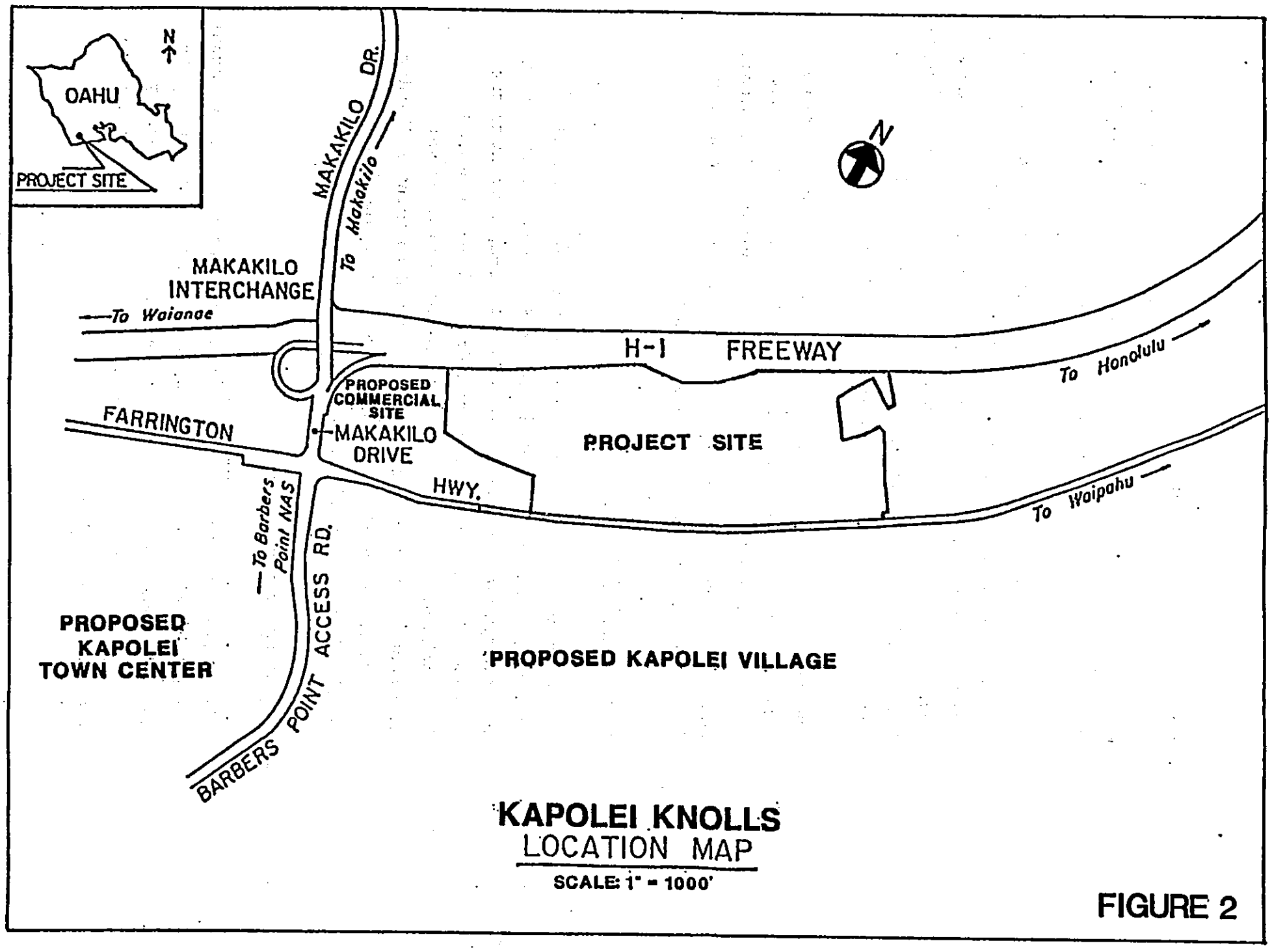
Kapolei Knolls consists of 79.5 acres that is currently owned by the Campbell Estate and is included in their State Land Use Commission petition to amend the Agricultural District designation to Urban. The subject project is part of the total Residential component of the Campbell Estate's petition and the schedule for development is well within the owners planned schedule. Lusk Company has received permission from the Campbell Estate to process the Development Plan Amendment for this 79.5 acre parcel so as not miss the opportunity to amend the DP Land Use Map in the current processing year. It is the applicant's intent to acquire the parcel for residential development from the Campbell Estate when the total 890 acres



KAPOLEI KNOLLS
CONCEPTUAL DEVELOPMENT PLAN

SCALE: 1" = 1000'

FIGURE 1



KAPOLEI KNOLLS
LOCATION MAP
SCALE: 1" = 1000'

FIGURE 2

receive Urban amendment approval. If the Kapolei Town Center petition is denied, the Lusk Company is prepared to prepare and file its petition to seek Urban designation for the 79.5 acre parcel and proceed with the residential development.

Kapolei Knolls will provide for the construction of approximately 500 single-family residential units, appurtenant infrastructure, and a recreational park. These "market housing" units will provide a portion of the housing for the newly proposed Kapolei Town Center. A proposed commercial complex located southwest of the project area should provide convenient service facilities.

The residential units, including garages, will consist of approximately 1,100 square feet and will be sited on 5,000 square foot minimum residential lots. Typical units will consist of 3 bedrooms and 2 baths or 4 bedrooms and 2 1/2 baths will be sold at average sale prices of $160,000, 1987 market value.

D. Statement of Objectives

The applicant is seeking to provide more homes for the State's growing population (particularly in the Secondary Urban Center) by development of Campbell Estate land in Ewa, adjacent to the proposed Kapolei Town Center and Kapolei Village communities. The applicant is desirous of satisfying the need to provide affordable housing in negotiation with the Department of Housing and Community Development, as well as to meet the demands for "market housing" in this area.

E. Project Phasing and Costs

The proposed project is expected to be completed in one continuous phase by 1995. Construction, however, will be subject to market considerations. The total cost of the project is approximately $72,000,000 (1987 Dollars). The proposed project will not involve the use of County funds.

IV. ALTERNATIVES CONSIDERED

A. Proposed Use

This alternative would result in implementation of the proposed project and would represent accessory development to the proposed Kapolei Village and Kapolei Town Center. This project is planned to be a complimentary residential development at Kapolei.

B. 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.

C. No Action

A "no action" alternative would result in preservation of existing conditions for the Kapolei Knolls project site. The undeveloped site would most likely continue to be used for sugarcane cultivation for the near future. However, as surrounding development occurs as part of the Secondary Urban Center, agriculture activities would probably be eliminated.

Advantages of the "no action" alternatives are few. These advantages include: no further expenditures of resources required by public and private agencies; continued sugarcane cultivation of the site; and no adverse impacts on the project site generated by development.

The primary disadvantage of this non-project alternative would be the absence of planned residential community with opportunities to suit mixed income families. Additionally, losses resulting from this alternative would include lost housing and employment opportunities, as well as lost tax revenues for City and State governments.

V. THE AFFECTED ENVIRONMENT

A. Geographical Characteristics

1. Topography

The project site is located on relatively flat lands with elevations ranging from approximately 100 feet above mean sea level on the makai side to 250 feet above mean sea level on the mauka side. Makalapa Drainageway traverses the middle of the property from H-1 to Farrington Highway.

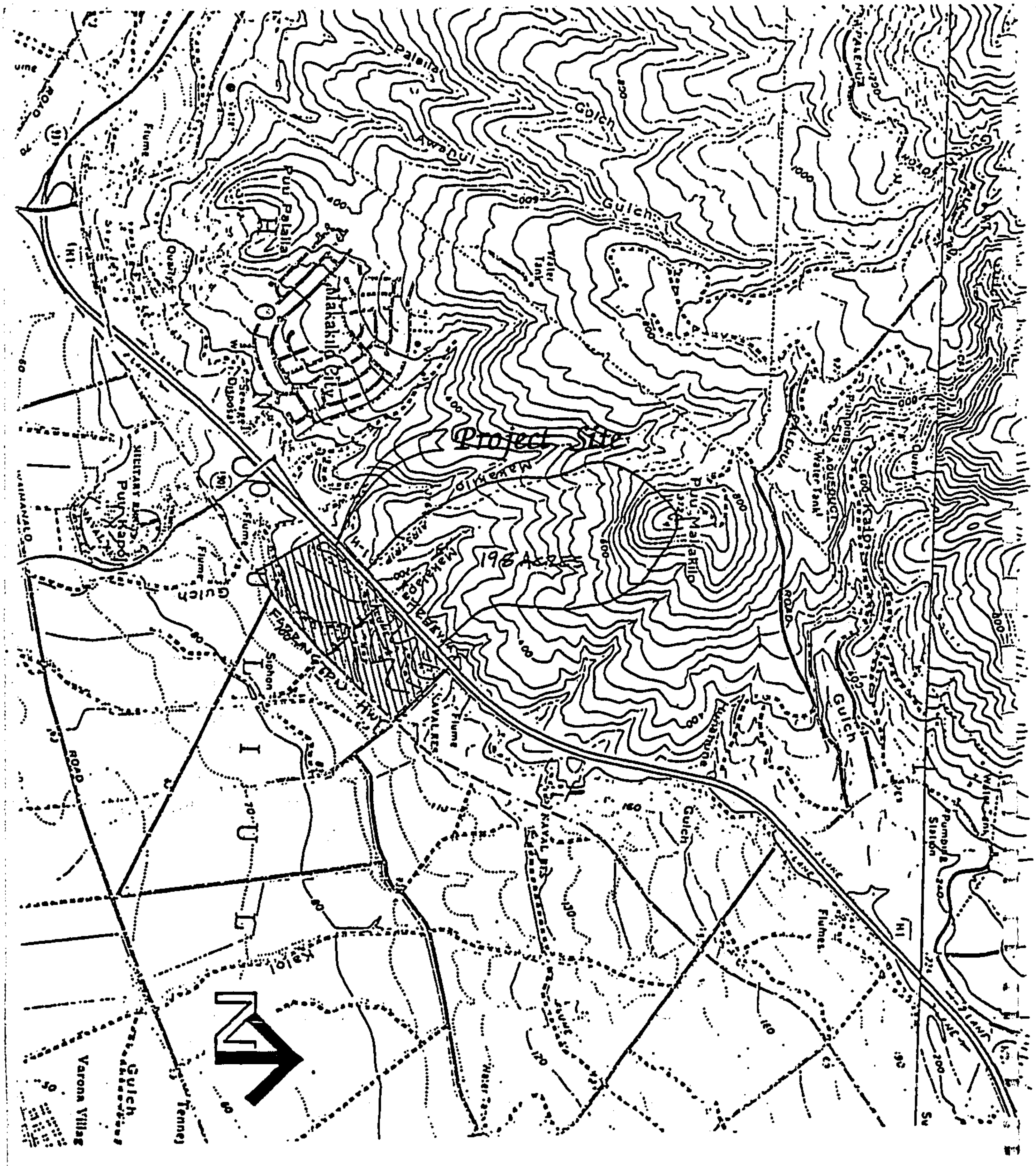
2. Soils

The predominant soil types found within the project site are the Mahana and Molokai silty clay loam, Ewa silty clay loam and stony silty clay, Lualualei stony clay, and stony steep lands. In general, most of the clays could be classified as having low to moderate expansion characteristics. The ALISH designates the site as Prime and Other Important Agricultural Lands, while the Land Study Bureau Detailed Land Classification Map designates the site with A and B ratings for the level areas and an E rating for the mauka gulch area.

B. Hydrological Characteristics

1. Surface Water and Drainage

One small natural drainageway, originating from within the Makalapa Gulch, mauka of the project site, crosses the H-1 Freeway in underground culverts and traverses the project site (Figure 3). This gulch area is approximately 198 acres and generates about 830 cfs of storm runoff based on the City and County of Honolulu Peak Flow Curve for the Ewa area.



RUNOFF AREA MAP FIGURE 3

Within the project site, runoff from about 69 acres flows to Makalapa Drainageway contributing approximately 180 cfs to the peak flow at Farrington Highway of 1010 cfs. During storms, the peak storm runoff crosses in an underground box culvert as well as over Farrington Highway to flow in makai streams and plantation ditches. Moderate storms often produce runoff which exceeds the conveyance capacities of these small streams, resulting in flooding of the sugar cane lands in the adjacent overbanks.

Approximately 8 acres of the project site is tributary to the Makakilo Drainageway located along the western boundary.

Eventual disposal of storm water is accomplished primarily through surcharging of the coral pit located just within the Barbers Point Naval Air Station's northern boundary. No outlet to the ocean exists and floodwaters that cannot be contained within the coral pit flow to the ocean across the naval air station.

2. Flood Plain Management

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

3. Wetlands Protection

The project site is not within a Federally designated wetland area.

4. Coastal Zone Management

The project site is not designated as a Coastal Zone Special Management Area.

C. Biological Characteristics

A biological analysis, conducted by Char & Associates, was prepared for inclusion in the Kapolei Village Environmental Impact Statement of November 1987, by the R.M. Towill Corporation. This study provided a summary of findings which have been provided below as being representative of the Kapolei Knolls site.

1. Flora

Canefields cover most of the project area. Weedy species which are found associated with these cultivated fields include nutgrass (Cyperus rotundus), swollen fingergrass (Chloris inflata), red pualele (Emilia fosbergii), sowthistle (Sonchus oleraceus), and hairy spurge (Euphorbia hirta). Locally common along the margins of the fields are two vines, wild bitter melon (Momordica charantia var. pavel) and little bell (Ipomoea triloba).

Drainage areas support a dense growth of California grass (Brachiaria mutica), two Panicum species, and Natal redtop (Phynchelytrum repens). Scattered clumps of castor bean (Ricinus cummunis) and koa haole (Leucaena leucocephala) shrubs are also frequently encountered.

The spiny fruited puncture vine (Tribulus terrestris) is locally abundant on some of the canehaul roads.

Roadside vegetation occurring within the area is composed mostly of a mixture of grass, small shrub, and herbaceous species. The most abundant element in this vegetation type is buffelgrass (Cenchrus ciliaris). Also abundant is pitted beardgrass (Andropogon pertusus). Other grasses occasionally found here include Bermuda grass (Panicum maximum), and sourgrass (Tricachne insularis). Among the

small shrubs and weedy annual species, the following are frequently encountered: spiny amaranth (Amaranthus spinosus), several weedy Euphorbia species, golden crown-beard (Verbesina encelioides), coat buttons (Tridax procumbens), partridge pea (Cassia lechenaultiana), indigo (Indiogofera suffruticosa), 'uhaloa (Waltheria indica var. americana), and 'ilima (sida fallax).

Kiawe - koa haole thicket vegetation consists of very scattered kiawe trees (Prosopis pallida) with a rather dense cover of koa haole shrubs (Leucaena leucocephala) filling in the matrix between the trees. Buffelgrass (Censhrus ciliaris) forms a more or less dense ground cover. A number of sisal plants (Agave sisalana) are found in this vegetation type. Sisal was grown on the Ewa Plains from 1893 to the 1920's to provide material for sisal or marine rope and sisal twine.

2. Fauna

Over the three types of vegetation, a total of ten bird species was recorded. Due to the highly disturbed nature of the vegetation, all but one of the bird species observed were introduced (or foreign) ones. The sole native species, the Pacific Golden Plover (Pluvialis dominica), is a wide ranging migratory species. The nine introduced species were the Cattle Egret (Bulbulcus ibis), Spotted Dove (Streptopelia chinensis), Zebra Dove (Geopelia striata), Black-rumped Waxbill (Estrilda troglodytes), Chestnut Mannikin (Lonchura malacca), Northern Cardinal (Cardinalis cardinalis), Red Avadavat (Amandava amandava), Red-vented Bulbil (Pycnonotus cafer), and Common Myna (Acridotheres tristis).

No mammals were actually observed on the site, but tracks of the Indian Mongoose (Herpestes auropunctatus) were found along the edge of the canefields.

A number of other bird and mammal species are also likely to use the study site, or at least pass through on occasion. The Mockingbird (Mimus polyglottos), reported from the Barbers Point Deep-Draft Harbor site (M&E Pacific, 1978) and Campbell Industrial Park (Belt, Collins & Associates, 1980), can be expected to utilize the study area to some degree. Four other bird species which are common in the thickets in adjacent parcels are the Red-crested Cardinal (Paroaria coronata), House Finch (Carpodacus maxicanus), House Sparrow (Passer domesticus), and the Japanese White-eye (Zosterops japonica). Another bird, the Nutmeg Mannikin (Lonchura punctulata), is commonly seen in adjacent areas feeding in overgrown grassy areas and can be expected to utilize the study site.

Other mammal species which are likely to be found on the study site but were not observed during this survey include the Roof Rat (Rattus rattus), the Norway Rat (Rattus norvegicus), the Polynesian Rat (Rattus exulans), the House Mouse (Mus musculus), and possibly, also feral dogs (Canis familiaris) and feral cats (Felis catus).

No terrestrial reptiles or amphibians were noted during the study. The Hawaiian Islands do not have any native amphibians or terrestrial reptiles. It is likely, however, that introduced gecko and skink species, such as the Mourning Gecko (Lepidodactylus lugubris), occur on the project site in those areas with shrubs and trees.

D. Historical and Archaeological Characteristics

A preliminary archaeological reconnaissance survey of the petition area was conducted during November 1986 (Paul H. Rosendahl, Ph.D., Inc., November 1986). A tenative evaluation of the archaeological significance of sites identified within the petition area indicates that all are of minimal research, cultural, or interpretive significance, primarily because they all appear to be less than 50 years old.

The project site has been under active sugarcane cultivation for a number of years. No archaeological sites are known to exist within the project area and previous cultivation of the site makes any findings unlikely. Fort Barrette (Kapolei Park), located 1/2 mile southwest of the property is the closest known historic site. The Oahu Railroad Company and Land Company right-of-way, located southeast of the project site, is listed on the National Register of Historic Places.

E. Existing Road Network and Traffic Conditions

A Traffic Impact study was conducted for the Kapolei Knolls project by Parsons Brinkerhoff Quade and Douglas, Inc. and is attached as Appendix A. The study summary for existing conditions is presented below.

1. Roadway Systems

Farrington Highway, a two-lane rural highway which has a 20-foot wide pavement structure, forms the southern boundary of the project site. Farrington Highway connects to Waipahu approximately four miles to the east and ties to a four-lane Farrington Highway at the Palailai Interchange with the H-1 Freeway, approximately one and one-half miles to the west.

Barbers Point Access Road (also referred to as Fort Barrette Road) is located to the southwest of the project site and serves the main gate of the Barbers Point Naval Air Station (NAS). This two-lane highway is wider near the signalized Farrington Highway intersection. North of this intersection, the road continues up to Makakilo as the six-lane Makakilo Drive, crossing over the H-1 Freeway at Makakilo Interchange. Makakilo Interchange provides ramp connections toward Honolulu to/from the north and south while connections to or from Waianae are made via Farrington Highway and Palailai Interchange, located one mile to the west.

2. Traffic Conditions

The description of existing traffic conditions is based on traffic counts taken by the State Highways Division. In the vicinity of the project site, Farrington Highway operates below capacity during peak periods. During the afternoon peak hour, the two-way volume on Farrington Highway is approximately thirty five percent of the highway's capacity. The existing two-way peak hour volumes on Farrington Highway adjacent to the project site are approximately 460 vehicles per hour (vph) during the morning (AM) and 540 vph during the afternoon (PM) peak hours.

The traffic on Makakilo Drive displays typical residential patterns with high directional splits reflecting home-to-work and work-to-home commuting. The existing two-way peak hour traffic volumes on Makakilo Drive near the H-1 overpass are approximately 1,300 vph during the morning and afternoon peak periods.

The H-1 Freeway in the vicinity of the proposed project is presently being upgraded from a four-lane freeway to a six-lane freeway. Makakilo traffic from the north enters the freeway via a single lane loop ramp; traffic from the south enters alongside in a separate lane on the right. The ramps presently handle a peak volume of 830 vph in the morning peak hour during which time the Honolulu-bound freeway volume is approximately 1,300 vph before the ramp.

Traffic from the freeway using the Makakilo Interchange westbound off-ramp to Makakilo and Barbers Point NAS is controlled by a stop sign at Makakilo Drive. Analysis of this unsignalized T-intersection indicates that the theoretical capacity for westbound left turns from the off-ramp onto southbound Makakilo Drive has been exceeded.

F. Ambient Air Quality

An Air Quality study for the proposed project (Appendix B), prepared by Barry D. Root, Air Pollution Consultant, is summarized below:

Present air quality at Kapolei is likely to be affected by air pollutants from four different types of sources: natural, industrial, agricultural, and vehicular. Natural air pollutant producers which could affect Kapolei air quality include the ocean (sea spray), plants (aero-allergens), dust (from wind blowing over unvegetated areas or from agricultural or construction activities), and perhaps a distant volcanic eruption on the island of Hawaii.

Industrial emissions affecting Kapolei would most likely come from the direction of Campbell Industrial Park. The nearest long-term State of Hawaii air pollution monitoring station to the project site is located in the Campbell Industrial Park at Barbers Point, about 3.5 miles southwest of Kapolei. Judging from monitoring station measurements, about half the particulate pollution monitored at Barbers Point must be larger than 10 microns in aerodynamic diameter. Larger particulates are considered to have less potentially harmful impact on the human respiratory system than particles under 10 microns. Judging from project data, present levels of particulates, sulfur dioxide, and nitrogen dioxide (the primary industrial pollutants) are estimated to be well within allowable standards in the project area.

Fugitive dust from sugar cane cultivation and heavy truck movements over unpaved cane haul roads as well as smoke from field burning at harvest time constitute the major types of agricultural air pollution sources likely to affect present air quality at Kapolei. The cane fires set at harvest time produce particulates, carbon monoxide and trace amounts of other organics. Fortunately, cane

fires occur only every other year or so for any given field and the fire itself generally lasts for less than an hour. Relatively high levels of both particulates and carbon monoxide can occur for a mile or more down wind from such fires, however, and while brief, these periodic impacts on air quality are not necessarily insignificant. In the case of this project, the proposed residential development will be taking place on lands currently used for sugar cane cultivation and other proposed developments in the area will be removing large adjacent areas from cane cultivation.

There are no nearby long-term measurements of carbon monoxide, ozone, or lead in the immediate vicinity of Kapolei, so the current burden of vehicular emissions is difficult to evaluate. Measurements of lead from sites in urban Honolulu indicate that most recent levels are barely above the threshold of detection for current measuring techniques. Airborne lead is thus not considered to be a problem at any Oahu location.

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 up 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 peak traffic conditions. Carbon monoxide would thus be the pollutant most likely to cause difficulty in meeting allowable AAQS as a result of new residential development in leeward Oahu.

G. Ambient Noise Environment

A Noise study (Appendix C) was conducted by Y. Ebisu & Associates for the proposed project. A summary of the existing noise environment is presented below.

Along the H-1 Freeway and Farrington Highway Rights-of-way, existing traffic noise levels are in the "Significant Exposure, Normally Unacceptable" category. Existing setback distances to the 65 day-night average sound level (Ldn) contour line are estimated at 276 Ft. and 110 Ft. from the centerlines of H-1 Freeway and Farrington Highway, respectively, under unobstructed line of sight conditions to either roadway. However, due to noise shielding effects from terrain features, the elevated freeway sections, and the existing roadway cuts, in the vicinity of the proposed Lusk-Kapolei project, actual setback distances to the H-1 Freeway's 65 Ldn contour are significantly less than 276 Ft., and are in the order of 125 to 150 Ft.

The results of the December, 1987 highway noise measurements are included as part of the study. The locations of the measurement sites and their relationships to the existing Ldn contours are also indicated. The agreement between the measured highway noise and the computed values was good at all four traffic noise measurement sites. Noise along Farrington Highway was dominated by heavy haul truck traffic, which accounted for approximately 25 percent of the total traffic volumes during the noise measurement periods.

The results of the aircraft noise measurements were also summarized in the report. P-3 aircraft conducting touch and go operations during tradewind conditions were generally south of the project site at the closest point of approach, which is consistent with the Flight Track #7 of the 1984 Air Installtion Compatible Use Zone (AICUZ) for Barbers Point NAS. During kona wind conditions, however, the P-3 aircraft were observed to be as far north as noise monitoring Site #2. Measured noise levels from P-3 flybys were approximately 5 to 10 decibles (dB) less than those suggested by the Wright-Patterson AFB noise data base, and were in the range of 60 to 78 dB (Lmax). Aircraft landing at Honolulu International Airport were also audible, and those civilian aircraft

which were north of the ILS approach to Honolulu were measured at levels similar to those of the military aircraft operating at NASBP. Measured hourly average (Leq) noise levels attributable to aircraft sources at the 5 measurement sites ranged from 52 to 59 dB.

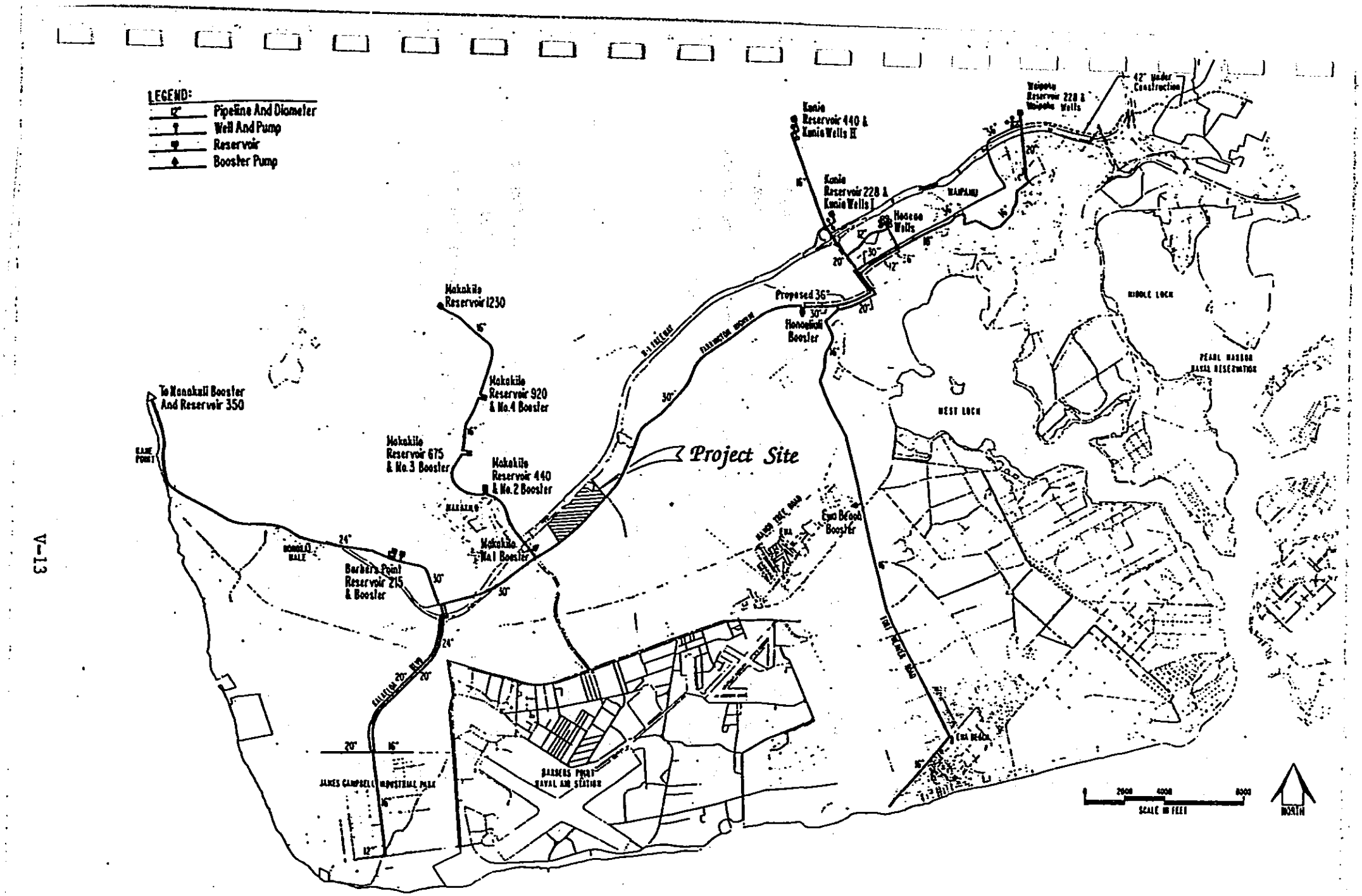
Based on the Decembers 1987 aircraft noise measurements, the aircraft noise contours do not appear to be unreasonable, and are at worst, 5 Ldn units greater than actual conditions. It is unlikely that the 60 Ldn aircraft noise contour crosses into the project site, and it is probable that the 55 Ldn aircraft noise contour crosses into the project site. The southwest corner of the project site may be exposed to annually averaged aircraft noise levels greater than 55 Ldn. The central, northern, and eastern portions of the project site are predicted to be exposed to aircraft noise levels below 55 Ldn. These conclusions are expected to remain valid into the foreseeable future as long as annually averaged equivalent (daytime and nighttime) NASBP operations on flight tracks #7, #11, #25, and #24 do not increase significantly (by 100 percent or more) over the levels in the 1984 AICUZ, and as long as the percentage mix of jet aircraft operations on the above flight tracks do not increase above 1984 AICUZ levels.

H. Infrastructure and Utilities

1. Water Supply

The existing municipal 30-inch water main located in Farrington Highway presently transmits water to Makakilo, the Campbell Industrial Park and the Waianae Coast (Figure 4).

The main conveys water from the BWS "228" System with maximum service elevation limit of about 128 feet. Consequently, this system can serve only about 20% or 15 acres



EXISTING WATER SYSTEM

FIGURE 4

of the project site which lies along Farrington Highway with elevations below the 128-foot elevation.

For higher elevation water, a 1.0 MG Reservoir with spillway elevation of 440 feet is located off Makakilo Drive. Water for this system is pumped by a booster from the 30-inch main located at the intersection of Makakilo Drive and Farrington Highway.

Presently, both systems have adequate capacity to serve the project's water requirements.

2. Sanitary Sewage Disposal

An existing municipal interceptor sewer (Figure 5) conveys wastewater from Makakilo to the Honouliuli Wastewater Treatment Plant. The Makakilo Interceptor Sewer and the Treatment Plant presently have capacity to service the subject project.

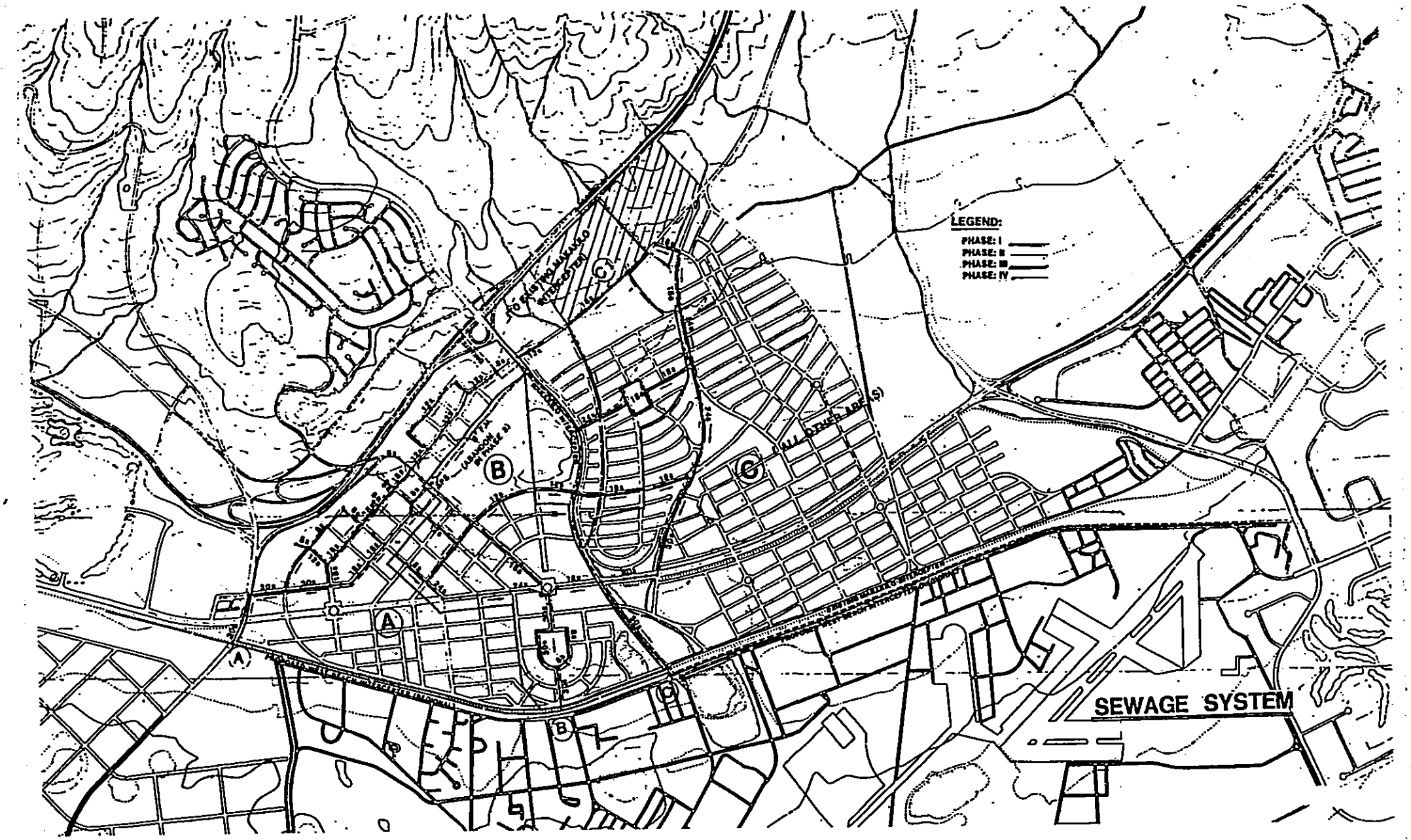
I. Existing Public Facilities and Services

1. Police Service

The project area is presently serviced by the Honolulu Police Department's Pearl City Station, which is staffed by 161 police officers. The developer will maintain coordination with HPD to insure the proposed project is adequately serviced.

2. Fire Protection

The proposed project is presently serviced from the Ewa Beach, Waipahu, and Makakilo Fire Stations.



V-15

SEWAGE SYSTEM

FIGURE 5

3. Public Educational Facilities

Schools within the vicinity include Barbers Point, Makakilo, Maukalani, and Ewa Beach Elementary Schools, Ilima Intermediate School, and Campbell High School.

4. Recreational Facilities

The proposed project will provide a recreational park space in conformity with the Department of Parks and Recreation Park Dedication Ordinance.

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 Kapolei Knolls 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 Kapolei Knolls project represents a housing increase of approximately 500 new housing units or 1,700 to 1,900 persons.

Demographic Analysis for the project (Appendix E), indicates the increase should not significantly impact the area in context with the adjacent proposed project. 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 proposed project will permanently remove the agricultural use of the site. While this impact is in conflict with the State Agriculture Plan, the proposed residential use is considered to offset the agricultural loss in order to provide for housing demand.

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 Honouliuli Wastewater Treatment Plant. Solid waste will be collected by City refuse collection services.

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

Potable water demand for the proposed project is subject to the Ewa Water Master Plan. The Kapolei Knolls project will have an average daily demand of approximately 0.25 mgd. It is expected that water will be available through the existing BWS "228" and "440" Water Systems.

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

The Traffic study (Appendix A) has indicated that project generated traffic, in addition to traffic generated by surrounding proposed projects, will significantly impact the existing traffic system. These impacts will require mitigation measures by changes in timing of signals at major intersections and new ramp and pavement widening roadway construction.

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 Kapolei Knolls project will provide a notable number of affordable and market housing units to the Ewa community.

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

The project area is currently serviced by health facilities at the Kaiser Punawai Clinic in Waipahu which offers a variety of health services. Emergency services are provided by the Wahiawa General Hospital. A full service St. Francis Hospital-West has been proposed in the vicinity of Farrington Highway and Fort Weaver Road Extension at Kunia Road.

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

Schools within the vicinity include Barbers Point, Makakilo, Maukalani, and Ewa Beach Elementary Schools, Ilima Intermediate School, and Campbell High School. The developer will maintain coordination with the Department of Education to insure that adequate educational services will be available to service project residents.

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 226-103(c)(1), (d)(1) Economic Priority Guidelines, "to promote continued viability of the sugar and pineapple industries:"

The project site is currently used in sugar production, however, the land owner, the Estate of James Campbell, through its Ewa Master Plan, has planned urban uses for the entire project area. While this use will permanently remove some sugar production lands, the proposed residential use is considered offsetting and desirable both socially and economically.

Section 226-104 Population Growth and Land Resources Priority Guidelines

The proposed project will result in land use change of agricultural land to urban usage. The site is currently used for sugar cane cultivation; however, the surrounding area has been proposed for urban use. The proposed project will be consistent with the proposed 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 approximately 500 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. These plans were reviewed to determine their relationship to the proposed project and are found to be generally compatible without any significant conflicts for Education, Energy, Health, Historic Preservation, Housing, and Recreation. It should be noted that while urban uses of agricultural lands are generally in

conflict with the State Functional Plan, the State Functional Plan also provides an exception for uses with overriding public interest or for other objectives of the Hawaii State Plan.

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 majority of the proposed project lies within the Agricultural District and will require a land use boundary amendment for Urban use.

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

The project site is subject to the provisions of the Coastal Zone Mananagement (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 permit will be required pursuant to H.R.S. 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 Economic Activity, Population, Natural Environment, Physical Development and Urban Design, Transportation and Utilities, Health and Education, and

Culture and Recreation Policies and Objectives, however, the plan for Housing is of particular significance.

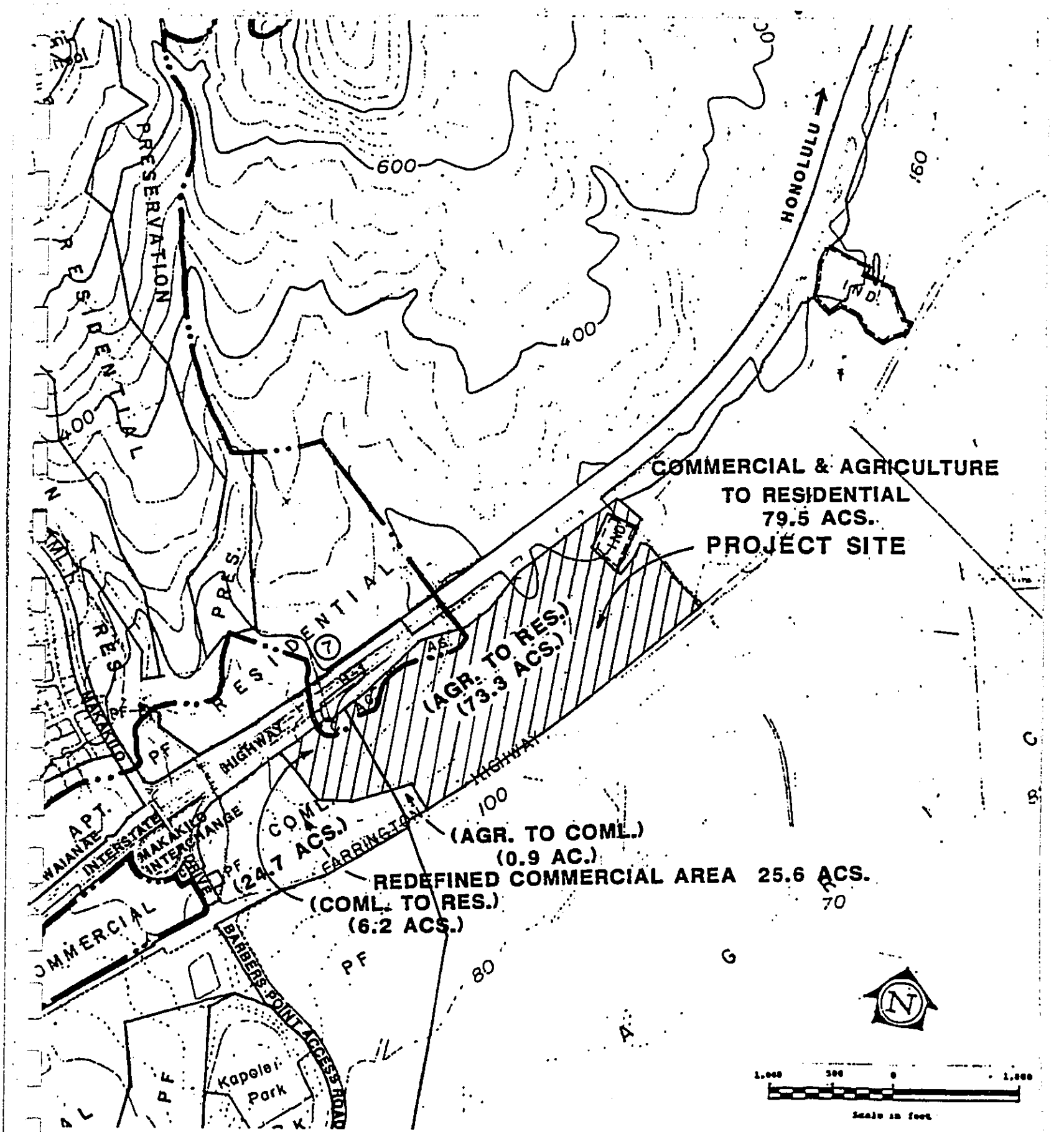
Housing Objective A promotes the provision of "decent" housing for all the people of Oahu at prices they can afford. Of this objective, Policies: 1, development of programs and controls which will provide decent homes at the least possible costs; and 3, encourage innovative residential development which 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 Ewa Development Plan Map as Agriculture (Figure 6). A Development Plan Land Use Amendment for Residential use is currently being requested from the City and County of Honolulu, Department of General Planning.

3. City and County Zoning

The project parcel is currently zoned AG-1 Restricted Agricultural. A change in the zoning designation for R-5 Residential use is planned to be obtained from the Department of Land Utilization.



DEVELOPMENT PLAN
LAND USE MAP

FIGURE 6

VII. ANTICIPATED IMPACTS AND MITIGATIVE MEASURES

A. Impact on Geographical Characteristics

Geographic and topographic alterations should be limited to site clearing and some grading. No major impacts are expected from the proposed construction. All earthwork will be conducted using landscaping and other mitigation and good housekeeping measures in conformity with State and City standards. These procedures should prevent or limit siltation and unnecessary runoff.

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 D and summarized below:

The results of the storm water runoff volumes indicated that there is no calculated storm water runoff for the present (1987) conditions for the Lusk-Kapolei Project for the 2-year, 1 hour duration storms, whereas, for full development conditions the volume calculates out to be 2.1 acre-ft. However, as the storm duration and recurrence interval increases, the difference reduces down to approximately 59% times greater for the 100-year, 24-hour storm, which was the greatest calculated incremental storm water runoff. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs.

The calculated increased runoff from the project area correspondingly indicates less potential groundwater recharge within the site of the project; however, in this situation potential recharge of the caprock aquifer will occur as the storm water

flows along the makai streams and plantation ditches to the terminus disposal in the coral pit area. In addition, aquifer recharge as well as sediment removal will be enhanced by the use of the interim and/or permanent retention basin(s) being planned.

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 pre-developed (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 and suspended solids loads increase slightly for the 1 hour duration storms and decrease for the 24-hour storms, while phosphorus increases for all levels of storms. Any potential impact of these increases is significantly negated by the use of sedimentation-retention/percolation basins which would tend to filter out the sediment and reduce a significant portion of the phosphorus and non-oxidizable forms of nitrogen by absorption.

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 years; 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, for a comparison basis only, lead and iron (by a slight margin) are actually reported to exceed the primary and secondary drinking water standards, respectively. With essentially all new automobiles switching over to unleaded gasolines since the mid-1970's the concentration of lead would be expected to decrease with time. The concern with iron concentrations in drinking water is due to its potential for staining fixtures and producing tastes.

The concern with potential impairment of receiving surface waters and/or underlying potable groundwater supplies from the development of the Lusk-Kapolei Project is significantly negated inasmuch as the present natural and developed aquifer recharge mechanisms are primarily underlaid by brackish caprock water makai of the project site, with the possible exception of the U.S. Navy's Barbers Point Well. In this situation all but possibly less than 2 acres of the proposed project site should be located down gradient (groundwater table) of the well. Thus, except for an unduly heavy pumping drawdown condition, which is not usually the situation on Oahu, the potential affects on the quality of the groundwater being pumped from the well would not be expected to be detectably influenced by the development of the proposed project.

C. Biological Impact

A biological study conducted by Char & Associates, botanical consultants to R.M. Towill Corporation for the Kapolei Village DEIS, concluded that the Kapolei Village project would have no significant impact on flora or fauna. No rare, endangered, or threatened species were found during the survey. The Kapolei Knolls project, which is located directly north of the Kapolei Village site, is expected to be similarly impact insignificant.

D. Historic and Archaeological Impact

No known historic sites are located on or adjacent to the project site. Agricultural use of the site makes any subsurface remains unlikely. In the event that any archaeological remains are discovered during site preparation, all work will cease 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 E. Conclusions of the study are presented below.

1. Demographic Impact

The resident population of Ewa is projected to grow from an estimated 36,800 in 1985 to 71,800 in 2000. The proposed project will cause the in-migration of approximately 500 new households, or 1,700 to 1,900 persons. By itself, the proposed project will have an impact on the market area. However, within the context of the developing Secondary Urban Center, the impact of such a project would be mitigated by the development of the necessary infrastructure and ancillary services to support the anticipated population growth in that area.

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.

Studies by Kenneth Leventhal & Company indicate that by the year 2005 there will be 22,000 - 34,300 new jobs in the Ewa area.

The project will contribute short-term employment and economic growth. The project, being an integral part of the overall Secondary Urban Center Master Plan, will provide a necessary portion of the community support in terms of needed housing within the Ewa Development Plan primary market area, as well as the entire Island of Oahu.

3. Housing Impact

The current inventory of housing units within the Ewa and Central Oahu area is minimal. Construction activity over the next 3-5 years should provide a continued minimal supply of new residential units, especially the larger, 2-bedroom and over units.

The City projects a shortage of 46,000 dwelling units by the year 2005 which includes a shortfall of 8,000 units in Ewa and 10,600 units in Central Oahu.

As concluded by Leventhal, "(t)here is (a) significant latent demand from portions of current and future renter households that would purchase a home if enough homes were offered at affordable prices." Also, the future "step-up" and new homeowners, other than those in the latent demand category, would also add to the overall market demand in the area.

However, additions to the supply of "affordable" housing units would probably be practical through multi-family residential developments, based on the "affordable" income ranges illustrated above and the price ranges of housing units in the current inventory of residential units.

Based on the foregoing analysis, there is an adequate potential market for the proposed residential units. Additional housing within the primary market area is needed. The market should absorb the 500 additional housing units proposed by the developer. These proposed units will alleviate the pent-up demand for housing within the planned Secondary Urban Center.

F. Agricultural Impact

An Agricultural Significance study was conducted by Evaluation Research Consultants (Appendix F) for the project site. A summary of this study is presented below.

1. Agricultural Ratings

The agricultural potential of the subject lands can be examined in terms of several different indices of productivity compiled by State of Hawaii and Federal agencies. The portion of the subject lands currently used for sugar, approximately 55 acres, are designated "Prime Agricultural Lands" by State of Hawaii Department of Agriculture except for a very small amount of "Other Important Agricultural Lands." The "Prime" designation means that the property has all the physical and climatic conditions which permit sustained high yields under economically advantageous operating conditions. Such lands are characterized by high yields with relatively low costs and little risk of damage to the physical environment. The category of "Other Important Lands" exhibits production problems such as flooding, erosion, etc. that require greater production costs, such as more drainage, more fertilizers, etc., and result in reduced yields.

The subject lands in sugar production were given a productivity ratings of "A" and "B" by the Land Study Bureau (LSB),

if irrigated. Land Study Bureau ratings range from A to E with A being the highest or most productive. The crop capability classifications assigned by the Soil Conservation Service ranged from I to IV. Soils with a classification I have few if any limitations, II implies some limitations due to slope, shallowness, unfavorable texture, stoniness, or low water holding capacity, III implies severe limitations, and IV very severe limitations. For the subject parcel, the limitation in the Molokai soils is due to slope and the potential for erosion and in the Ewa soils the limitation is due to stoniness in the surface layers.

In terms of the proposed Land Evaluation Site Assessment (LESA) classification these lands have Land Evaluation (LE) ratings ranging from 59 to 90. The LE ratings vary between 12 and 96, the implication being that the higher the rating, the greater the production potential of the parcel. The LE rating is a weighted average of five different productivity indices, including the three discussed above.

All of the above productivity measures are based on irrigated production and assume that good water is available. If irrigation water was not available, the lands would not be productive. For example, all the LSB ratings would decline to E, the lowest possible score.

2. Potential Agricultural Uses

Even after subtracting the past conversions of crop land to urban usages and the projected increases in agricultural land use on Oahu in the year 2015 based on the projections in the LESA commission report, there are over 13,000 acres of land suitable for crop production not currently in production on

Oahu. If more sugarcane lands become fallow, this number will increase.

Based on the physical, agronomic, and environmental characteristics of the subject parcel in combination with the history of crop production in Hawaii, the best agricultural use of the land is for the production of sugarcane. Besides sugarcane, 16 vegetable crops and 7 fruit and nut crops can be considered to have agronomic potential on the subject lands. All of these activities, however, only have potential if adequate amounts of good water are available.

However, agronomic potential (the crop will grow) and economic potential (the crop can be grown for a profit) are not the same. Some of the crops listed have been tried and found to be unprofitable, either because of high production costs, lack of markets, or the availability of less expensive imports. Also, some of the crops that can be grown in the Ewa area could be grown elsewhere in the State more profitably.

The subject property has some economic advantages in the production of fruit and vegetables relative to other areas in the State. The primary advantage is that it is close to the principal market in Hawaii and to transportation links to overseas markets.

There are factors, however, which limit the economic potential of this area for the production of fruit and vegetables. One is the cost and supply of water. Most crops require about 5 acre feet of water per year (equivalent to 4,500 gallons per day per acre of crop), although some, such as daikon, sugarcane, and perennial crops, require more. If water were purchased from the City and County of Honolulu under current

agricultural rates, 5 acre-feet would cost $1,126, and this does not include delivery to the field.

Another set of factors limiting the growth of diversified agriculture relate to the size of the local market and the difficulties the State has experienced in developing crops for export.

3. Agricultural Market

It is not the availability of land that is limiting the expansion of alternative crops, but rather the size of the market for locally produced crops. The de facto population of the entire State is only slightly more than a million persons and in the principal market area (Oahu), the de facto population is only 825,000 persons. This is a very small market and it does not require substantial acreage to supply such a market, particularly when many popular foods either require temperate climatic conditions not found in Hawaii or can be produced more profitably elsewhere and imported for less than it costs to produce them locally.

The subject lands have the agronomic potential to be productive agricultural lands. However, due to market parameters, the declining importance of the sugar industry, and the availability of similar lands on Oahu, taking the subject lands out of agriculture will not have a significant impact on the agricultural sector of Honolulu County or the State. Lands of similar quality and eocnomic potential are currently lying fallow and there are sufficient lands available to meet current and projected future agricultural needs.

G. Impact on Traffic Conditions

The Traffic Impact Study (Appendix A) conducted by Parsons

Brinkerhoff Quade and Douglas, Inc. presented the following summary for project and regional traffic impacts.

The proposed project will increase traffic volumes along Farrington Highway and at Makakilo Interchange on the H-1 Freeway. With no other development in the Kapolei area, the two-lane highway and unsignalized intersections at the project access roadways on Farrington Highway would adequately serve future traffic. At the signalized Farrington Highway/Makakilo Drive intersection, changes to the phasing and timing should provide sufficient capacity. Minor impacts would occur at Makakilo Interchange. Widening of Farrington Highway at the approaches to the project access roads will provide for separate left turn lanes to serve traffic entering the project site. The access roads should be of adequate width to allow separate lanes for right and left turns.

Other development, however, has been proposed in the area between H-1 and NAS Barbers Point. Major roadway improvements will be needed to accommodate the traffic demands. The proposed project will increase volumes at critical locations by approximately five percent of the volumes projected without the project.

Roadway improvements which serve the other development, such as the larger Kapolei Town Center and Kapolei Village projects, would serve future traffic with the Lusk-Kapolei project; longer delays and increased congestion are the expected impacts. Restriping of lanes may be needed on Makakilo Drive.

If Kapolei Village is developed, Farrington Highway will need widening to two lanes in each direction between Makakilo Drive and the first local access (Access 1) intersection. A separate left turn lane should be provided for eastbound Farrington Highway traffic wishing to turn left into the project. Beyond 1995, traffic volumes at the Farrington Highway/Access 1 intersection should be monitored to determine if signalization should

be considered as other additional development could increase traffic demands on Farrington Highway or produce excessive side street delays.

H. Impact on Air Quality

1. Short Term Direct and Indirect Impacts of Project Construction

There will be two types of short-term direct air quality impact from project construction: fugitive dust and on-site emissions from construction equipment. There will also be a short-term indirect impact from slow moving construction equipment traveling to and from the project site as well as a temporary increase in local traffic caused by commuting construction workers.

Adequate fugitive dust control can usually be accomplished by establishment of a frequent watering program to keep bare-dirt surfaces in work areas from becoming significant dust generators. Paving parking areas and establishing landscaping as early in the construction process as possible as well as good housekeeping on the job site have also proven to be helpful in abating fugitive dust emissions

On-site mobile and non-mobile construction equipment will also emit some air pollutants in the form of engine exhausts. The largest equipment is usually diesel-powered. Nitrogen dioxide emissions from this type of equipment can be significant, but carbon monoxide emissions are rarely more than those from a single automobile, and the overall air quality impact of emissions from construction equipment should be insignificant compared to vehicular emissions from the H-1 Freeway and other roadways nearby.

Indirectly, slow moving construction vehicles on roadways

adjacent to the project, primarily the two-lane Farrington Highway, can obstruct the normal free flow of traffic to such an extent that overall vehicular emissions are increased, but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume on the roadways affected.

2. Long Term Direct Impact

Residents of the 500 single-family dwelling units proposed for the project will generate an annual demand for electrical energy of about 3.6 million kilowatt hours. In the worst case this demand would be met by burning additional fuel oil in existing power plants, primarily the Kahe Power Plant on the Waianae Coast. This new energy requirement could be reduced significantly by installing solar heaters for all new homes and by incorporating solar design features into all construction plans, e.g. use of landscaping to provide afternoon shade to cut down on use of air conditioning and positioning of windows to maximize indoor light without unduly increasing indoor heat.

3. Long Term Indirect Impact of Project-Related Traffic

By serving as an attraction for increased motor vehicle traffic in the area, the proposed Lusk-Kapolei residential 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, so few vehicles now require leaded gasoline that the EPA is proposing a total ban on lead in gasoline to take effect immediately. Even without a ban on lead in gasoline, reported quarterly averages of lead in air samples collected at the Department of Health building on Punchbowl and Beretania Streets in urban Honolulu have been zero since early 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 and increases in traffic levels after 1995 will result in directly proportional increases in vehicle-related pollutant emissions.

4. Regional Considerations

Aside from potential indirect air quality impacts in the immediate project vicinity, there are potential regional scale impacts to be considered as well. The Lusk-Kapolei project could add as many as 100 peak hour vehicles to existing levels along this critical corridor. This represents only about one percent of existing traffic, however, and peak hour contribution of Lusk-Kapolei traffic alone would be less than 0.4 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. In this light, the potential regional air pollution impact of traffic from the Lusk-Kapolei project would appear to be relatively small.

5. Mitigative Measures

On-site air pollutant emissions from the proposed Lusk-Kapolei residential project are likely to be minimal once the project is completed and occupied. Off-site, there will be impacts generated because of new residential demands for electrical energy and waste incineration. Electrical requirement 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 the project. Project developers have *no control* over the emission levels of individual vehicles, but the total number of project-related vehicles operating on Oahu roadways could conceivably be reduced by provision of a park and 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 the proposed Lusk-Kapolei residential development would be to reduce the size and scope of the project to produce fewer peak hour vehicle trips.

I. Impact on the Noise Environment

The Noise study (Appendix C) conducted by Y. Ebisu & Associates for the proposed project summarized impacts as described below.

The existing and future traffic noise levels in the vicinity of the proposed Lusk-Kapolei Project were evaluated for their potential impact on present and future residences in the project environs. The traffic noise level increases along H-1 Freeway and Farrington Highway were calculated for the Completion Year 1995 time period,

and traffic noise increases associated with project and non-project traffic were assessed. Increases in traffic noise of 3.3 to 3.6 Ldn are predicted to occur as a result of project and non-project traffic on H-1 Freeway. Traffic noise increases of 0.3 Ldn are projected to occur as a result of project traffic on H-1 Freeway. Along Farrington Highway, total project and non-project traffic noise increases are expected to be relatively small at 0.3 to 1.2 Ldn, with project traffic contributing less than 0.5 Ldn to the increases.

Future traffic noise impacts on Lusk-Kapolei residents can be minimized by the use of buffer zones of adequate depth along H-1 Freeway, Farrington Highway, and along the internal roadways of the development. In order to not preclude federal assistance on the project, it is suggested that minimum setback distances to the future 65 Ldn contour be used when practical in siting future residential units. Because these setback distances are large along some sections of H-1 Freeway and Farrington Highway, the use of other noise mitigation measures may be desirable. These other measures include the construction of sound attenuating berms or walls along the high volume roadways, or the use of sound attenuating windows for two story homes.

Because of noise from military aircraft operations in the vicinity of the project site, there is a moderate risk of adverse impacts from aircraft noise in the southwestern portion of the project site. However, because future aircraft noise levels are not expected to exceed 60 Ldn, and may be less than 55 Ldn, these risks are not considered to be severe or unmanageble. Recommendations are provided for adequate disclosure of the aircraft noise environment to potential residents, for providing the option of air conditioning selected units, and for adjusting the helicopter flight track which currently crosses over the project site.

J. Impact on Infrastructure and Utilities

1. Storm Drainage System

Urban development of the sugar cane and brush area will increase storm runoff. Since runoff from the development cannot be directly routed to the ocean for disposal, detention basins are planned for on-site disposal of runoff.

Culvert improvement are also proposed for storm runoff to cross Farrington Highway.

The runoff quantities and ditch/culvert hydraulics will be prepared and submitted to the appropriate City/State agencies for approval when detailed grading and construction plans are undertaken.

2. Water Supply

The subject project is a portion of an overall plan to develop the Ewa Plain. Consequently, a water master plan was prepared in 1985 for Campbell Estate and subsequently revised in August, 1987 by Belt Collins & Associates. That plan specifies the water requirements for Ewa Plain projects as well as the proposal for source development, reservoir capacity and transmission mains.

The Kapolei Knolls project consisting of about 500 residential units will have an average daily demand of 0.25 million gallons per day (mgd). Being a single-family type of development, only a potable water system is required under the Board of Water Supply's Systems criteria for service in Ewa.

If developed in the initial phase of Kapolei, the Lusk project can be serviced by the existing BWS "228" and "440" Water

Systems. For the areas below the 128-foot elevation, water can be drawn from the 30-inch water main in Farrington Highway. For areas above the 128-foot elevation to the H-1 Freeway, however, water must come from the Makakilo "440" System. This requires extension of a 16-inch water main to the project site from the vicinity of the Booster Pump Station at the intersection of Makakilo Drive and Farrington Highway.

The use of this water would still be conditioned on the eventual completion of the facilities proposed in the Ewa Water Master Plan and approval of the Board of Water Supply.

3. Sanitary Sewage Disposal

The average daily wastewater generated by Kapolei Knolls from its 500 single-family units is 0.20 mgd. The existing Makakilo Interceptor Sewer and Honouliuli Wastewater Treatment Plant has capacity to convey and dispose of the project's sewage.

The Sewage System Plan, indicates Campbell Estate's proposal to ultimately sewer the Kapolei Project Area.

However, if Kapolei Knolls is initiated earlier than other makai area developments, a temporary pump station may be required to boost wastewater along Farrington Highway to the existing Makakilo Interceptor. Or, as an alternate, the large trunk mains must be constructed with other developer participation.

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 proportionate share or assessment as established by the City for the expansion of the treatment plant.

K. Impact on Public Facilities and Services

1. Police Services

Demand for police service will increase with the development of the proposed project. Coordination with the Honolulu Police Department will be maintained during the planning stages of the project to ensure that adequate services are available to the Kapolei Knolls community.

2. Fire Protection

The Honolulu Fire Department has indicated that adequate protection services are available to accommodate the proposed project. Service to Kapolei Knolls will be provided by the Ewa Beach, Waipahu, and Makakilo Fire Stations.

3. Public Educational Facilities

Demand for educational facilities near the project site will increase; therefore, coordination with the Department of Education will be maintained to insure that adequate facilities are available for Kapolei Knolls residents.

The Department of Education has indicated that the proposed project will increase enrollment for Barber's Point/Makakilo Elementary by 100 to 200 students. Ilima Intermediate by 50 to 75 students; and Campbell High by 75 to 100 new students.

4. Recreational Facilities

Kapolei Knolls is planned to include a dedicated recreational park space which will comply with requirements of the Department of Parks and Recreation and Park Dedication Ordinance.

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 cultivated canefield 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 and ozone readings from urban Honolulu indicate that State of Hawaii standards for vehicle-related air pollutants are being violated up to three times a year.

(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 obtained at the appropriate stage of the planning process. Alternatives to the proposed action were found to be less desirable than the proposed residential community.

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

ORGANIZATIONS AND AGENCIES

Agency	Date of Comment	Date Comment Received	Response to Comment
State			
Department of Accounting & General Services	--------	--------	--------
Department of Agriculture	12/21/87	12/24/87	01/15/88
Department of Education	--------	--------	--------
Department of Defense	12/15/87	12/16/87	NRN
Department of Health	01/04/88	01/07/88	01/15/88
DBED Housing Finance & Development Corporation	12/24/87	12/30/87	01/15/88
Department of Business and Economic Development	01/06/88	01/11/88	01/15/88
Department of Land and Natural Resources	1/04/88	1/05/88	01/15/88
Department of Social Services	--------	--------	--------
Department of Transportation	--------	--------	--------
Land Use Commission	12/03/87	12/07/87	NRN
OEQC	--------	--------	--------
University of Hawaii			
Environmental Center	12/31/87	01/04/88	01/15/88
Water Resources Research Center	--------	--------	--------
City			
Board of Water Supply	12/24/87	12/29/87	01/15/88
Building Department	12/10/87	12/14/87	NRN
Department of General Planning	12/24/87	12/28/87	01/15/88
Department of Housing & Community Development	* 01/11/88	01/14/88	NRN
Department of Land Utilization	01/05/88	01/07/88	01/15/88
Department of Parks & Recreation	12/15/87	12/21/87	01/15/88
Department of Public Works	12/17/87	12/22/87	01/15/88
Department of Transportation Services	01/08/88	01/11/88	NRN
Office of Human Resources	--------	--------	--------
Fire Department	12/11/87	12/16/87	01/15/88
Police Department	12/28/87	12/31/87	01/15/88

Organizations and Agencies Consulted (Continued)

Federal	Date of Comment	Date Comment Received	Response to Comment
U.S. Army Corps of Engineers	-------	-------	-------
U.S. Geological Services	-------	-------	-------
U.S. Coast Guard	-------	-------	-------
Department of Navy	-------	-------	-------
U.S. Department of Housing & Urban Development, Region IX	-------	-------	-------
U.S. Soil Conservation Service	* 01/08/88	01/13/88	NRN
U.S. Fish & Wildlife Service	01/05/88	01/06/88	NRN
Private Agencies/Individuals			
American Lung Association	01/07/88	01/11/88	01/15/88
Campbell Estate	-------	-------	-------
Ewa Neighborhood Board No. 23	-------	-------	-------
HI's Thousand's Friends	-------	-------	-------
Hawaiian Electric Company, Inc.	01/05/88	01/07/88	01/15/88
Oahu Sugar Company	12/21/87	12/23/87	01/15/88
Office of Hawaiian Affairs	-------	-------	-------
League of Women Voters	-------	-------	-------
Outdoor Circle	-------	-------	-------
Land Use Research Foundation	-------	-------	-------

NRN: No Response Needed
* Received After Deadline Date

LIST OF PREPARERS

Community Planning, Inc. - EIS Coordination
George K. Houghtailing
Albert Fukushima

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

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

Barry D. Root - Air Quality Study

Y. Ebisu & Associates - Noise Impact Study
Yoichi Ebisu

LIST OF PREPARERS (Continued)

Gordon L. Dugan, Ph.D. - Storm Water Runoff

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

Evaluation Research Consultants - Agricultural Significance
Peter V. Garrod, Ph.D.

XII. COMMENTS AND RESPONSES DURING EIS PREPARATION NOTICE

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 21, 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 Lusk-Kapolei Project
The Lusk Company
TMK: 9-1-16: por. 4 Ewa, Oahu
Area: 77 acres

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

According to the EISPN, the subject residential project will provide a portion of the housing for the newly proposed Kapolei Village. Our records indicate that the subject area is part of a future phase of the Kapolei Town Center project (State Land Use Commission Docket No. A87-613). We assume that the Kapolei Village project mentioned in the EISPN refers to the State Housing Finance and Development Corporation's proposed 850-acre housing project to the south of the subject project.

The draft EIS should include discussion on the following issues:

- the exact relationship of the proposal to the Kapolei Town Center and Kapolei Village proposed developments;
- a complete soils description with references to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system, Land Study Bureau Overall Productivity Rating system, and the Soil Conservation Service Soil Survey which indicate the suitability of agricultural use on the site;

DEC 24 1987

- the full impact on the economic viability of Oahu Sugar Company resulting from the cessation of sugarcane production on fields 016 and 020. This would include the loss in tons of sugar per acre, lost revenues, location and cost of replacement field preparation (if any), and any other indicators of adverse impact;
- the impact of this development on future agricultural production requirements and expansion of diversified agriculture, as identified in the Final Report of the Land Evaluation and Site Assessment (LESA) Commission (February 1986);
- the potential of establishing viable alternative agricultural uses on the project site;
- the broader economic and resource impact on the State from the irrevocable loss of prime agricultural lands;
- conformity to the State Agriculture Functional Plan and its objectives and policies, particularly, Implementing Action B(5)(c); and
- the relationship to the following Hawaii State Plan objectives, policies and priority guidelines:

226-7(b)(6) "Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs."

226-103(c)(1) "Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries."

226-103(d)(1) "Identify, conserve and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands."

226-104(b)(2) "Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district."

226-106(1) "Seek to use marginal or non-essential agricultural land and public land to meet housing needs of low and moderate-income and gap-group households."

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

Suzanne D Peterson

SUZANNE D. PETERSON
Chairperson, Board of Agriculture

cc: ✓Mr. F. J. Rodriguez
Mr. William Balfour, President and Manager, Oahu Sugar Company
OSP
LUC
OEQC
HFDC

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

January 15, 1988

Ms. Suzanne D. Peterson, Chairperson
State of Hawaii
Department of Agriculture
1428 So. King Street
Honolulu, Hawaii 96814-2512

Dear Ms. Peterson:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your department's comments dated December 21, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lusk-Kapolei project. The applicant has been provided copies of your comments and the specific requested data and the project's ability to comply with the various components of the Hawaii State Plan will be identified in the Draft EIS.

Thank you for your comments and 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 8791

[redacted]

DEC 15 87

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:

Lusk - Kapolei
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.

Sincerely,

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

Enclosure

cc:
F. J. Rodriguez

NO RESPONSE NEEDED

DEC 16 1987

JOHN WAIHEE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EPHSD

January 4, 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: Environmental Impact Statement Preparation Notice (EISPN) for Lusk-Kapolei Project, Ewa, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject EISPN. In the preparation of an environmental impact statement for the subject project, the following concerns should be addressed:

Noise

1. Since the residential units will be in close proximity to each other (one per each 5,000 square foot lot), these units should be designed to comply with the provisions of Title 11, Administrative Rule Chapter 43, Community Noise Control for Oahu.

2. The effects of aircraft noise from Barber's Point Naval Air Station and Honolulu International Airport to the proposed project.

3. Noise emanating from vehicles on Farrington Highway, H-1 Freeway, and Fort Barrette Road may have an adverse effect on residents adjacent to these roadways. Traffic noise attenuation measures, such as barriers or berms, must be considered for the project plans.

4. Construction activities must comply with the provisions of Title 11, Administrative Rule 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 or devices 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 by the conditions issued with the permit.

JAN 7 1988

5. Traffic noise from heavy vehicles travelling to and from the project site must be minimized near residential areas and must comply with the provisions of Title 11, Administrative Rule Chapter 42, Vehicular Noise Control for Oahu.

Vector Control

This lower Makakilo area is subject to annual invasion by migrating mice. Past experience with developers of Makakilo indicate that our rule on "Rodents; construction of new buildings," has not been complied with.

The developer should be made aware of our rule, Title 11, Administrative Rule Chapter 26, Vector Control, Section 31, Paragraph (c), and should comply with it.

Some suggestions for compliance are as follows: (1) all openings made for utility lines must be properly screened with hardware cloth; (2) there should not be any space between the outer wall and the concrete slab; and (3) all doors leading outside should be made tight with weather stripping.

BRUCE S. ANDERSON, Ph.D.

cc: F. J. Rodriguez ✓

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

January 15, 1988

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

Dear Dr. Anderson:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your department's comments dated January 4, 1988 on the Environmental Impact Statement Preparation Notice for the Lusk-Kapolei project. The comments have been forwarded to the applicant and engineering consultant, Community Planning, Inc. for their review. We respond to your concerns as follows:

1. Noise

   a. All provisions of Title 11, Administrative Rule Chapter 43, Community Noise Control for Oahu will be complied with in accordance with the density of the proposed residential that is approved during the ensuing land use processes.

   b. A comprehensive noise study is provided in the Draft EIS currently under preparation which will address both the aircraft noise and highway noise impacts that could affect the project. If noise attenuation measures are required, they will be implemented in accordance with appropriate codes and standards.

   c. All provisions of the Noise Control regulations that are required for construction operations will be made mandatory by the contractor in charge of the site work and the home construction.

2. Vector Control

   The peculiarly local phenomena of migrating mice has been made known to the applicant. He will be keeping this in mind when construction begins, so that the general contractor can comply with Chapter 26 for rodent control.

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) 521-2361

JOHN WAIHEE
GOVERNOR

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

RUSSELL N. FUKUMOTO
Acting Executive Director

IN REPLY REFER

TO:

87:PLNG/5477JT

December 24, 1987

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:

Re: Environment Impact Statement Preparation Notice (EISPN) for the Proposed Lusk-Kapolei Project, Located at Ewa, Oahu, Hawaii

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

1. Reference to "Kapolei Village". The State of Hawaii, Housing Finance and Development Corporation (HFDC) in cooperation with the City & County of Honolulu, Department of Housing and Community Development (DHCD) is proposing to develop a master planned residential community along with a full range of community support facilities just south of the proposed Lusk project. The joint HFDC/DHCD project has been named "Kapolei Village". Although the EISPN refers to "Kapolei Village", we have been informed by Tae Yong Kim of Environmental Communications, Inc., that the Campbell Estate's proposed Town Center is actually being referenced.

2. Affordable housing. The applicant proposes to develop 500 "market" units. Based upon market studies, there is a definite need for more affordable housing. We therefore believe that the project should offer a portion of the units for sale or rent to families earning less than 120% of Honolulu's median income as established by the U.S. Department of Housing and Urban Development. At present, the median income for a family of four is $34,100.

DEC 30 1987

3. Support infrastructure. The impact of the proposed project on support infrastructure (e.g., water, sewer, drainage, roadways) should be assessed relative to the total development proposed in the Kapolei area.

   Furthermore, the storm drainage alternative of constructing a silting and retention basin on the HFDC/DHCD's Kapolei Village site is not viable. We therefore suggest that the applicant meet with our development staff to work out a drainage plan that is beneficial to all parties.

4. The Hawaii State Plan. The EIS should address how the proposed project relates to the objectives, policies and guidelines of the Hawaii State Plan. Specifically, section 226-19, Socio-Cultural Advancement - Housing and section 226-106, Affordable Housing. A similar evaluation of the State Housing Functional Plan should also be included in the EIS.

5. Noise. Is the proposed site impacted by noise stemming from operations at the Barbers Point Naval Air Station?

Thank you for the opportunity to comment. Should you have any questions, please contact Mr. Lloyd Haraguchi, Development Project Coordinator, at 848-3240.

Sincerely,

RUSSELL N. FUKUMOTO
Acting Executive Director

cc: F. J. Rodriguez

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

January 15, 1988

Mr. Russell N. Fukumoto
Acting Executive Director
State of Hawaii
Department of Business and
Economic Development
Housing Finance and
Development Corporation
P.O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your comments dated December 24, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the Lusk-Kapolei project. The comments have been forwarded to the applicant/developer and the civil engineering consultant, Community Planning, Inc. for their review and response.

Initially, we will respond to your comments as follows:

1. The mis-stated references to Kapolei Village will be clarified in the draft EIS currently under preparation; we regret any inconvenience resulting from this mis-statement.

2. The applicant/developer has indicated that the affordable housing percentage of their project that will be designated as "affordable" will be subject to the requirements that will be forthcoming during the land use policy change process still to be completed. At the present time, the City & County of Honolulu, through the Department of Housing & Community Development and also the City Council have no formal policy of percentage designation, but have required 10% of the project's density to be provided as "affordable" units. The applicant/developer will be working closely with all appropriate agencies to insure an equitable distribution.

3. Support infrastructure components are still in the conceptual design stages and there is no final determination of the adequacy required for this project. Community Planning, Inc. will be coordinating their design with government agencies as well as adjacent developers to insure compatible and cost-effective solutions to the sharing of infrastructure facilities.

4. Hawaii State Plan objectives, policies, and guidelines will be be addressed in the Draft EIS.

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5. Noise impacts due to aircraft noise will be evaluated along comparable standards as those employed by the Housing Finance Development Corporation/Department of Housing & Community Development Kapolei Village noise studies. The close proximity of both projects lend themselves to equitable evaluation.

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

Yours very truly,

F. J. Rodriguez

F. J. Rodriguez

FJR:ls

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: 74XXXX MDPED

Ref. No. P-7919

January 6, 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: Environmental Impact Statement Preparation Notice,
Lusk-Kapolei, Honouliuli, Ewa, Oahu

We have reviewed the subject preparation notice and have the following comments relative to the Hawaii Coastal Zone Management (CZM) Program.

A CZM program objective advocates reducing hazards to life and property from flooding. The proposed project is the construction of about 500 single-family residential units on approximately 77 acres situated between the H-1 freeway and Farrington Highway near Makakilo. According to the preparation notice, the project site is subject to flooding during moderate storms. Runoff detention basins are proposed within a future golf course area to accommodate increased runoff from the urban development. The Environmental Impact Statement should include a detailed description of the property's existing and future drainage patterns particularly in relationship to other developments in the area. Also, it should address any related impacts on floodwater flows across the Barbers Point Naval Air Station's property which, according to the notice, ultimately receives runoff from the project area.

Thank you for the opportunity to comment on this preparation notice.

Sincerely,

Murray E. Towill
for Roger A. Ulveling

cc: Mr. F. J. Rodriguez

JAN 11 1988

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

January 15, 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: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your agency's comments postmarked January 8, 1988 on the Environmental Impact Statement Preparation Notice (EISPN) for the Lusk-Kapolei project. The Draft EIS is currently under preparation and will address the issues of concern expressed in your comments regarding surface runoff and drainage.

As you know, the project is part of the current State Land Use Boundary Amendment for urban use of the Kapolei Town Center. The proposal for residential use is also to be reviewed by the City and County for Development Plan Land Use Amendment and rezoning.

We look forward to your review of the Draft EIS and thank you for your 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 8391

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 H. 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

JAN 4 1988

DOC. NO.: 2326E
FILE NO.: 88-272

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: Lusk-Kapolei
TMK: 9-1-16: por. 4

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

Historic Sites Concerns:

The parcel of land involved in this project has been agricultural land for a number of years. Other archaeological surveys of nearby cane fields have not yielded any evidence of significant historic sites. We believe, therefore, that this project will have "no effect" on significant historic sites.

Water and Land Development Concerns:

A concern is the water supply for the 500 homes being proposed. Because the project lies in a Ground Water Control Area, the EIS should address the project's water needs and the source of water supply. Specifically, the EIS should describe those aspects of the "Ewa Water Master Plan" upon which the project would base its water supply system.

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

JAN 5 1988

F. J RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

January 15, 1988

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

Dear Mr. Paty:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your department's comments of January 4, 1988 for the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lusk-Kapolei project. The comments have been reviewed by the applicant/developer and civil engineering firm, Community Planning, Inc. We respond as follows:

1. Historic Sites

We will proceed on the basis of your stated position but will advise the State Historic Preservation Office in the event that during site preparation, sites are uncovered, we will advise your staff immediately.

2. Water Development

The Board of Water Supply has advised the applicant that there is potable water available for the project based upon allotment distribution indicated in the Ewa Water Master Plan. An acceptable preliminary water master plan for the site, including transmission and storage, will be coordinated with the Board of Water Supply and adjacent landowners.

We thank you for your comments and look forward to your review of the Draft EIS.

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

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. Chew
Lawrence F. Chun
Everett L. Cuskaden
Sharon R. Himeno
Toru Suzuki
Robert S. Tamaye
Renton L.K. Nip

ESTHER UEDA
Executive Officer

December 3, 1987

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

Dear Mr. Clegg:

Subject: EISPN for Lusk-Kapolei, Oahu Tax Map Key
Number 9-1-16: Portion of 4

Thank you for this opportunity to comment on the subject Environmental Impact Statement Preparation Notice.

We would like to point that the proposed project site is part of the petition area presently under consideration by the Land Use Commission for reclassification from the Agricultural to the Urban District under LUC Docket Number A87-613/The Trustees Under the Will and of the Estate of James Campbell Deceased.

Sincerely,

ESTHER UEDA
Executive Officer

EU:to

cc: F. J. Rodriguez

NO RESPONSE NEEDED

DEC 7 1987

University of Hawaii at Manoa

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

December 31, 1987
PN:0058

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:

Preparation Notice
Environmental Impact Statement
Lusk - Kapolei
Ewa, Oahu

This document proposes the building of 500 single-family residential units on 77 acres between the H-1 Freeway, Farrington Highway, and east of Makakilo Drive. This review was conducted with the assistance of Henry Gee and Edwin Murabayashi, Water Resources Research Center; and Steven Armann, Environmental Center.

Clarification is needed on statements made on page III-5 and IV-4 regarding wastewater treatment. On page III-5 the statement says, "[t]he Makakilo Interceptor sewer and the Treatment Plant presently have capacity to service the subject project." However, the statement on page IV-5 indicates, "[t]he 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."

The Draft EIS should include a more detailed description of the water supply system. Most of the water will come from wells located in the Pearl Harbor Aquifer and the impact to this aquifer caused by developments located outside the boundaries of the recharge area should be addressed. The Draft EIS should also address alternative water sources such as wells within the development or adjacent to the development. It should be noted that Makakilo's water supply is not solely from the 30 inch main, but a blend of water with maximum recommended chloride levels (250mg/l) from well 2004-04 and water from the 30 inch main. If new wells are drilled what will be the impact on chloride concentration for the Makakilo and Navy well (2103.03) due to additional withdrawal and elimination of recharge area formerly in sugarcane production should be addressed.

JAN 4 1988

The Draft EIS should discuss, in-depth, both air and noise pollution associated with and around the project site. Considering the close proximity of the site to the H-1 Freeway, Farrington Highway and the Naval Air Station at Barber's Point it is essential that the associated pollutants be discussed. Futhermore, the Grace Pacific Quarry operation near the project site needs to be precisely identified and its associated impacts discussed. A traffic analysis is necessary to ensure that Farrington Highway remains a safe roadway for both the public and Grace Pacific's heavy operating equipment.

Thank you for the opportunity to comment on this EIS Preparation Notice. We hope our comments will be helpful in preparing the Draft EIS.

Yours truly,

Jacquelin N. Miller
Associate Environmental Coordinator

cc: OEQC
F. J. Rodriguez
L. Stephen Lau
Henry Gee
Edwin Murabayashi
Steven Armann

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

January 15, 1988

Ms. Jacquelin N. Miller
Associate Environmental
Coordinator
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Ms. Miller:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received the comments dated December 31, 1987 on the Environmental Impact Statement Preparation Notice for the Lusk-Kapolei project.

The comments have been forwarded to the applicant/developer and their consultants for their information and responses. We provide the following comments:

1. Wastewater Management - The sewerage master plan for the area to be developed is being coordinated with the City and County Department of Public Works and adjacent landowners/developers so that adequate capacity can be planned for future use. The Draft EIS will respond to this subject.

2. The Ewa Water Master Plan is being utilized to provide adequate potable water for the proposed project. The Campbell Estate will be the primary source of water source developement for projects to be developed on their lands. The Board of Water Supply has indicated in correspondence that water is available to serve the proposed development.

3. The Draft EIS will contain the specific studies relative to air, noise, surface runoff impacts, and traffic impacts due to the proposed project development.

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

Very truly yours,

F. J. Rodrigues

FJR:ls

1146 Fort St Mall, Suite 200 • P O. BOX 536 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-0361

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

December 24, 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 LUSK-KAPOLEI PROJECT, TMK: 9-1-16: POR. 4

Thank you for the opportunity to review and comment on the environmental assessment for the proposed residential housing project.

We have the following comments:

1. The approved Ewa Water Master Plan includes the off-site water system required to serve the proposed development. However, use of the existing Makakilo 440 water system facilities will require the approval of Finance Realty, the developer of Makakilo.

2. The on-site water master plan should be submitted for our review and approval.

3. Water for the development should be obtained from sources developed by Campbell Estate. However, before water can be made available to the proposed development, the necessary off-site transmission mains and reservoir should be installed.

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

cc: F. J. Rodriguez

DEC 29 1987

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

January 15, 1988

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
Lusk - Kapolei

We have received your agency's comments dated December 24, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the Lusk-Kapolei project. The comments have been forwarded to the applicant/developer and their civil engineering consultants, Community Planning, Inc. for their information and future planning. We respond to your comments as follows:

1. Availability of potable water from approved Ewa Water Master Plan is acknowledged. The applicant/developer will be working with the landowner and the adjacent developer, Finance Realty to obtain all approvals for effective sharing of the Makakilo 440 water system; this will be taking place as the project moves through the City Development Plan and State Land Use Boundary amendment process.

2. An on-site water master plan will be provided for your review and approval upon completion of the project's Development Plan.

3. All provisions for the development of potable water necessary for the Lusk-Kapolei project will be coordinated with and through the Campbell Estate so that connections with the off-site transmission mains and storage reservoirs can be provided. This will also be done as the project moves through the DP processing, zoning change, and State Land Use Amendment processes.

Thank you for your comments and continuing interest.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8361

PB 87-1163

December 10, 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 LUSK-KAPOLEI
TMK: 9-1-16:POR. 4 (77± ACRES)

We have reviewed the subject EIS Preparation Notice and have no comments.

Thank you for the opportunity to review the preparation notice.

HERBERT K. MURAOKA
Director and Building Superintendent

TH:jo
cc: J. Harada
P. Rodrigues

NO RESPONSE NEEDED

DEC 14 1987

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

KK/DGP 88/E-1

December 24, 1987

Mr. F. J. Rodriguez
P.O. Box 536
Honolulu, Hawaii 96809

Dear Mr. Rodriguez:

Environmental Impact Statement Preparation Notice
for the Proposed Lusk - Kapolei
Development Project Situated in Ewa, Oahu

This is in response to your request for comments on the Environmental Impact Statement Preparation Notice for the proposed Lusk - Kapolei development in Ewa.

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

1. Vehicular Access and Traffic

   The applicant should prepare a traffic study which discusses the proposed development's impact on Farrington Highway and Barbers Point Access Road and its impact on downstream traffic on the H-1 Freeway.

2. Sewage Treatment and Disposal

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

3. Water System

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

4. Drainage System

   The Draft EIS should examine the project's drainage impact and proposed mitigation measures.

5. Environmental Characteristics

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

   B. Environmental Quality: The projects impact on air quality and noise levels should be evaluated.

   C. The Air Installations Compatible Use Zone Plan for the Naval Air Station Barbers Point (1984) should be considered in the land use plan for the project.

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

Donald Clegg
DONALD A. CLEGG
Chief Planning Officer

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

January 15, 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: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your department's comments dated December 24, 1987 for the Environmental Impact Statement Preparation Notice (EISPN) of the Lusk-Kapolei project. The comments have been forwarded to the applicant/ developer and their civil engineering consultant for review.

The Draft EIS currently under preparation, will address the specific areas as noted in your response. 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 8381

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4181

FRANK F. FASI
MAYOR

MIKE MOON
DIRECTOR

ROBERT MIYABATO
DEPUTY DIRECTOR

January 11, 1988

MEMORANDUM

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

FROM: Mike Moon

SUBJECT: Environmental Impact Statement Preparation Notice
Lusk - Kapolei
TMK: 9-1-16: Por. of 4

We appreciate the opportunity to review and comment upon the Environmental Impact Statement (EIS) Preparation Notice for the proposed Lusk-Kapolei residential development.

The Department's primary concern relates to the provision of housing opportunities for a range of income groups. We recommend that the EIS for the project include a description of the types and price ranges of the housing units proposed for the project. 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 the developer will be informed of any changes.

Thank you for the opportunity to comment.

Robert Miyabato
for MIKE MOON
Director

RECEIVED AFTER DEADLINE DATE/NRN

JAN 14 1988

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

(BWM)

January 5, 1988

MEMORANDUM

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

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

SUBJECT: CHAPTER 343, HRS, CONSULTATION COMMENTS FOR
LUSK-KAPOLEI EISPN
TAX MAP KEY 9-1-16: POR. 4

We have reviewed the Environmental Impact Statement Preparation Notice (EISPN) and have the following comments and suggestions:

1. Project Map. A location map should show the project's relation to Kapolei Village and its proposed golf course. The map should include a map scale.

2. Archaeology. Consultation with DLNR State Historic Preservation Office (SHPO) is recommended to establish the claim that there are no archaeological sites on the project site.

3. Drainage. The location of the drainage basins should be shown on a map. Storm runoff for the basins should be noted.

4. Water Supply. The impacts of the project on the regional water supply system should be discussed. A summary of the pertinent portions of the Water Master Plan prepared by Belt Collins and Associates, which was revised in August 1987, should be included. The Water Master Plan should be included in the appendix.

Thank you for the opportunity to comment. If you have any questions on our comments, please feel free to call Bennett Mark of our staff at extension 5038.

John P. Whalen

JOHN P. WHALEN
Director of Land Utilization

JPW:fm
cc: F.J. Rodriguez
Environmental Communications, Inc.
15518

JAN 7 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

January 15, 1988

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

Dear Mr. Whalen:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your department's comments of January 5, 1988 on the Environmental Impact Statement Preparation Notice (EISPN) for the Lusk-Kapolei project. The comments have been made available to the applicant and engineering firm, Community Planning, Inc. for their information and use. We respond as follows:

1. Project Map

The map to be provided will identify the project location and relationship to the adjacent developments.

2. Archaeology

The State Historic Preservation Office has commented initially advising of the paucity of historical sites. We will continue to maintain contact with their office.

3. Drainage

There will be a drainage analysis provided by the Engineering consultant as well as a study on surface runoff by Dr. Gordon L. Dugan.

Final determination of storm runoff basins will be made in consultation with the landowner and proposed adjacent developers so that effective runoff control can be achieved on a cost effective basis.

4. Water Supply

The appropriate agency involved in determining water availability has indicated that potable water is available for the project. Transmission

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and storage components of the water system will be designed in accordance with the Ewa Water Master Plan prepared by the Campbell Estate.

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

Very truly yours,

F. J. Rodriguez

F. J. Rodriguez

FJR:ls

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 M. OZAWA
DEPUTY DIRECTOR

December 15, 1987

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

FROM: HIRAM K. KAMAKA, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
LUSK - KAPOLEI DEVELOPMENT - HONOULIULI
TAX MAP KEY 9-1-16: POR. 4

The proposed Lusk - Kapolei project would have a significant impact on our existing and proposed public parks in the subject area. The report has not addressed this concern nor has it addressed the impact the project would have on the joint State/City Kapolei Village Development located just makai of the project site. These concerns should be addressed and included in subsequent EIS documents.

We also recommend that the applicant contact our department to discuss the project's recreational needs and park requirements.

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

HIRAM K. KAMAKA, Director

HKK:ei

Attach.

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

DEC 21 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

January 15, 1988

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

Dear Mr. Kamaka:

Subject: Environmental Impact Statement Preparation Notice
Lusk- Kapolei

We have received your department's comments dated December 15, 1987 on the Environmental Impact Statement Preparation Notice for the Lusk-Kapolei project. These comments have been forwarded to the applicant/developer for their review and their Planning consultants, Community Planning, Inc. will be in contact with your staff to discuss the park requirements for the Kapolei project.

The anticipated impacts on the State/City Kapolei Village will be reviewed in terms of how significant if any, the impacts may be on the adjacent project covered in the Draft Environmental Impact Statement (DEIS).

We look forward to your comments on the Draft EIS.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 4751

ENV 87-239

December 17, 1987

MEMORANDUM

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

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: EISPN FOR LUSK-KAPOLEI, EWA, OAHU
(TAX MAP KEY: 9-1-16: PORTION OF 4)

The EISPN for the subject proposed project was reviewed and we have the following comments:

1. The use of permanent retention basin(s) is recommended to reduce the anticipated storm runoff to predevelopment period. There are no assurances that the U.S. Navy will accept any additional storm flows from this and other proposed developments in the drainage basin.

2. A drainage master plan study should be submitted to the Drainage Section, Division of Engineering, for review and approval.

3. There are no municipal sewers near the project site. The existing Makakilo Interceptor Sewer was not designed to serve the proposed development. The use of the interceptor sewer for a temporary connection by way of a wastewater pump station (WPS) may be permitted provided there is reasonable assurance that a permanent connection to the proposed West Beach interceptor sewer will be constructed by the developer at his cost. A temporary WPS that is not constructed according to the City standards will not be operated and maintained by the Division of Wastewater Management.

4. The developers of Kapolei Village and West Beach should be contacted to make any arrangement for oversizing the affected proposed trunk and interceptor sewers to accommodate the wastewater flows from the development.

5. The existing capacity of the Honouliuli WWTP is not adequate to serve the proposed development. The proposed expansion of the plant to 38 mgd is tentatively scheduled for completion in 1993. Currently, there are almost 33,000 approved housing units in the plant tributary areas with an additional 24,000 units proposed. If all approved or proposed units were constructed by the year 2005, the anticipated flows will exceed the proposed plant capacity of 38 mgd by 10 mgd.

ALFRED J. THIEDE
Director and Chief Engineer

cc: F. J. Rodriguez

DEC 22 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

January 15, 1988

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

Dear Mr. Thiede:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

Thank you for your department's comments dated December 17, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lusk-Kapolei project. The comments have been forwarded to the applicant/developer for review and further study by their retained engineering consultant, Community Planning, Inc.

1. The Drainage Master Plan is being developed and a preliminary plan will be included in the Draft EIS. This Plan will be in a state of continuous revision and change as the project moves through the remaining Land Use Policy amendment process. There will be contact with your staff on this critical area of infrastructural development.

2. Wastewater Management will also be studied by the engineering consultant in conjunction with your Wastewater Division staff to insure adequate capacity. Coordination with other land owners/developers on the corridor to the Honouliuli Treatment Plant will be implemented with your agency's review and approval.

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

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521-8391

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

PL1.0917
TE-9937

January 8, 1988

MEMORANDUM

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

FROM: JOHN E. HIRTEN, DIRECTOR

SUBJECT: EIS PREPARATION NOTICE
LUSK - KAPOLEI
EWA, OAHU, HAWAII
TMK: 9-1-16: Por.4

This is in response to a request by Environmental Communications Inc. dated December 1, 1987 for comments on the subject preparation notice.

We have no comments to offer at this time.

(for) JOHN E. HIRTEN

cc: F. J. Rodriguez ✓

NO RESPONSE NEEDED

JAN 11 1988

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 S. BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

FRANK K. KAHOOHANOHANO
FIRE CHIEF

LIONEL E. CAMARA
DEPUTY FIRE CHIEF

December 11, 1987

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

FROM: FRANK K. KAHOOHANOHANO, FIRE CHIEF

SUBJECT: EISPN: LUSK - KAPOLEI

We have reviewed the subject matter and find no adverse impact on Fire Department facilities or services, planned or provided, as a result of the proposed project.

Primary fire protection for the proposed development will be provided by the Ewa Beach, Waipahu and Makakilo Fire Stations. Existing facilities and services are considered adequate and we have no objections to the proposed project.

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

Frank K. Kahoohanohano
FRANK K. KAHOOHANOHANO
Fire Chief

FKK:RS:lm

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

DEC 16 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

January 15, 1988

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

Dear Chief Kahoohanohano:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

Thank you for your department's comments dated December 11, 1987 for the Environmental Impact Statement Preparation Notice for the Lusk-Kapolei project. We will include your agency's comments in the Draft Environmental Impact Statement currently under preparation, and as the project continues through the land use policy process, we will maintain contact with your office.

Thank you 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 8761

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 • MAIL ADDRESS: P.O. BOX 3998

FRANK F. FASI
MAYOR

DOUGLAS G. GIBB
CHIEF

WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE SS-LK

December 28, 1987

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

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

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN) FOR LUSK - KAPOLEI

We have reviewed the EISPN for the project to construct approximately 500 single-family residential units in the newly proposed Kapolei Village and offer the following comments.

As expressed in our response to the Environmental Impact Statement for Kapolei, our primary concern is the impact that the construction will have on our already crowded freeways. To ease traffic flow and to minimize traffic congestion, we recommend that attention be given to the location of the residences in relation to the freeway entrances and exits.

Thank you for the opportunity to provide comments.

DOUGLAS G. GIBB
Chief of Police

cc: F. J. Rodriguez

DEC 31 1987

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

January 15, 1988

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

Dear Chief Gibb:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have your agency's comments dated December 28, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lusk-Kapolei project. The comments have been forwarded to the applicant/developer and their consultants for review and response.

A traffic impact study is being prepared for inclusion in the Draft EIS. Also, the comment on locating residences in relationship to freeway entrances and exits is being provided to Community Planning, Inc., who will be preparing the preliminary subdivision plan.

We look forward to your department's review of the Draft EIS and thank you for your comments.

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

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. BOX 50004
HONOLULU, HAWAII
96850

January 8, 1987

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

Dear Mr. Clegg:

Subject: Preparation Notice for the Proposed Lusk-Kapolei Development, Ewa, Oahu, Hawaii

The above-mentioned document has been reviewed as you requested. Two additional items should be addressed in the envrionmental impact statement:

a). The effect of the project on prime agricultural land.

b). The potential for soil erosion and sedimentation, and what steps be carried out to minimize any effects of both.

c). The potential of establishing viable alternative agricultural land uses on the project site.

We would appreciate the opportunity to review the draft environmental impact statement, when it becomes available.

Sincerely,

RICHARD N. DUNCAN
State Conservationist

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

RECEIVED AFTER DEADLINE DATE/NRN

JAN 13 1988

United States Department of the Interior

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

ES
Room 6307

JAN 5 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 Preparation Notice,
Lusk - Kapolei Housing Project, Ewa, Oahu

Dear Mr. Clegg:

We have reviewed the referenced document and offer the following comments for your consideration.

The proposed project site has been highly altered by sugar cane cultivation. In view of this, the proposed project will have little adverse impact on significant fish and wildlife resources at the project site.

We appreciate this opportunity to comment.

Sincerely,

Ernest Kosaka

Ernest Kosaka, Field Supervisor
Environmental Services
Pacific Islands Office

cc: F. J. Rodriguez

NO RESPONSE NEEDED

CONSERVE AMERICA'S ENERGY

JAN 6 1988

Save Energy and You Serve America!

For Information

245 North Kukui Street, Honolulu, Hawaii 96817, Telephone (808) 537-5966

AMERICAN LUNG ASSOCIATION of Hawaii
The Christmas Seal People®

January 7, 1988

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

Dear Mr. Clegg:

Subject: EIS Preparation Notice: Lusk - Kapolei

Thank you for providing a copy of the subject EISPN for our review. As you are well aware, our principal interest in this project relates to its impact on air quality. We trust that the draft EIS will thoroughly address:

- cumulative impact of all other developments in the area, especially as regards traffic-related air pollutants near major intersections and downstream on H-1 and Parrington Highway;
- possible impact of industries at Campbell Industrial Park on the project;
- possible impact of cane burning onf the project;

We would appreciate receiving a copy of the draft EIS when it is released for review.

Sincerely yours,

James W. Morrow
Director
Environmental Health

JWM:ct
L8753

cc: OEQC
Environmental Communications, Inc.

JAN 1 1 1988

Christmas Seals Fight TB, Asthma, Emphysema, Air Pollution

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

January 15, 1988

Mr. James W. Morrow, Director
Environmental Health
American Lung Association of Hawaii
245 North Kukui Street
Honolulu, Hawaii 96817

Dear Mr. Morrow:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your agency's comments postmarked January 8, 1988 on the Environmental Impact Statement Preparation Notice (EISPN) for the Lusk-Kapolei project. The proposed project DEIS is in preparation at the present time, and there will be an Air Quality Analysis included as part of the Draft EIS.

The Lusk-Kapolei project will provide for the development of 79.5 acres for urban-residential use. We would assume that the cumulative impacts from this project and the adjacent Kapolei Village project will be evaluated by the State Department of Health, Environmental Health Division.

We look forward to your agency's review of the Draft EIS; thank you for your continuing concern.

Yours very truly,

F. J. Rodrigues

FJR:ls

1146 Fort St Mall, Suite 200 • P O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8701

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

January 5, 1988

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:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for LUSK-Kapolei, Ewa, Oahu, Hawaii

We have reviewed the above document and have the following comments:

1. There are no existing 138 kv transmission lines crossing or in proximity to the subject development; and

2. The proposed HECO Waiau-CIP #1 and #2 138 kv transmission lines may pass in the vicinity of this project.

Sincerely,

Brenner Munger

cc: F. J. Rodriguez
D. Nagata, HECO

An HEI Company

JAN 7 1988

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

January 15, 1988

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
Lusk - Kapolei

We have received your comments dated January 5, 1988 on the Environmental Impact Statement Preparation Notice for the Lusk-Kapolei project. We have advised the planning and engineering consultant for the applicant, Community Planning, Inc. of your concerns on location of proposed transmission lines that may pass in the vicinity of the project.

The technical electrical engineering consultant will be apprised of these potential impacts at the appropriate time after the State Land Use Commission, Development Plan review, and parcel rezoning has been accomplished.

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 [illegible] • HONOLULU, HAWAII [illegible] • TELEPHONE [illegible]

OAHU SUGAR
PO Box O
Waipahu, Hawaii 96797
(808) 677-3577

Amfac

December 21, 1987

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

Dear Mr. Clegg:

Subject: Lusk-Kapolei, EISPN

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

- Oahu Sugar Company is growing sugarcane on 55.11 acres (Field 016) within the project's proposed boundaries. The expected yield from this field is 14.25 tons of sugar per acre. The tentative harvest date is April 27, 1988, which may vary by several months. Oahu Sugar Company has plans to plant the field shortly after harvest and to continue to grow sugarcane on the 55.11 acres.

- The EISPN notes the existence of irrigation flumes. Field 016 is a drip irrigated field and the flumes are abandoned.

- The EISPN states that culvert improvements are planned across Farrington Highway. Due to the increased amount of water which will travel through these culverts, it is advised that the drainage ways and makai streams be expanded.

- Please note that the future site of the Kapolei Village's golf course is presently in sugarcane and the developer has possible plans to utilize this area for silting and retention basins. This would preclude the cultivation of sugarcane on these sites.

We appreciate the chance to comment.

Very truly yours,

W. D. Balfour, Jr.
President and Manager

WRD:yk

cc: Mr. F. J. Rodriguez

DEC 23 1987

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ, PRESIDENT

January 15, 1988

Mr. W. D. Balfour, Jr.
President and Manager
Oahu Sugar Company
P.O. Box O
Waipahu, Hawaii 96797

Dear Mr. Balfour:

Subject: Environmental Impact Statement Preparation Notice
Lusk - Kapolei

We have received your comments dated December 21, 1987 on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lusk-Kapolei project.

The three items referenced in your letter have been provided to the applicant/developer and their engineering consultant, Community Planning, Inc. This information will also be reflected in the Draft EIS currently under preparation.

Thank you again for your comments and we look forward to your review and input on the Draft EIS.

Very truly yours,

F. J. Rodriguez

FJR:ls

1146 Fort St. Mall, Suite 200. P O BOX 338 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521-8101

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	02/04/88	02/08/88	NRN
Dept. of Agriculture	03/08/88	03/10/88	03/18/88
Dept. of Defense	02/01/88	02/02/88	NRN
Dept. of Education	02/03/88	02/16/88	03/18/88
Dept. of Health	*03/11/88	03/17/88	NRN
Dept. of Land & Natural Resources	02/04/88	02/08/88	03/18/88
	02/16/88	02/17/88	03/18/88
Dept. of Business & Economic Development	02/24/88	03/02/88	03/18/88
Housing Finance and Development Corp.	03/07/88	03/08/88	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	03/14/88	NRN
Water Resources Research Center	----------	----------	----------
City and 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.	03/02/88	03/04/88	03/18/88
Dept. of General Planning	02/25/88	02/26/88	03/18/88
Dept. of Land Utilization	03/08/88	03/10/88	03/18/88
Dept. of Parks and Recreation	----------	----------	----------
Dept. of Public Works	02/05/88	02/09/88	03/18/88
Dept. of Transportation Services	----------	----------	----------
Fire Department	02/09/88	02/11/88	NRN
Police Department	02/08/88	02/10/88	03/18/88

Agency	Date of Comment	Date Comment Received	Response to Comment
Federal			
Army-DAFE (Facilities Eng.-USASCH)	--------	--------	--------
Navy	--------	--------	--------
Soil Conservation Service	03/03/88	03/07/88	NRN
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/Agencies			
American Lung Association	03/08/88	* 03/10/88	NRN
Grace Pacific Corp	--------	--------	--------
Hawaiian Cement	--------	--------	--------
Hawaiian Electric Company	02/24/88	02/26/88	03/18/88
Ewa Community Association	03/08/88	03/09/88	03/18/88
Aiea Neighborhood Board No. 20	--------	--------	--------
Pearl City Neighborhood Board No. 21	--------	--------	--------
Ewa Neighborhood Board No. 23	--------	--------	--------
Oahu Sugar Company	--------	--------	--------

* NRN Received Beyond 45-day Deadline Date

LIST OF PREPARERS

Community Planning, Inc. - EIS Coordination
George K. Houghtailing
Albert Fukushima

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

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

Barry D. Root - Air Quality Study

Y. Ebisu & Associates - Noise Impact Study
Yoichi Ebisu

Gordon L. Dugan, Ph.D. - Storm Water Runoff

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

Evaluation Research Consultants - Agricultural Significance
Peter V. Garrod, Ph.D.

XIV. COMMENTS AND RESPONSES

(P)1092.8

FEB 4 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

Dear Mr. Clegg:

Subject: Draft Environmental Impact Statement
Kapolei Knolls

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

Very truly yours,

T. Tominaga

TEUANE TOMINAGA
State Public Works Engineer

EM:jk

NO RESPONSE NEEDED

FEB 8 1988

JOHN WAIHEE
GOVERNOR

COPY

SUZANNE D. PETERSON
CHAIRPERSON, BOARD OF AGRICULTURE

ROBERT Y. TSUYEMURA
ACTING 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

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) for Lusk-Kapolei Knolls
The Lusk Company
TMK: 9-1-16: por. 4 Ewa, Oahu
Area: 79.5 acres

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

The DEIS satisfactorily addresses some of the earlier concerns expressed in our December 21, 1987, response to the Preparation Notice. However, it would be prudent for the applicant to include further discussion on the specific economic impact on Oahu Sugar Company, the broader resource-oriented concerns, and the relationship of the proposed use to the State Agriculture Functional Plan. To reiterate, the concerns are as follows:

- The full impact on the economic viability of Oahu Sugar Company resulting from the cessation of sugarcane production on fields 016 and 020. This would include the loss in tons of sugar per acre, lost revenues, location and cost of replacement field preparation (if any), and any other indicators of adverse impact;

- The broader economic and resource impact to the State from the irrevocable loss of prime agricultural lands;

- Conformity to the State Agriculture Functional Plan and its objectives and policies, particularly, Implementing Action B(5)(c).

MAR 10 1988

We note that Oahu Sugar Company has stated in it comments on the EIS Preparation Notice (letter dated December 21, 1987) that they intend to continue growing sugarcane on field 016, which is drip-irrigated.

Thank you for the opportunity to comment on this document. A copy of the Final EIS would be most appreciated.

for Roy Yamamura
SUZANNE D. PETERSON
Chairperson, Board of Agriculture

cc: Mr. F. J. Rodriguez
OEQC
OSF (Attn: LUD)
LUC
Mr. William Balfour, President and Manager
Oahu Sugar Company

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

March 18, 1988

Ms. Suzanne D. Peterson, Chairperson
Department of Agriculture
State of Hawaii
1428 So. King Street
Honolulu, Hawaii 96814-2512

Dear Ms. Peterson:

Subject: DEIS for the Kapolei Knolls Project

We have received your department's comments postmarked March 9, 1988 which is beyond the stated 45-day review period for the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. We have reviewed these comments with the applicant and we respond as follows:

1. For your office's information, the 79.5 acre Kapolei Knolls project is being reviewed under the Lusk Company's Development Plan Amendment application, but is part of the total 890 acres of Campbell Estate lands currently under review for a Boundary Amendment by the State Land Use Commission for Kapolei. In the event that the Campbell Estate petition is not successful or is granted only for portions of the lands, not including the Kapolei Knolls site of 79.5 acres, the Lusk Company would seek Boundary amendment for their own parcel independently from the State Land Use Commission.

   We are providing for your information, the responses to the concerns over the viability of Oahu Sugar Company in the event that these 79.5 acres would be removed from agricultural use, based on the data provided in the Environmental Assessment (E.A.) prepared for the Campbell Estate in June 1987 and submitted to the Land Use Commission for the Kapolei Knolls Town Center project.

2. In this E.A., Jack Larsen, President of Agroland, Inc. went to great lengths in describing the impacts to the Oahu Sugar Company if 890 acres were removed from cultivation. Larsen points out that with improved cultivation practices, OSCo has managed to improve the tons of sugar per acres from 11.0 in 1977 to 15.0 in 1987. Decreasing acreage to cultivate does not apparently deter OSCo from maintaining a viable operation in the 1980s despite the less than appealing prices for sugar in the world market. We conclude our response to this subject by providing for your files, the pertinent pages from Larsen's report which deal with the subject parcel and the total acres needed to remain economically viable as a sugar producer.

   We respect your department's position on the role you play as the

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 8391

steward of the State's prime agricultural lands, and with all due respect, we admire the perserverance in reluctantly releasing these prime acreages to urbanization. Economic returns to the landowner will continue to prey on agricultural land use policies and the most recent example of this will be the Land Use Commission's decision to amend the Boundary designation petition of Mililani Mauka for over 700 acres of prime pineapple lands. It is difficult to respond on State policies that are in conflict, and at the present time, the need for housing units to meet all demand categories overrides the objectives and policies of the State Agricultural Functional Plan.

3. We will address your concerns on the Implementing Policies and Action B(5)(c), and list them on page VI-6.

4. The practice of drip-irrigation by OSCo on fields in the Ewa Plain will continue.

Thank you again for your comments and continuing concern.

Very truly yours,

F. J. Rodrigues

F. J. Rodrigues

FJR:ls

February 1, 1988

Engineering Office

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

Dear Mr. Clegg:

Kapolei Knolls
Honouliuli, 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.

Yours truly,

[redacted]

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

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

NO RESPONSE NEEDED

FEB 2 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 3, 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: Kapolei Knolls - Draft EIS

Our review of the draft Environmental Impact Statement for the Kapolei Knolls development indicates that it may have the following enrollment impact on our area schools:

School	Grade	Projected Enrollment
Barber's Pt./Makakilo	K-6	100 - 200
Ilima Intermediate	7-8	50 - 75
Campbell High	9-12	75 - 100

The above schools will be used to initially accommodate the students from this development. The construction of new schools within the planned Kapolei Village subdivision will be dependent upon the growth and the surplus classroom conditions in our existing schools.

Due to the many proposed developments in the Ewa Plains, it is urgent that we be kept abreast of the developers' construction timetable.

Sincerely,

Charles T. Toguchi

Charles T. Toguchi
Superintendent

CTT:jj

cc E. Imai, OBS
E. Nakano, Leeward Dist.
F. J. Rodriguez

FEB 16 1988

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

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 Kapolei Knolls Project

We have received your department's comments dated February 3, 1988 on the Draft Environmental Impact Statement prepared for the proposed Kapolei Knolls project.

Your review of the Draft Environmental Impact Statement (DEIS) and the potential impact on the area schools will be provided to the applicant/developer and their consultants so that a continuing dialogue can be maintained to insure that capacity for future enrollment can be provided.

Thank you for your comments and 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 6361

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

March 11, 1988

In reply, please refer to:
EPHSD

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 Kapolei Knolls, Ewa, Oahu

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

1. The DEIS has addressed most of our previous concerns (comments to the EISPN) relating to vehicular traffic noise and aircraft noise impacts along with possible mitigative measures. Regulatory compliance during the construction phase was also included.

2. There are additional concerns that should be addressed in the final EIS. Mitigative measures to minimize potential noise impacts from these identified concerns must be included.

   a. Noise from activities associated with the proposed commercial site, west of the residential development, including stationary equipment (air conditioning/ventilation units, exhaust units and refrigeration compressors), vehicles utilizing off-street parking areas and vehicles utilized for deliveries and services.

   b. Noise from recreational activities associated with the proposed park site within the residential community.

Bruce S. Anderson
BRUCE S. ANDERSON, Ph.D.

cc: Mr. F. J. Rodriguez ✓

NO RESPONSE NEEDED

MAR 17 1988

STATE OF HAWAII
DEPARTMENT OF HEALTH
ENVIRONMENTAL PROTECTION AND
HEALTH SERVICES DIVISION
P. O. BOX 3378
HONOLULU, HAWAII 96801

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

HONOLULU, HAWAII
MAR 22 '88
U.S. POSTAGE

NRM: RECEIVED BEYOND THE 45-DAY DEADLINE DATE

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

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

February 4, 1988

MEMORANDUM

TO: Roger C. Evans, OCEA

FROM: Ralston H. Nagata, State Parks Administrator

SUBJECT: Comments on Draft EIS -- Kapolei Knolls (88-350)
Honouliuli, Ewa District, Oahu
TMK: 9-1-16: por 4

HISTORIC SITES SECTION CONCERNS:

As is noted in the Draft EIS, there are no historic sites remaining on the subject property. We believe that this project will have "no effect" on significant historic sites.

RECREATION CONCERNS:

There are no state park concerns.

RALSTON H. NAGATA

FEB 8 1988

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

Mr. Ralston H. Nagata
Department of Land and 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 Kapolei Knolls

We have received your comments dated February 4, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls 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

1146 Fort St Mall, Suite 200 • P O BOX 538 • HONOLULU HAWAII 96809 • TELEPHONE (808) 521 8391

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

FEB 16 1988

DOC. NO.: 2723E
FILE NO.: 88-350

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: Kapolei Knolls, Draft EIS
TMK: 9-1-16: por. 4

In response to your request, we have reviewed the document cited above and have the following comments to offer:

The Final EIS should mention, specifically, how much water would be needed for the project, since it's located in the Pearl Harbor Ground Water Control Area.

Thank you for the opportunity to comment on this project.

Very truly yours,

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

cc: Mr. F. J. Rodriguez

FEB 17 1988

ENVIRONMENTAL COMMUNICATIONS INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

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

Dear Mr. Paty:

Subject: Draft EIS for the Kapolei Knolls Project

We have received your department's comments dated February 16, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. We have reviewed your comments with the civil engineering consultant and respond as follows:

Your inquiry as to the anticipated water demand for the project is provided in the DEIS on pp. VII-16, 17 under Section J. Impact on Infrastructure and Utilities. The anticipated potable water demand for Kapolei Knolls is stated at an average daily demand of 0.25 million gallons per day (MGD). There are discussions ongoing by the applicant with the Board of Water Supply, as well as with Campbell Estate who submitted the Ewa Water Master Plan for orderly development of their lands.

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) 521-8701

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: 7409250 HIDPED

Ref. No. P-8107

February 24, 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 Kapolei Knolls Development, Honouliuli, Ewa, Oahu

The proposed project involves the construction of approximately 500 single family residential units and appurtenant infrastructure on about 79.5 acres. The housing units are expected to provide for the demands of the proposed Kapolei Town Center project adjacent to Kapolei Knolls. We have reviewed the subject EIS and have the following comments:

1. The final EIS should evaluate the cumulative environmental impacts of both the Kapolei Knolls development and the adjacent proposed Kapolei Town Center development, 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." This is especially applicable because the EIS states that the purpose of the subject development is to provide housing for the demands of the Kapolei Town Center development (p. III-1). In addition, Section 11-200-7 of the EIS Rules states:

   Multiple or phased applicant or agency actions. A group of actions proposed by an agency or applicant shall be treated as a single action when:

   (1) The component actions are phases or increments of a larger total undertaking;

   (2) An individual project is a necessary precedent for a larger project;

MAR 2 1988

(3) An individual project represents a commitment to a larger project; and

(4) The actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole.

In this regard, we question why the Kapolei Town Center project, for which no EIS has been prepared, and the Kapolei Knolls project were not included in a single EIS. Not only are the two projects adjacent to each other, but according to the EIS, they are interrelated and interdependent.

2. The final EIS should discuss the relationship of the subject project to Campbell Estate's Ewa Long Range Master Plan.

3. The final EIS should disclose the number and type of affordable housing units that will be provided in the subject project. In addition, the EIS should address why the proposed Kapolei Knolls project is considered "accessory" to the State's Kapolei Village affordable housing project, as stated on page IV-1 of the draft EIS. Is the developer implying that the development of affordable houses by the State frees the private sector, and projects like this one, from providing their share of affordable housing?

4. The final EIS should provide more detailed information on the integration of the proposed drainage system with the Kapolei Village drainage system and the Barbers Point coral pit.

5. The final EIS should disclose the location of the potable water source. If the proposed development will tie into the Board of Water Supply water distribution system, then the projected capacity of this system and its capability of accommodating the subject project should be addressed. The DEIS only states on page V-12 that the existing system has adequate capacity for the proposed project.

6. The assumption used to determine the cost of water for agricultural purposes on page VII-8 does not appear justified. Potable water purchased from the Board of Water Supply distribution system is generally not used for agricultural purposes. A comparison of the cost of water from sources normally used for agriculture should be made.

7. The final EIS should disclose which off-site infrastructure costs the Petitioner is willing to fund. Expansion of water, sewer, and transportation systems must be coordinated with other Ewa area developments to reduce development costs and

overlap. The DEIS does not clearly state whether any off-site infrastructure development and associated costs will be shared with other planned developments.

8. The final EIS should address whether the existing police, fire, and school facilities will be adequate to serve the proposed project. The DEIS simply indicates that these public facilities are currently available and will have to be expanded. The funding source for these expanded facilities should also be addressed.

9. The final EIS should not assume that helicopter flight paths will be altered to reduce noise levels, as indicated on page VII-15. Impacts on the aural environment should be reassessed and should also more thoroughly describe the problem and mitigation of highway noise.

10. The final EIS should elaborate on the methods or studies used to determine that no historical or archaeological sites are present on the subject property. No special survey or study of the cultural resources appears to have been conducted.

11. The overriding need for "market housing" should be discussed in the context of the cumulative impact such urbanization would have on the viability of Oahu Sugar Company.

Thank you for the opportunity to provide comments.

Sincerely,

Roger A. Ulveling

cc: Mr. F.J. Rodriguez ✓

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 Kapolei Knolls Project

We have received your department's comments dated February 24, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. The applicant and their civil engineering consultant have reviewed your concerns and we respond as follows:

1. We have discussed this item with your staff and also the Office of Environmental Quality Control (OEQC) to get a better understanding of the cited regulations pertaining to "cumulative environmental impacts." Before we discuss our position on the comment, we will describe the current situation regarding the affected parcel so that there is a better understanding regarding the project's background. This clarification will also be included in the Final EIS in Section III, C, Project Description. "Kapolei Knolls consists of 79.5 acres that is currently owned by the Campbell Estate and is included in their State Land Use Commission petition to amend the Agricultural District designation to Urban. The subject project is part of the total Residential component of the Campbell Estate's petition and the schedule for development is well within the owners planned schedule. Lusk Company has received permission from the Campbell Estate to process the Development Plan Amendment for this 79.5 acre parcel so as not miss the opportunity to amend the DP Land Use Map in the current processing year. It is the applicant's intent to acquire the parcel for residential development from the Campbell Estate when the total 890 acres receive Urban amendment approval. If the Kapolei Town Center petition is denied, the Lusk Company is prepared to prepare and file its petition to seek Urban designation for the 79.5 acre parcel and proceed with the residential development."

The applicant does not ignore the proximity or adjacent proximity of the Kapolei Town Center or the Hawaii Housing Authority's project known as Kapolei Village, but feel it is inappropriate to comment on cumulative impacts for the Town Center Project at this time, as that applicant is being processed by the Campbell Estate. We trust that this will clarify any misunderstanding.

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

The comment that cumulative environmental impacts of both Kapolei Knolls and Kapolei Town Center be evaluated in accordance with EQC Rules and Regulations was reviewed in discussions with OEQC staff. It was their opinion that if the project under review was part of a master plan project and that our DEIS covered only an increment of the total development, then this rule was applicable. We qualified that the Kapolei Knolls project was separate from the Town Center project and was being processed on its' own merit and that the Section 11-200-17(i) rule did not apply; this was agreed to by OEQC staff.

2. Kapolei Knolls will provide residential housing units as indicated in the Campbell Estate's Ewa Long Range Master Plan, but is not evaluated.

3. The applicant has not determined the number and type of housing units to be provided for the affordable market as government agencies have not indicated their requirements and policies on that subject. The applicant has indicated to the City that they will comply with all reasonable requests for affordable housing units as their contribution on an established basis. The developer takes the comment that there is the implication of evading their responsibility of providing affordable housing as an unfair statement. With or without Kapolei Village adjacent to Kapolei Knolls, the applicant will meet their committment to government's request for affordable housing units.

4. The Campbell Estate has developed a Drainage Master Plan for their lands in Ewa that are subject to development. Kapolei Knolls will be an active participant in this Master Plan's implementation, with particular emphasis on the adjacent Kapolei Village drainage system; timing and coordination of when the joint systems will be built and connected is critical and is being carefully monitored by each projects engineering consultants. Final details are not available for review at this time.

5. The Board of Water Supply has indicated in correspondence dated February 22, 1988 and we quote: "The off-site water system to serve the proposed development is included in the approved Ewa Water Master Plan, revised August 1987 which was submitted to us by Campbell Estate. Water should be made available from sources developed by Campbell Estate. In addition to the water sources, the developer will be required to install the storage, booster pump, and transmission facilities."

6. We would clarify for the benefit of your staff, that our reference on page VII-8 is specific to the water requirements for truck farming, and not mass acreage farming such as Sugar. Sugar is more salt tolerant as a crop and has used irrigation water with chloride content in the upper 25-400 parts per million (ppm). Vegetable and fruit crops do not tolerate irrigation water with high chloride content and thus the requirement for potable quality water. The reference is correct as it is stated.

7. The applicant will pay its pro rata share for all infrastructural costs as determined on a per unit cost, or per gallon basis, whichever criterion is applicable. These costs are undetermined at this time since preliminary engineering costs are available today in 1987 dollars and do not accurately reflect those costs to be incurred at the time of installation.

8. The applicant has maintained close contact with the Police Department, Fire Department, and the State Department of Education on the availability of public facilities for Kapolei Knolls. To date, the Fire Department has advised that they foresee "no adverse....facilities or services," that there is adequate capacity; the Police Department is concerned about potential traffic impacts; and the State DOE is capable at the present time to handle the initial number of school age children from the project. They anticipate additional facilities pending review of future development phasing and availability of surplus school space.

9. Review of your comments by the Noise Consultant relative to impacts due to highway noise indicated that his summary contained on page 26 of his report (Appendix C) is still applicable and that "without noise mitigation measures future traffic noise levels are expected to be in the "Significant Exposure, Normally Unacceptable noise exposure category along portions of the north section of the project which front the H-1 Freeway and along the south section of the project which front Farrington Highway." He further states on page 28 that mitigation measures such as berms and noise attenuation features in building construction are recommended to mitigate these potential impacts.

10. Review of the archaeological studies conducted by the Campbell Estate for their Kapolei Town Center project in the Environmental Assessment prepared for their State Land Use Commission petition indicate "No archaeological remains are known to exist in the area." This was the statements made by Paul H. Rosendahl, Ph.D., Inc. in a preliminary archaeological survey conducted in November 1986. We will include this in the appropriate section on page V-5, Section D. Historic and Archaeological Characteristics.

11. The question as to the viability of the Oahu Sugar Company is tied to the decision made by the landowner, the Campbell Estate to urbanize the leased lands currently being farmed by OSCo. The OSCo Survival Plan is a document that was developed by both the Sugar Company and the landowner and describes the minimum acreage considered necessary to survive the taking of lands for urban use. If the landowner makes certain management or ownership decisions as to long term future use of agricultural lands, the current tenant is forced to accept these decisions

and if "Market Housing" is the alternative use, then the landowner has made the basic decision to move in that direction.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodrigues

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/1011JT

March 7, 1988

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

Dear Mr. Clegg:

Re: Draft Environmental Impact Statement (EIS)
for Kapolei Knolls

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

The applicant is proposing to develop approximately 500 market and affordable housing units. Although the EIS provides information on the conceptual type, sizes and average 1987 value of the market units, comparable information on the affordable units is lacking.

In our letter of December 24, 1987 regarding the EIS Preparation Notice, we stated that a portion of the units should be offered for sale or rent to families earning less than 120% of the area median income established by the U.S. Department of Housing and Urban Development (HUD).

The HUD-established 1988 median income for a family of four in the City and County of Honolulu is $36,500. We estimate that a family of four earning from 80% to 120% of the area median, could afford to purchase a home in the price range of $81,000 to $141,400.[1]

[1]This sales price estimate is based upon (1) an interest rate of 10%; (2) a down payment of 10% of the sales price; (3) a customer trust fund of $100 for real property taxes, fire insurance, maintenance fees, and other reserves; and, (4) an income to payment ratio of 3:1.

We also estimate that a family of four earning from 50% to 80% of the area median, could afford to pay between $456 and $730 for rent per month.[2] Thus, given the range of affordable sales prices and rents, a continuum of affordable housing opportunities could be provided in the proposed development.

Sincerely,

JOSEPH K. CONANT
Executive Director

cc: Mr. P..J. Rodriguez

[2]Based upon the HUD guideline that a family should pay not more than 30% of their adjusted income towards rent.

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

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

Dear Mr. Conant:

Subject: DEIS for the Kapolei Knolls Project

We have received your department's comments dated March 7, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. The comments have been reviewed by the applicant in terms of meeting the affordable housing requirements, and we respond as follows:

The review of how the applicant will comply with the affordable housing conditions imposed by the State and City agencies is still ongoing. The applicant is planning to coordinate the Kapolei Knolls project with the adjacent housing projects to determine if affordable units will be provided onsite as normally required, or if there is an opportunity to share or contribute fees offsite for development of affordable housing locations.

As this project continues through the remaining land use policy review process, the applicant will maintain continuous dialogue with all agencies responsible for determining requirements for affordable housing units.

We appreciate the current updating of financial requirements for individual purchasers and will factor this data into the design of the units.

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) 521-6361

JAN 25 1988

John Waihee

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

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: Kapolei Knolls

LOCATION: Honouliuli, 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: 548-4611

JOHN WAIHEE
Governor

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FREDERICK P. WHITTEMORE
Vice Chairman

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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 Kapolei Knolls

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

We have received your office's comments of January 27, 1988 on the Draft Environmental Impact Statement (DEIS) for Kapolei Knolls. 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.

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) 521-8391

University of Hawaii at Manoa

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

March 8, 1988
RE:0486

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
Lusk-Kapolei Knolls
Ewa, Oahu

The Environmental Center has reviewed the above referenced Draft Environmental Impact Statement (EIS) with the assistance of Peter Flachsbart, Urban and Regional Planning; Yu-Si Fok, Edwin Murabayashi, and Henry Gee, Water Resources Research Center; and Nancy Kanyuk, Environmental Center. The document proposes the construction of approximately 500 single-family residential units on about 79.5 acres, makai of the Makakilo Community between the H-1 Freeway and Farrington Highway, at Honouliuli, Ewa, Oahu. These "market housing" units will provide a portion of the housing for the newly proposed Kapolei Town Center.

Sewage Disposal

Although the Draft EIS addresses the subject of waste water disposal by noting that the Makakilo Interceptor Sewer and Treatment Plant presently has the capacity to service the subject project, it does not clearly establish whether access to these facilities has been obtained from the city. Additionally, the Draft EIS neglects to address the concern voiced by Alfred Thiede, chief engineer, that "the existing capacity of the Honouliuli waste water treatment plant is not adequate to serve the proposed development" (Memo-12/17/87).

Water Supply

The existing 30-inch Farrington Highway water main and Makakilo Drive Reservoir have been cited as two systems with adequate capacity to serve the project's water requirements, yet the Draft EIS does not indicate whether permission to tap into these facilities has been obtained. According to Board of Water Supply, this project should provide off-site transmission mains and reservoirs before water allocation can be made.

Water Resources Research Center

AN EQUAL OPPORTUNITY EMPLOYER

MAR 14 1988

In addition, the Draft EIS does not respond to the Department of Land Utilization's request for the inclusion of impacts of the proposed project on the regional supply system as established in the Water Master Plan prepared by Belt, Collins and Associates (Revised, August 1987).

Surface Water Runoff

The Draft EIS states on page V-2 that disposal of stormwater eventually leads to sheet flow across the Berbers Point Naval Air Station. However, it is not clear that the Federal Government will condone neighboring development which contributes to such a potential problem. Although the project area's flood hazards are undetermined (page V-2), effort should be made to find out the 100-year storm created overland flow of floods so that the planned housing development can make allowance to let overland flood water pass safely. In addition, inclusion of clearly delineated areas which are tributary to the Makakilo drainageway on one of the figures would facilitate review of the project.

Air Quality

Although an extensive air quality impact study is included in the Draft EIS, Section VII-H. of the Draft EIS (pages VII-11 to VII-14) does not address the issues raised in the consultant's report. In particular, references to existing and projected additional violations of allowable State Ambient Air Quality Standards are not mentioned. Although the contributions of the proposed project may be small compared to that of other planned developments in the region, full discussions of cumulative impacts are required in preparation of a Draft EIS.

In Appendix B, the air quality study, reference is made to wind direction frequencies, ostensibly included in Table 3. These frequencies are not listed, and may be critical in terms of establishing whether violations have occurred. Therefore, the information is essential.

Thank you for the opportunity to comment on this Draft EIS. We hope our comments will be helpful in preparing the final document.

Yours truly,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
L. Stephen Lau
√Environmental Communications, Inc.
Peter Flaschbart
Yu-Si Fok
Henry Gee
Edwin Murabayashi
Nancy Kanyuk

NO RESPONSE NEEDED

UNIVERSITY OF HAWAII

Environmental Center
2550 Campus Road • Honolulu, Hawaii 96822

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U S POSTAGE ≈0.18

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

NRN: RECEIVED BEYOND THE 45-DAY DEADLINE DATE

PB 88-110

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 KAPOLEI KNOLLS

We have reviewed the draft EIS for the proposed Kapolei Knolls project and have no comments.

Thank you for the opportunity to review the draft EIS.

HERBERT K. MURAOKA
Director and Building Superintendent

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

NO RESPONSE NEEDED

FEB 1 1988

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 KAPOLEI KNOLLS, TMK: 9-1-16: POR. 4

We have the following comments on the draft EIS:

1. The off-site water system to serve the proposed development is included in the approved Ewa Water Master Plan, revised August 1987, which was submitted to us by Campbell Estate.

2. The on-site water master plan for the development must be submitted for our review and approval.

3. Water for the proposed development should be made available from sources developed by Campbell Estate. In addition to the water sources, the developer will be required to install the storage, booster pump, and transmission facilities.

4. Since the Makakilo booster and 440-foot reservoir were built by Makakilo City, the developers of Kapolei Knolls should obtain written approval from Finance Realty before any connections to the Makakilo system will be approved.

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

cc: F. 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 Kapolei Knolls Project

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

1. We acknowledge the inclusion of the project's approved Ewa Water Master Plan.

2. An on-site water master plan will be submitted to your agency for review and approval.

3. The applicant has indicated that all required infrastructure components will be coordinated with the Campbell Estate as well as adjacent landowners and developers.

4. Coordination and approval from Finance Realty will be made before final design planning is completed to insure availability of the use of the Makakilo System Booster Pump and the 440-foot reservoir.

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 0351

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4181

FRANK F. FASI
MAYOR

MIKE MOON
DIRECTOR

ROBERT MIYABATO
DEPUTY DIRECTOR

March 2, 1988

MEMORANDUM

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

FROM: Mike Moon

SUBJECT: Draft Environmental Impact Statement
Kapolei Knolls
Honouliuli, Ewa District, Oahu

This is in response to your request for comments regarding the Draft Environmental Impact Statement (EIS) for the proposed development of 500 single-family "market housing" units on 79.5 acres in Ewa by The Lusk Company.

As noted in our comments regarding the EIS Preparation Notice, the Department's policy is to request that ten percent of the total number of units in a project benefitting from a zoning change be set aside for households of low- and moderate-income or that the developer contribute in-kind toward the development of such housing. The project summary contained in the draft EIS indicates that, at average sales prices of $160,000, the units at Kapolei Knolls will probably exceed the affordability criteria for units included in the ten percent set-aside. Therefore, we recommend that the developer consult with the Department in order to develop a program that adequately addresses the City's affordable housing requirements.

Thank you for the opportunity to comment.

Robert Miyabato
for MIKE MOON
Director

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

MAR 4 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

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

Dear Mr. Moon:

Subject: DEIS for the Kapolei Knolls Project

We have received your department's comments dated March 2, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. We have reviewed the comments with the applicant and their civil engineering consultant and we respond as follows:

The applicant has indicated his willingness to meet and cooperate with your staff to the extent necessary to achieve your department's goals of providing the required number of affordable housing units.

As you know, the project is in the midst of the Development Plan Annual Review and still requires a State Land Use Boundary Amendment, zoning change, and other governmental reviews prior to construction. We are confident that during this period of land use policy review, there will be continuous dialogue by the applicant and your office to satisfy housing requirements.

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 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

KK/DGP 1/88-182

February 25, 1988

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

Dear Mr. Rodriguez:

Draft Environmental Impact Statement
for the Proposed Kapolei Knolls
Development Situated in Ewa, Oahu

We have reviewed the subject Draft Environmental Impact Statement (EIS) and have the following comments:

1. Section VI.B.2, page VI-6, fails to consider the State Functional Plan for Agriculture which states:

   "Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustice or inequity will result or overriding public interest exists to provide such lands for other objectives of the Hawaii State Plan." (emphasis added)

2. In Section VI.B.4, page VI-7, the last sentence is unclear. It appears that the phrase should read ". . . so [not] a permit will not be required . . ."

FEB 26 1988

3. Section VII.G, page VII-10 comments that "Minor impacts would occur at Makakilo Interchange." This is misleading since Table 5 in the Traffic Impact Study, Appendix A indicates that under Case 1 given the existing 4-lane freeway and single-lane ramp (eastbound) the A.M. Peak Hour level of service will deteriorate from E to F with an increase in volume of 116 vehicles (6% increase). The P.M. Peak Hour will remain at level of service F with an increase in volume of 79 vehicles (4% increase). These impacts should not be considered minor since the A.M. Peak Hour will change from operating at capacity to exceeding capacity and the P.M. Peak Hour situation which already exceeds capacity will be further impacted by an additional 79 vehicles.

   Another concern in this section is the fact that although the Farrington Highway/Makakilo Drive intersection should provide sufficient capacity as stated, according to Table 4 of the Traffic Impact Study, even with mitigation the level of service during the A.M. Peak Hour will deteriorate from C to D while the P.M. Peak Hour will deteriorate from B to D. The average delay for the four approaches during the A.M. Peak Hour will increase from a range of 8.3 to 21.4 seconds to 26.4 to 55.7 seconds. The P.M. Peak Hour traffic will also suffer an increase in delay from a range of 7.7 to 12.2 seconds to 25.5 to 30.6 seconds. We feel that this drop in level of service is significant and should be mentioned in this section.

4. Under Section X, page X-1, the statement that the State Land Use amendment is contingent upon the development plan amendment is incorrect. A State Land Use change to Urban can and has preceded development plan amendments in the past.

If you have any questions, please contact Keith Kurahashi of my staff at 527-6051.

Sincerely,

Donald A. Clegg

DONALD A. CLEGG
Chief Planning Officer

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

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 Kapolei Knolls Project

We have received your department's comments dated February 25, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. The comments have been reviewed by the applicant and the civil engineering consultant and we respond in the following:

1. Our omission of the State Functional Plan for Agriculture will be added in the Final EIS. Although a technical inclusion, we recognize the overriding demand for housing as demonstrated by the landowner's current request to amend the State Land Use Boundary for these lands, and potential urban uses being proposed by the Hawaii Housing Authority and other private developers.

2. The sentence referred to on page VI-7 is corrected to read "no permit will be required . . . . ." Thank you for calling it to our attention.

3. Your staff review and reference to the sentence "minor impacts would occur at Makakilo Interchange" was perhaps taken out of context. In reading the section in which the sentence is only a part, the reviewer would note that a qualifying description earlier in the paragraph stated "With no other development in the Kapolei area . . . . ."; further, the subsequent sections describe accurately that "Other development, however, has been proposed in the area between H-1 and Naval Air Station Barbers Point." Finally, the ensuing paragraphs describe the potential impacts that would result and also, the measures required by government to mitigate these potential future traffic impacts. We do not disagree with your review and conclusions; we merely indicate that the narrative fully describe the calculations listed in Table 4 and 5. We note that the Traffic Report is provided in it's entirety as Appendix A and the tables indicating the degree of impact measured in levels of service are available for the technicians who rely on these figures for their evaluation.

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4. Your reference to page X-1, Section X is amended to read "A State Land Use Amendment as well as a City Zoning change will be obtained at the appropriate stage of the planning process." We acknowledge your timely advice.

Thank you for your comments and continuing concern.

Very truly yours,

F. J. Rodrigues

F. J. Rodrigues

FJR:ls

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 ☎ [illegible]

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

LU1/88-446(BWM)

March 8, 1988

MEMORANDUM

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

FROM: JOHN P. WHALEN, DIRECTOR

SUBJECT: CHAPTER 343, HRS
COMMENTS ON KAPOLEI KNOLLS DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS); TAX MAP KEY 9-1-16: PORTION 4

We have reviewed the Draft EIS and have the following comments and suggestions:

1. Definition of "Affordable" Housing

"Affordable" Housing should be described in terms of the percentage of units that will be made available for those eligible for "gap group" housing (families with 80% to 120% of the median income), for "moderate cost" housing (families with 50% to 80% of the median income) and "low cost" housing (families with less than 50% of the median income.)

2. Drainage

While the section on "Surface Water and Drainage" describes the acreage and volume of the drainage areas affected, a map showing these drainage areas would be appropriate. Also, the impacts of flood waters overflowing the coral pit into Barbers Point Naval Air Station needs to be addressed in more detail.

3. Water Supply

While the section on "Water Supply" states that the use of water would be "conditioned on the eventual completion of

MAR 10 1988

the facilities proposed in the Ewa Master Plan and approval of the Board of Water Supply," the EIS should indicate the project's water requirements in terms of the water drawn from the Pearl Harbor Ground Water Control Area. The EIS should describe how the project's water requirements relate to the "Ewa Water Master Plan."

4. Wastewater

The section on "Sanitary Sewage Disposal" should note that the Honouliuli WWTP does not have adequate capacity to serve the proposed development, and that expansion of the capacity of the WWTP from 25 mgd to 38 mgd is tentatively scheduled for 1993.

The regional effect of all of the developments in the Ewa area on the WWTP should be noted. According to DPW, if all 33,000 approved and 24,000 proposed housing units were built by the year 2005, the anticipated flow into the WWTP will exceed the proposed plant capacity of 38 mgd by 10 mgd.

Thank you for the opportunity to comment. If you have any questions, please contact Bennett Mark of our staff at 527-5038.

John P. Whalen

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
1684B

ENVIRONMENTAL
COMMUNICATIONS
INC.

F J RODRIGUEZ
PRESIDENT

March 18, 1988

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

Dear Mr. Whalen:

Subject: DEIS for the Kapolei Knolls Project

We have received you department's comments on the Draft Environmental Impact Statement (DEIS) for the Kapolei Knolls dated March 8, 1988 which were postmarked March 9, 1988 and received in our office on March 10, 1988. We will respond to your comments despite their receipt beyond the 45-days review time. The comments have been provided to the applicant and their civil engineering consultant and we respond as follows:

1. Definition of "Affordable" Housing

The applicant will comply with the requirements that may be imposed by the Department of Housing & Community Development, as well as the State Land Use Commission. At this initial review period, it is difficult if not impossible to determine the percentage breakdown for the categories you list; gap group, moderate cost, and low cost housing. We appreciate the definitions in terms of income levels per category.

2. Drainage

The landowner (Campbell Estate) has advised the applicant/developer that all onsite drainage attributed to the project, must remain onsite. Only that drainage which presently reaches the project site from drainage lands mauka of the site will continue to move through the project in a makai direction. As part of the total Ewa Drainage Master Plan developed for the Campbell Estate by R.M. Towill, this requirement will insure that net drainage flow from the project site will not increase. We regret that we cannot provide the map you request since it has not been designed at this early stage.

3. Water Supply

While we will respect your office's concerns over the drawdown from the Pearl Harbor Ground Water Control Area (PHGWCA), the project demand of 0.25 MGD is included in the Ewa Plain Water Development Company Water Master Plan which the Campbell Estate has provided to the Board of Water Supply. As such, we do not know if the water for the Kapolei Knolls will come from the PHGWCA. We can only assume that it will.

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4. Wastewater

We feel that the section on Wastewater Treatment and Disposal on page VII-17 and 18 are adequately stated "The City's Department of Public Works has indicated that the existing 25 mgd capacity of the Honouliuli Treatment Plant has already been committed to present and planned projects." The applicant reiterates that when the planned expansion scheduled to commence in 1991 is started, they are prepared to meet their pro-rata share for improvements.

Thank you for your comments and continuing concern.

Yours very truly,

F. J. Rodriguez

FJR:ls

EMV 88-33

February 5, 1988

MEMORANDUM

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

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT EIS FOR KAPOLEI KNOLLS, HONOULIULI, EWA, OAHU
(TAX MAP KEY: 9-1-16: PORTION OF 4)

We have reviewed the subject Draft EIS and have the following comments:

1. The use of permanent detention pond(s) to reduce anticipated storm runoff to predevelopment period are planned. These ponds must be privately maintained.

2. There is still no assurance that additional storm flows into the coral pit within the Barbers Point NAS will be accepted by the U.S. Navy from adjacent proposed developments.

3. The Makakilo Interceptor Sewer and the Honouliuli WWTP may have the capacity to serve the proposed development at this date (February 1988) but the capacity has been earmarked for approved developments. The Draft EIS should have addressed the permanent wastewater system plans for the development.

4. As stated in our memorandum of December 17, 1987, if all proposed and approved developments in the tributary area were constructed by the year 2005, the anticipated flows will exceed the Honouliuli WWTP proposed capacity of 38 mgd by 10 mgd.

ALFRED J. THIEDE
Director and Chief Engineer

cc: Environmental Communications, Inc.

FEB 9 1988

F. J. RODRIGUEZ
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

March 18, 1988

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

Dear Mr. Thiede:

Subject: Draft Environmental Impact Statement for Kapolei Knolls

We have received your department's comments dated February 5, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. We have provided the applicant/developer and their civil engineering consultant with the comments and we respond as follows:

1. The permanent detention ponds to contain surface runoff/drainage will be on site and maintained by the Community Association as part of the common element maintenance program.

2. The applicant/developer is continuing to work with the landowner to comply with the conditions as set forth in their Master Drainage Plan for the Ewa Plain. As this Plan reaches implementation, the acceptability of the runoff flowing into the coral pits on Barbers Point NAS lands will be determined.

3. It is understood that currently at this time (February 1988), there is capacity at the Honouliuli WWTP to serve this project. We further understand that at the time this proposed project is completed with the unfinished land use policy review process (State Land Use Commission, Development Plan Review, and Zoning), the availability of sewerage capacity may be absorbed. The applicant/developer will cooperate and pay his proportionate share of anticipated expansion to the Honouliuli WWTP to meet demand capacity requirements. We are aware that the current proposed capacity of the Honouliuli WWTP is at the stated capacity of 38 MGD. We will continue to work with the City to insure that our project can be included in the ultimate design capacity of 50 MGD at the Honouliuli WWTP.

Thank you for your comments and continuing interest.

Yours very truly,

F. J. Rodrigues

F. J. Rodrigues

FJR:ls

1146 Fort St Mall, Suite 200 • P. O. BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 531-6361

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: KAPOLEI KNOLLS, HONOULIULI, 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 1 1 1988

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 • AREA CODE (808) 848-3111

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: ENVIRONMENTAL IMPACT STATEMENT: KAPOLEI KNOLLS

We have reviewed the environmental impact statement for Kapolei Knolls and would like to offer the following comments.

Traffic at the T-intersection of H-1 Freeway and Makakilo Drive is currently exceeding the theoretical capacity. An increase in the number of cars as a result of the new development may impede traffic flow and create unsafe conditions. In the interest of traffic and pedestrian safety, it may be advisable to replace the stop sign with a traffic signal to ease the flow of traffic and reduce back-up on the off-ramp.

Other developments which are part of the entire Lusk-Kapolei project are expected to result in longer delays and increased congestion in traffic between H-1 and Barbers Point NAS. We suggest that a collaborative effort between the developer and the State Department of Transportation be made to find solutions during initial phases of the development for potential problem areas.

Thank you for the opportunity to comment.

DOUGLAS G. GIBB
Chief of Police

cc: Mr. F. J. Rodriguez

FEB 10 1988

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ
PRESIDENT

March 18, 1988

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

Dear Chief Gibb:

Subject: Draft EIS for the Kapolei Knolls Project

We have received your comments dated February 8, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls Project. We respond as follows:

1. The traffic impacts that are associated with the development of this project are being coordinated with the State Department of Transportation so that traffic projections reflecting adjacent projects can be tied together in a comprehensive traffic master plan. Your recommendation of a traffic signal instead of stop sign has been forwarded to the traffic consultant for their consideration and use in their discussions with the State DOT.

2. As this project continues through the land use policy review process that remains, this aspect of project impact will be reviewed in detail with the State DOT as well as with traffic consultants of the adjacent projects.

We appreciate your comments and thank you for your continuing concern.

Very truly yours,

F. J. Rodriguez

FJR:ls

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UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

March 3, 1988

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

Dear Mr. Clegg:

Subject: Environmental Impact Statement (EIS) -
Kapolei Knolls, Honouliuli, Ewa District, Oahu

We have no comment to offer at this time regarding the above-subject matter. Thank you for the opportunity in allowing us to review the above EIS.

Sincerely,

RICHARD N. DUNCAN
State Conservationist

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

NO RESPONSE NEEDED

MAR 7 1988

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

REPLY TO ATTENTION OF:

February 23, 1988

Planning Branch

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 Kapolei Knolls. The following comments are offered.

a. A Department of the Army permit is not required for this project since no work is proposed in waters of the United States or adjacent wetlands.

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

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Copy Furnished:

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

FEB 25 1988

F. J. RODRIGUEZ,
PRESIDENT

ENVIRONMENTAL
COMMUNICATIONS
INC.

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 Kapolei Knolls Project

We have received your office's comments dated February 23, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls 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

F. J. Rodriguez

FJR:ls

1146 Fort St Mall, Suite 200. P. O BOX 536 • HONOLULU, HAWAII 96809 • TELEPHONE (808) 521 6391

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, Kapolei Knolls, Honouliuli, Ewa District, Oahu
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

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

FEB 5 1988

245 North Kukui Street, Honolulu, Hawaii 96817, Telephone (808) 537-5966

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 Kapolei Knolls

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

1. Pages VII-12 & 13. The sections entitled "Long Term Indirect Impact or Project-Related Traffic" and "Regional Considerations" failed to mention the fact the project would be contributing to violations of State air quality standards as reported in the sub-consultant's air quality study (Appendix B, pp. 9 & 18). It is important that such violations be noted in the main text so that decision-makers do not have to scrutinize every subconsultant's report looking for such significant impacts.

2. Those same sections also 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. The public health significance of thousands of vehicle occupants, including many school children, 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. It was addressed in the sub-consultant's report (Appendix B, p. 11).

3. In the sub-consultant's air quality study (Appendix B, p. 10) 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.

4. Also in Appendix B (p. 11), the discussion of in-vehicle CO exposure concludes that higher pollutant exposure does occur to vehicle occupants but goes on to erroneously state that only under "emergency" conditions such as the recent tsunami alert would persons remain in their vehicle for one hour near any of the receptor sites considered in the study. There are two flaws in this argument. One is that commutes of close to or over one hour have been measured in the past on major Oahu roadways during a.m. peak hours. The concern is that such long commutes will continue and extend into other areas, especially leeward Oahu, as residential developments such as this one are built in the next 20 years. Secondly, the in-vehicle CO exposure is not related to the specific roadside receptor locations as suggested by the author's text on page 11. On the contrary, a motorist and his passengers will continue to be exposed to elevated levels of CO and other pollutants along the entire route in stop-and-go traffic.

5. 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.

We hope that you find these comments useful as it is very important that an EIS be a thorough and informative decision-making tool.

Sincerely yours,

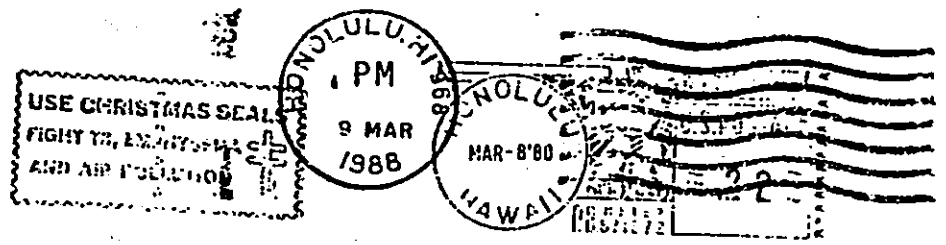
James W. Morrow
Director
Environmental Health

JWM:ct
L8811

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 24, 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: Draft Environmental Impact Statement (EIS) for Proposed Kapolei Knolls Development, Honouliuli, Ewa District, Oahu, Hawaii

We have reviewed the above document and note that our previous comments of January 5, 1988 (copy attached), on the Environmental Impact Statement Preparation Notice for LUSK-Kapolei project, are applicable to this proposed project.

Sincerely,

Brenner Munger

Attachment

cc: [redacted] Environmental Communications, Inc.

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

January 5, 1988

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:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for LUSK-Kapolei, Ewa, Oahu, Hawaii

We have reviewed the above document and have the following comments:

1. There are no existing 138 kv transmission lines crossing or in proximity to the subject development; and

2. The proposed HECO Waiau-CIP #1 and #2 138 kv transmission lines may pass in the vicinity of this project.

Sincerely,

Brenner Munger

cc: F. J. Rodriguez
D. Nagata, HECO

CHRON.

An HEI Company

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 Kapolei Knolls Project

We have received your comments dated February 24, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project. The comments have been provided to the applicant and the civil engineering consultant and we respond as follows:

1. We acknowledge the absence of 138 kv transmission lines crossing or in proximity to the subject development.

2. The possible proximity of the proposed HECO Waiau-CIP #1 and #2 138 kv transmission lines to Kapolei Knolls is acknowledged. We will maintain contact with HECO during the remaining land use amendment rezoning processes to keep your offices apprised of this project's development plans.

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) 521-8361

ENVIRONMENTAL
COMMUNICATIONS
INC.

F. J. RODRIGUEZ,
PRESIDENT

March 18, 1988

Mr. Charles "Dick" Beamer, Ph.D.
Ewa Beach Community Association
P.O. Box 3
Ewa Beach, Hawaii 96706

Dear Mr. Beamer:

Subject: DEIS for the Kapolei Knolls Project

We have received the Ewa Beach Community Association comments dated March 8, 1988 on the Draft Environmental Impact Statement (DEIS) prepared for the Kapolei Knolls project.

The applicant has reviewed the comments and welcomes the support of the Ewa Beach Community Association for their project. Please be assured that all infrastructure requirements that are mandated for compliance, will be met by the applicant.

Again, the support by the Ewa Beach Community Association is greatly appreciated.

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) 521-6361

EBCA

EWA BEACH COMMUNITY ASSOCIATION

P.O. BOX 3, EWA BEACH, HAWAII 96706

March 8, 1988

COPY

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

Dear Mr. Clegg:

The Ewa Beach Community Association Board of Directors recommended approval of the Kapolei Knolls project of approximately 500 single-family residental units. This project will complement the proposed Kapolei Village and Kapolei Town Center and will have an advantage of providing a planned residential community with opportunities to include mixed income families.

This recommendation is subject to a satisfactory resolution of the traffic, drainage, water, sewerage and other utilities impact on the area.

Very truly yours,

Charles "Dick" Beamer

Charles "Dick" Beamer, Ph.D.
President
Ewa Beach Community Association

cc: Mr. Fred J. Rodriguez

MAR 9 1988

APPENDIX A

Traffic Impact Study
Lusk-Kapolei
Ewa, Hawaii

by

Parson Brinkerhoff Quade and Douglas, Inc.

December 1987

TRAFFIC IMPACT STUDY

LUSK - KAPOLEI

EWA, HAWAII

The Lusk Company

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LUSK-KAPOLEI PROJECT

Ewa, Oahu, Hawaii

Prepared for:

The Lusk Company

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Honolulu, Hawaii

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TABLE OF CONTENTS

	Page
INTRODUCTION	1
EXISTING CONDITIONS	2
FUTURE CONDITIONS WITHOUT PROJECT	6
TRAFFIC GENERATION	10
PROJECT IMPACTS	13
MITIGATION MEASURES	22
CONCLUSIONS AND RECOMMENDATIONS	25
REFERENCES	26
APPENDIX	27

LIST OF FIGURES

Figure		Page
1	LOCATION MAP	3
2	TRAFFIC ASSIGNMENT (FUTURE W/O PROJECT)	7
3	TRAFFIC ASSIGNMENT (PROJECT TRAFFIC)	12
4	TRAFFIC ASSIGNMENT (FUTURE WITH PROJECT)	14
5a	TRAFFIC ASSIGNMENT (AM, CASE 2)	18
5b	TRAFFIC ASSIGNMENT (PM, CASE 2)	19

LIST OF TABLES

Table		Page
1	EXISTING CONDITIONS	5
2	TRIP GENERATION	10
3	TRIP DISTRIBUTION FACTORS	11
4	INTERSECTION ANALYSIS (CASE 1)	15
5	RAMP ANALYSIS	16
6	INTERSECTION ANALYSIS (CASE 2)	20
7	INTERSECTION ANALYSIS	24

TRAFFIC IMPACT STUDY

LUSK-KAPOLEI PROJECT

INTRODUCTION

The Lusk Company has proposed to develop 500 single-family dwelling units on 79.5 acres situated on the Ewa Plain of leeward Oahu. This report summarizes the findings of an evaluation of the traffic impacts of the proposed project. Future conditions with and without the proposed project have been considered for two possible scenarios: Case 1 assumes continued growth of Makakilo and development of the Ko'Olina (formerly West Beach) resort, while Case 2 includes implementation of other proposed major developments in the Ewa area. The report evaluates the expected traffic impacts and recommends transportation system improvements as necessary.

EXISTING CONDITIONS

The project site is located on the Ewa Plain of leeward Oahu and is situated between the H-1 Freeway and Farrington Highway (Figure 1). Presently, minimal highway traffic is generated from the project site and vehicular access is obtained from Farrington Highway.

Roadway System

Farrington Highway, a two-lane rural highway which has a 20-foot wide pavement structure, forms the southern boundary of the project site. Farrington Highway connects to Waipahu approximately four miles to the east and ties to a four-lane Farrington Highway at the Palailai Interchange with the H-1 Freeway, approximately one and one-half miles to the west.

Barbers Point Access Road (also referred to as Fort Barrette Road) is located to the southwest of the project site and serves the main gate of the Barbers Point Naval Air Station (NAS). This two-lane highway is wider near the signalized Farrington Highway intersection. North of this intersection, the road continues up to Makakilo as the six-lane Makakilo Drive, crossing over the H-1 Freeway at Makakilo Interchange. Makakilo Interchange provides ramp connections toward Honolulu to/from the north and south while connections to or from Waianae are made via Farrington Highway and Palailai Interchange, located one mile to the west.

Traffic Conditions

The description of existing traffic conditions is based on traffic counts taken by the State Highways Division[1]. In the vicinity of the project site, Farrington Highway operates below capacity during peak periods. During the afternoon peak hour, the two-way volume on Farrington Highway is approximately thirty-five percent of the highway's capacity. The existing two-way

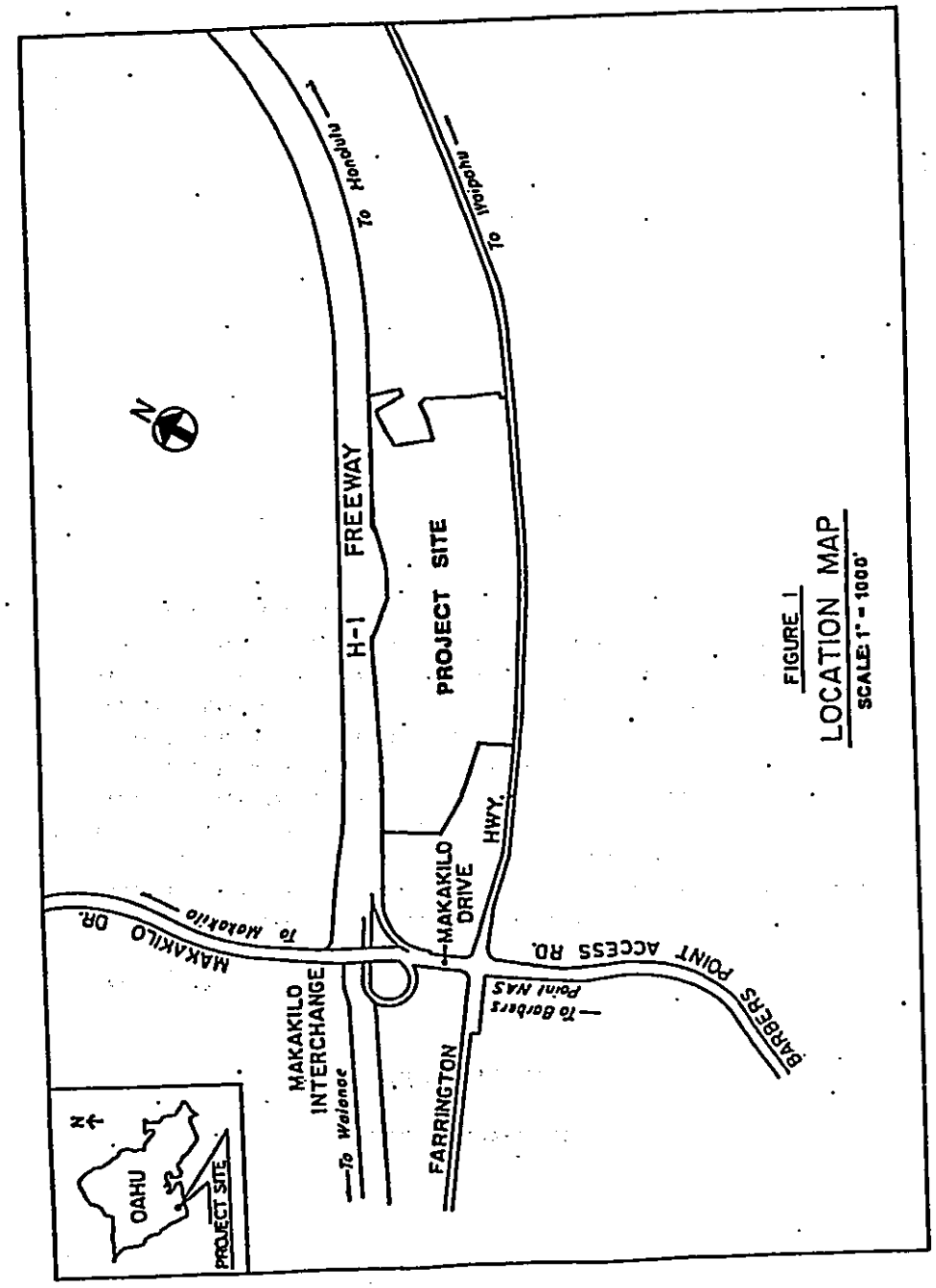

FIGURE 1
LOCATION MAP
SCALE 1" = 1000'

peak hour volumes on Farrington Highway adjacent to the project site are approximately 460 vehicles per hour (vph) during the morning (AM) and 540 vph during the afternoon (PM) peak hours.

The traffic on Makakilo Drive displays typical residential patterns with high directional splits reflecting home-to-work and work-to-home commuting. The existing two-way peak hour traffic volumes on Makakilo Drive near the H-1 overpass are approximately 1,300 vph during the morning and afternoon peak periods. Table 1 shows the findings of the analysis for the signalized Makakilo Drive/Farrington Highway intersection.

The H-1 Freeway in the vicinity of the proposed project is presently being upgraded from a four-lane freeway to a six-lane freeway. Makakilo traffic from the north enters the freeway via a single lane loop ramp; traffic from the south enters alongside in a separate lane on the right. The ramps presently handle a peak volume of 830 vph in the morning peak hour during which time the Honolulu-bound freeway volume is approximately 1,300 vph before the ramp.

Traffic from the freeway using the Makakilo Interchange westbound off-ramp to Makakilo and Barbers Point NAS is controlled by a stop sign at Makakilo Drive. Analysis of this unsignalized T-intersection indicates that the theoretical capacity for westbound left turns from the off-ramp onto southbound Makakilo Drive has been exceeded. Table 1 displays the findings of the intersection, ramp, and freeway analyses. The Levels of Service are described in the attached appendix.

TABLE 1

EXISTING CONDITIONS (1985)

	AM Peak Hour	PM Peak Hour
Unsignalized intersection		
Makakilo/H-1 off-ramp		
Left turn LOS	F	B
Right turn LOS	A	C
Signalized intersection		
Makakilo/Farrington		
Overall LOS	B	B
Average Delay (seconds)		
EB approach	12.3	8.6
WB approach	10.6	7.5
NB approach	4.9	7.9
SB approach	6.7	7.5
Ramps and Freeway (Makakilo Interchange eastbound on-ramp)		
vm/LOS	1289/C	1135/C
vf(after merge)/LOS	1932/B	1883/B

Notes: EB = eastbound
WB = westbound
SB = southbound
NB = northbound
LOS = Level of Service
vm = merge volume (passenger cars per hour)
vf = freeway volume (passenger cars per hour)

FUTURE CONDITIONS WITHOUT PROJECT

Estimates of future traffic conditions in the Ewa area must account for other development; however, the implementation of many of these other projects is uncertain. The proposed project is expected to be completed in 1995, before completion of other larger projects in the area. The evaluation of future traffic conditions with and without the proposed project, therefore, included two possible future scenarios. Case 1 includes the continued growth of Makakilo and development of the Ko'Olina (formerly West Beach) resort. Case 2 considers not only the growth in Makakilo and Ko'Olina, but also includes partial development of the proposed Kapolei Town Center and Kapolei Village projects.

Case 1

Figure 2 shows the Case 1 traffic assignment for future conditions without the project. The traffic assignment for the Farrington Highway/Makakilo Drive intersection was based on historical traffic count data for this intersection from the State Highways Division.

The intersection analyses were conducted with "HCAP" computer software[2] which is based on the computational methods in the 1985 Highway Capacity Manual[3]. The operational method, which calcu- lates volume-to-capacity (v/c) ratios and identifies Levels of Service (LOS), was used. Levels of Service are described in the attached appendix.

The signalized intersection of Farrington Highway/Makakilo Drive was analyzed for existing laneage and two-phase signal operation. Under these conditions, this intersection would operate at LOS C and LOS B during the AM and PM peak hours, respectively.

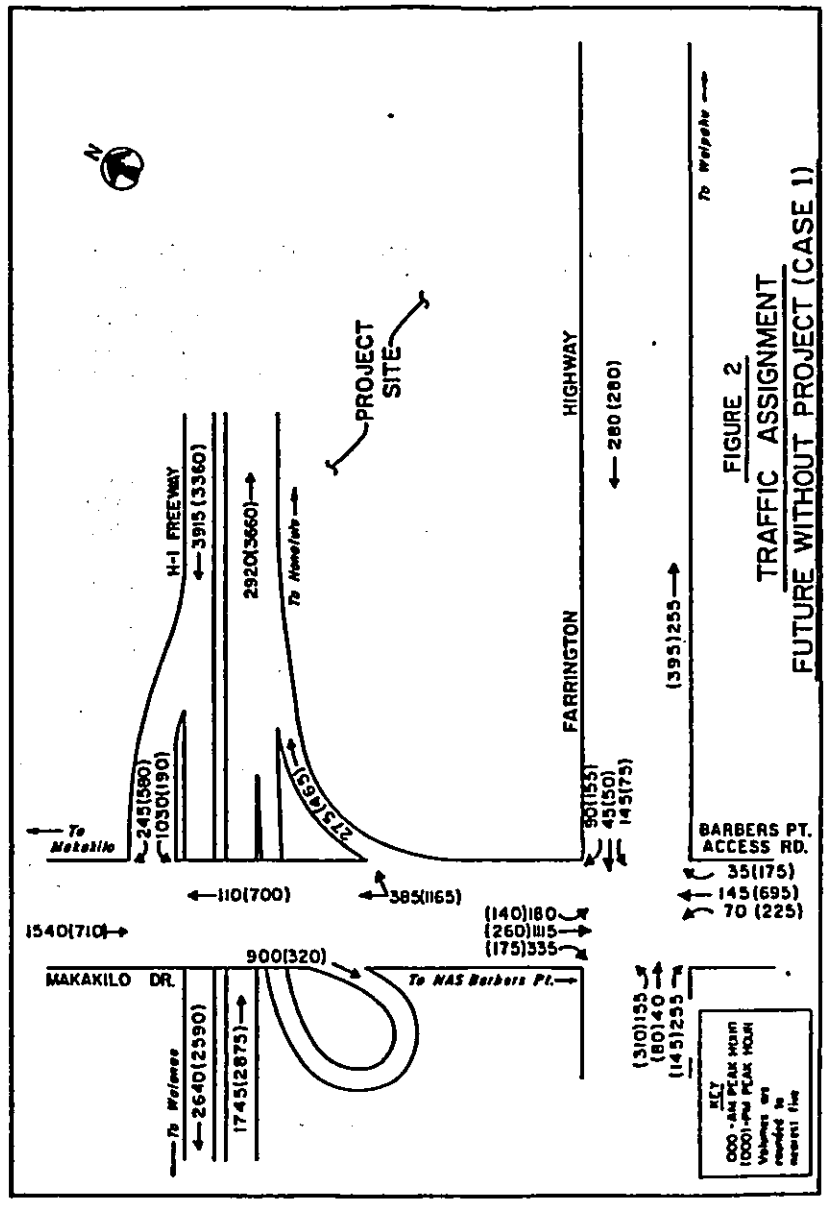

FIGURE 2
TRAFFIC ASSIGNMENT
FUTURE WITHOUT PROJECT (CASE 1)

The future traffic on the H-1 Freeway under Makakilo Drive was projected using estimates of growth in population and employment in Waianae, Campbell Industrial Park, and Ko'Olina. The 1985 Highway Capacity Manual analysis of freeway merge locations (on-ramps), which estimates lane usage on the adjacent freeway traffic lane, was used to identify merge conditions. The ramp volume, the total freeway volume upstream of the ramp, and the proximity of other ramps in the area can affect the operation of a ramp junction.

The H-1 Freeway was assumed to operate as if it were a four-lane freeway to address the worst case situation; the third lane in each direction will be used as a high-occupancy vehicle (HOV) lane (significant use of the HOV lane would decrease freeway volumes, thereby improving merge conditions). The analysis of the Honolulu-bound Makakilo Interchange on-ramp shows that the on-ramp from the south would have the critical merge, and that the critical merge volume and the freeway volume after the merge will exceed capacity (LOS F) during the PM peak hour.

Case 2

According to the Kapolei Village Master Plan Report[4], 40 percent of Kapolei Village would be completed by year 1995. The signalized intersection of Farrington Highway and Barbers Point Access Road/Makakilo Drive intersection would operate at LOS D conditions during the AM and PM peak hours.

The Kapolei Village project proposes that a new road, the Village Parkway, intersect Farrington Highway from the south, forming a signalized T-intersection just east of the Makakilo Drive/Farrington Highway intersection. The analysis of this intersection shows that it would operate at LOS C during both peak periods.

Kapolei Village would also create a smaller residential area to the east of the Village Parkway which would be served by three access roads intersecting Farrington Highway from the south at three T-intersections. These roads are referred to (from west to east) as Access 1, Access 2 and Access 3. Analyses of the three intersections show that a shared lane from each access road would operate at LOS C during the AM peak hour and at LOS E during the PM peak hour. The left turn from Farrington Highway into each access road would operate at LOS A during the both peak hours.

TRAFFIC GENERATION

Traffic generation is a three-step process which involves trip generation, trip distribution, and traffic assignment. Trip generation estimates the number of trips that the project will produce and attract. Trip distribution is used to determine the destinations and origins of the generated trips, while traffic assignment places these trips onto the roadway network.

Trip Generation

The proposed project will include 500 single-family dwelling units. The trip rates for single-family dwelling units, taken from the Institute of Transportation Engineers' informational report, Trip Generation, Third Edition[5], and the resultant trip estimate are shown in Table 2.

TABLE 2

TRIP GENERATION

	Daily (vpd)	AM Peak Hour (vph)		PM Peak Hour (vph)	
	Enter & Exit	Enter	Exit	Enter	Exit
Trip Generation Rate per Single Family DU	10.0	0.21	0.55	0.63	0.37
Trip Generation for 500 DU	5000	105	275	315	185

Notes: vpd = vehicles per day
vph = vehicles per hour
DU = dwelling unit

Trip Distribution

The trip distribution factors for Case 1, shown in Table 3, were estimated using traffic counts taken in the vicinity of the project by the State of Hawaii's Department of Transportation.

In Case 1, the trips were distributed in four directions: north to/from Makakilo, south to/from NAS Barbers Point, east to/from Honolulu or Waipahu and west to/from Waianae.

For Case 2, the trip distribution factors used in this study were from the Kapolei Village Traffic Impact Study[6]. The completion of an Ewa Parkway ("east-west road"), which would provide a direct connection to the east or Ewa Beach, was assumed for Case 2 conditions.

TABLE 3

TRIP DISTRIBUTION FACTORS
CASE 1

	AM Peak Hour		PM Peak Hour	
Direction	Enter	Exit	Enter	Exit
North	0.20	0.05	0.05	0.15
South	0.05	0.20	0.15	0.05
East	0.60	0.55	0.55	0.55
West	0.15	0.20	0.25	0.25
TOTAL	1.00	1.00	1.00	1.00

Traffic Assignment

Traffic assignment makes an estimate as to which roadways the project traffic would utilize. Two access roads were assumed along Farrington Highway for access to the proposed project. The project traffic entering or exiting from the north or south would use Makakilo Drive or Barbers Point Access Road, respectively. Traffic to/from the east would be expected to use Farrington Highway or the H-1 Freeway, while traffic entering or exiting to/from the west would use Farrington Highway. Figure 3 shows the traffic assignment for project traffic.

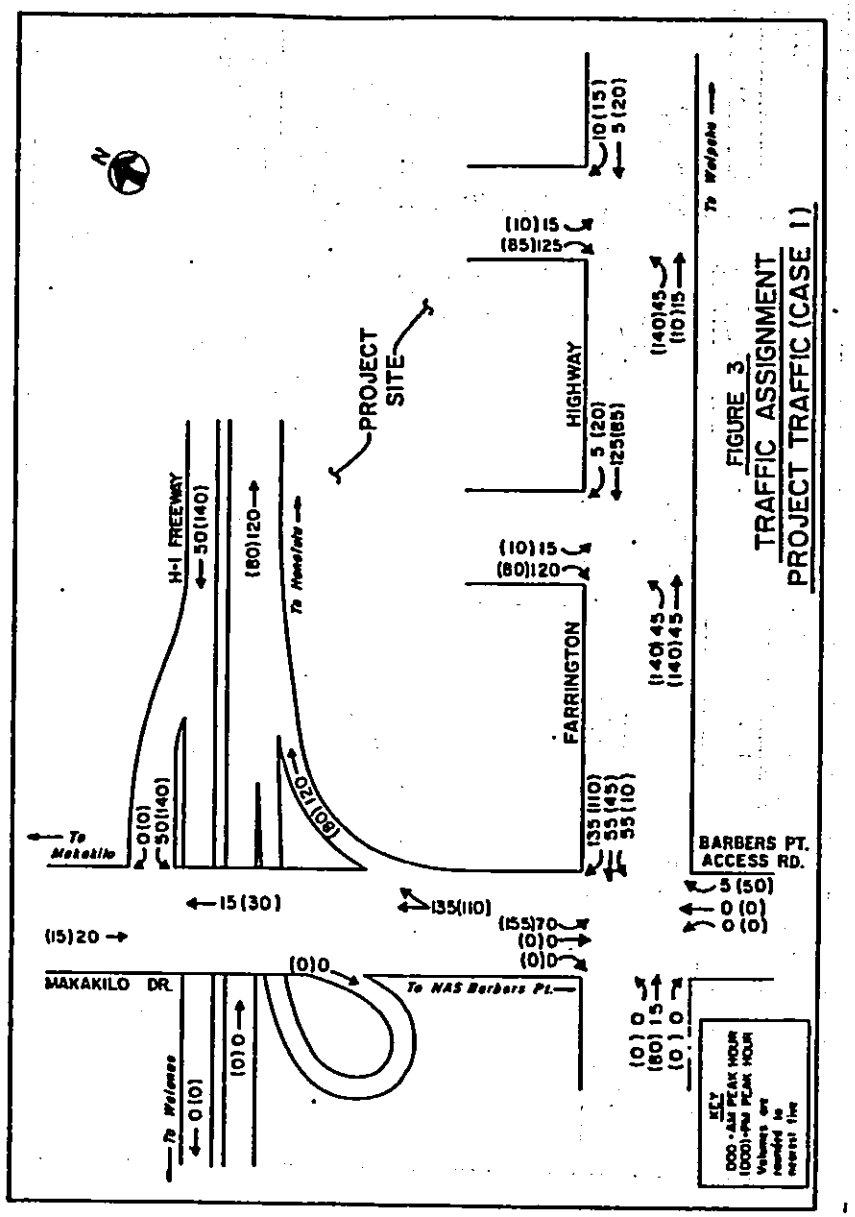

FIGURE 3
TRAFFIC ASSIGNMENT
PROJECT TRAFFIC (CASE 1)

PROJECT IMPACTS

The completion of the proposed project is expected in 1995. The traffic study assumed that two access roads will be provided for vehicular access into the site from Farrington Highway.

Case 1

Figure 4 shows the future Case 1 traffic assignment with the project. The analysis of the Farrington Highway/Makakilo Drive intersection with no lane improvements and two-phase operation of the traffic signal shows that it will operate at LOS C during the AM peak hour and LOS F during the PM peak hour.

The project's two access roads will form T-intersections with Farrington Highway with the access roads being the stems of the intersections. With Farrington Highway remaining a two-lane highway, the unsignalized intersection analysis show that both the west (Waianae) and east (Waipahu) access roads intersections will accommodate the left turns from Farrington Highway into the project site at LOS A during both peak periods. A shared lane for left and right turns from the project site at each intersection would operate at LOS A during the AM and PM peak hours. Table 4 summarizes the intersection analysis findings.

At the Makakilo Interchange, Honolulu-bound traffic would use a two-lane on-ramp; without the project, three Honolulu-bound lanes (a six-lane freeway) would be needed to allow adequate merging. The analysis of a two-lane ramp merging with a six-lane freeway shows that the critical merge location would be at LOS D while downstream traffic volume would result in LOS C on the freeway during the AM peak hour. Both the critcal merge and downstream freeway conditions be LOS C during the PM peak hour. The ramp analysis findings, shown in Table 5, indicate minimal impact due to the proposed project.

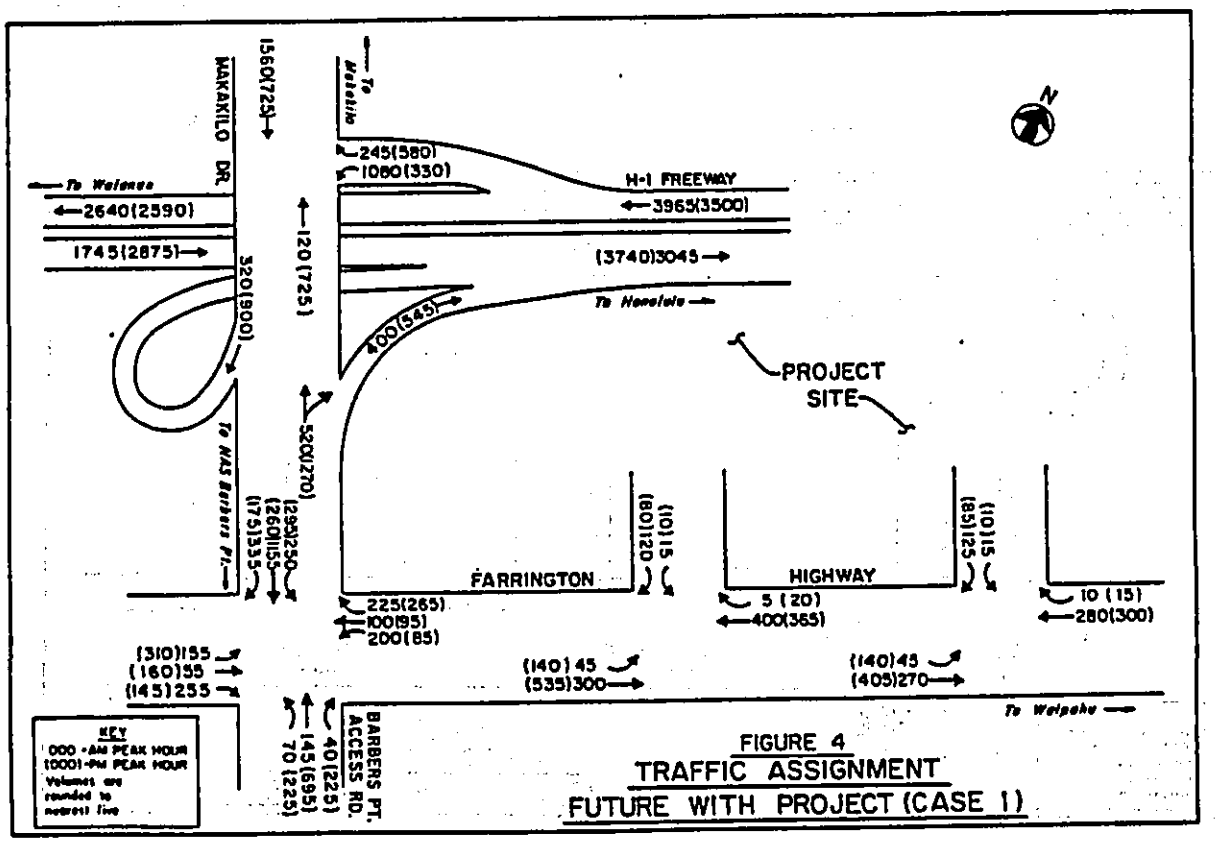

FIGURE 4
TRAFFIC ASSIGNMENT
FUTURE WITH PROJECT (CASE 1)

TABLE 4

PEAK HOUR INTERSECTION ANALYSIS
CASE 1

	FUTURE WITHOUT PROJECT		FUTURE WITH PROJECT		FUTURE WITH PROJECT (MITIGATED)	
	AM	PM	AM	PM	AM	PM
SIGNALIZED INTERSECTION						
Makakilo/Farrington overall LOS	C	B	C	F	D	D
Average Delay (seconds)						
EB Approach	13.8	12.2	16.7	34.4	35.7	30.6
WB Approach	14.4	7.7	26.4	8.5	28.1	30.8
NB Approach	8.3	9.2	8.3	9.2	26.5	43.1
SB Approach	21.4	11.7	20.9	412.7*	26.4	25.5
UNSIGNALIZED INTERSECTION LOS						
Farrington/West Access						
SB Approach (shared lane)	-	-	A	A	-	-
exclusive left turn lane	-	-	B	D	-	-
exclusive right turn lane	-	-	A	A	-	-
EB left turn off highway	-	-	A	A	-	-
Farrington/East Access						
SB Approach (shared lane)	-	-	A	A	-	-
exclusive left turn lane	-	-	B	C	-	-
exclusive right turn lane	-	-	A	A	-	-
EB left turn off highway	-	-	A	A	-	-

Notes: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound
LOS = Level of Service, * = theoretical capacity of intersection exceeded

TABLE 5

RAMP ANALYSIS

	FUTURE WITHOUT PROJECT AM Peak Hour	FUTURE WITHOUT PROJECT PM Peak Hour	FUTURE WITH PROJECT AM Peak Hour	FUTURE WITH PROJECT PM Peak Hour
MAKAKILO INTERCHANGE (Eastbound on-ramp)				
CASE 1				
4-lane freeway				
vm/LOS	1,965/E	2,053/F	2,081/F	2,132/F
vf(after merge)/LOS	3,189/D	4,039/F	3,321/D	4,128/F
2-lane ramp onto 6-lane freeway				
vm1/LOS	1,087/C	1,226/C	1,164/C	1,228/C
vm2/LOS	1,568/D	1,239/C	1,707/D	1,331/C
vf(after merge)/LOS	3,203/C	4,058/C	3,336/C	4,148/C
CASE 2				
2-lane ramp onto 6-lane freeway				
vm1/LOS	1,231/C	1,433/C	1,282/C	1,463/D
vm2/LOS	1,862/E	1,618/D	1,920/E	1,671/D
vf(after merge)/LOS	3,486/C	4,428/D	3,541/C	4,479/D

Notes: vm1 = merge volume at first merge location (passenger cars per hour)
vm2 = merge volume at second merge location (passenger cars per hour)
vf = freeway volume after merge (passenger cars per hour)
LOS = Level of Service

Case 2

For Case 2, the analysis assumed that the project's two access roads would be located directly opposite the Access 1 and Access 3 roads of the proposed Kapolei Village project. Two cross-intersections are formed at the intersections of Farrington Highway with Access 1 and Access 3, while Kapolei Village's Access 2 remains a T-intersection.

For future conditions with the project, the phasing plan in the Kapolei Village Master Plan Report was used to estimate that approximately 40 percent of Kapolei Village would be completed by year 1995. Partial development of the proposed Kapolei Town Center was also estimated. Improvements to Farrington Highway, the Farrington Highway/Makakilo Drive intersection, and the Farrington Highway/Village Parkway intersection would be needed for Case 2. The improvements described in the Kapolei Village Traffic Study were assumed. Figure 5a and 5b show the traffic assignment for future conditions with the project. Table 6 shows the results of the intersection analyses for Case 2.

The signalized intersection of Farrington Highway/Makakilo Drive was assumed to be improved by widening at all approaches. The northbound approach would include a left turn lane, two through lanes, and a shared lane for through and right turn movements. The southbound approach would be striped for double turn lanes for left and right turn movements and two lanes for through traffic. The eastbound approach would include two lanes for left turns, two through lanes and a single lane for right turns while the westbound approach would be similar except it would only have a single lane for left turns. This intersection would be at LOS D during both peak hours.

The signalized intersection of Farrington Highway/Village Parkway was assumed to include two through lanes and separate turn lanes for turns into Village Parkway on Farrington Highway;

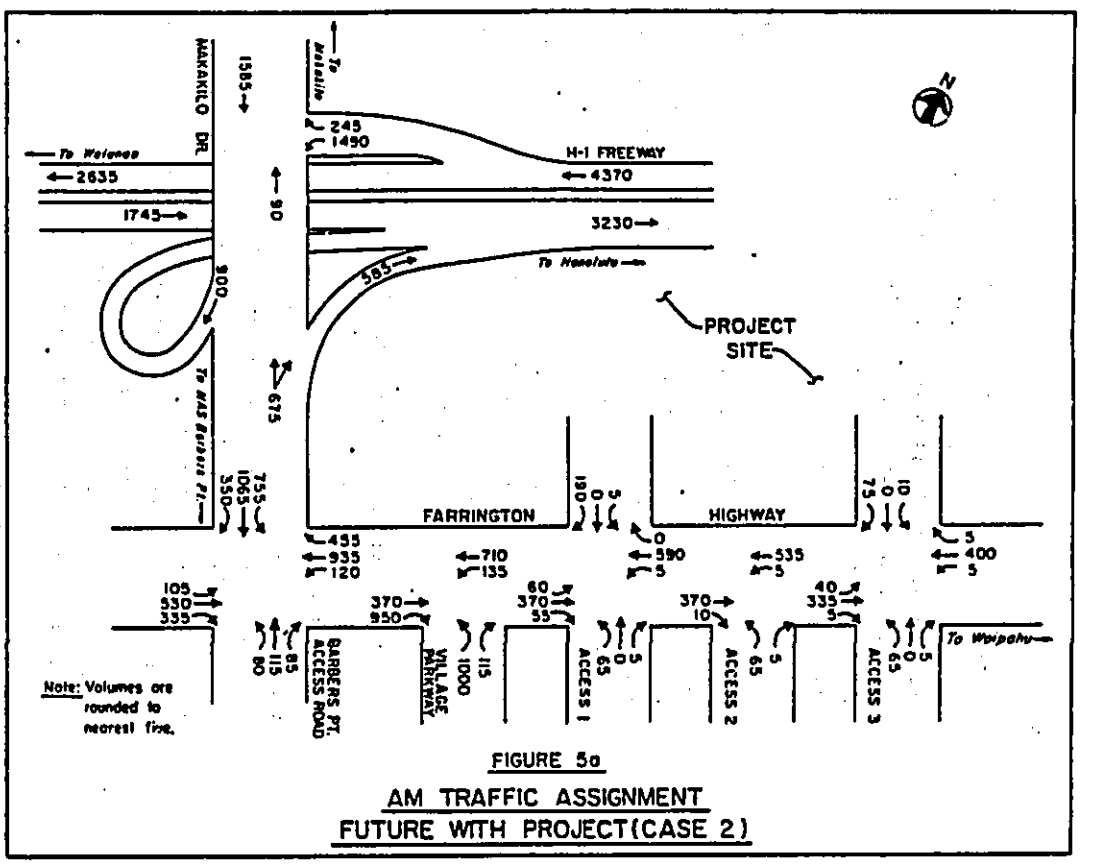

FIGURE 5a

AM TRAFFIC ASSIGNMENT

FUTURE WITH PROJECT(CASE 2)

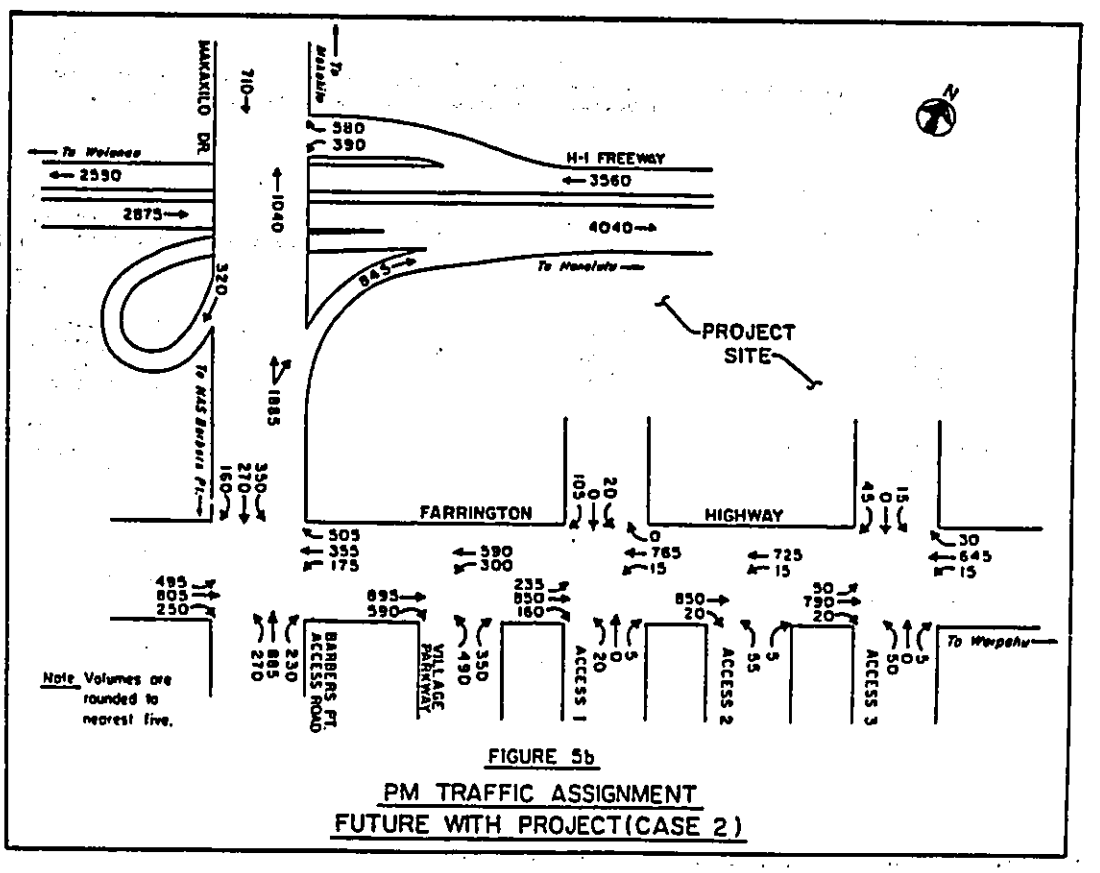

FIGURE 5b

PM TRAFFIC ASSIGNMENT

FUTURE WITH PROJECT(CASE 2)

TABLE 6

INTERSECTION ANALYSIS
CASE 2

	FUTURE WITHOUT PROJECT		FUTURE WITH PROJECT	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
SIGNALIZED INTERSECTIONS				
Makakilo Drive/Farrington Highway	D	D	D	D
Overall level of service				
Average Delay (seconds)	25.1	27.9	25.4	36.7
Eastbound approach	20.0	30.8	23.5	39.3
Westbound approach	40.0	32.4	39.9	33.3
Northbound approach	32.2	30.9	32.6	35.2
Southbound approach				
Farrington Highway/Village Parkway	C	C	C	C
Overall level of service				
Average Delay (seconds)	18.1	12.9	19.8	16.8
Eastbound approach	18.7	17.5	17.7	15.4
Westbound approach	20.7	24.3	23.6	24.3
Northbound approach				
UNSIGNALIZED INTERSECTION LEVELS OF SERVICE				
Farrington Highway/Access 1	C	E	E	E
Northbound approach (shared)	A	A	A	A
Westbound left turn	-	-	B	E
Southbound approach (shared)	-	-	A	C
Eastbound left turn				
Farrington Highway/Access 2	C	E	C	E
Northbound approach (shared)	A	A	A	A
Westbound left turn				
Farrington Highway/Access 3	C	E	C	E
Northbound approach (shared)	A	A	A	A
Westbound left turn	-	-	A	D
Southbound approach (shared)	-	-	A	A
Eastbound left turn				

the Village Parkway approach would include two left turn lanes and a single right turn lane. The intersection would operate at LOS C during the both peak hours.

Analysis of the unsignalized Farrington Highway/Access 1 intersection shows that the Access 1 northbound approach would operate at LOS E during both peak hours. The Access 1 southbound approach would operate at LOS B during the AM peak hour and at LOS E during the PM peak hour. Left turns into the Access 1 north and south legs would be LOS A during both peak periods.

The unsignalized T-intersection of Farrington Highway and Access 2 would have adequate capacity to serve the projected traffic. The westbound left turns into Access 2 would operate at LOS A during both peak periods. The Access 2 shared lane would experience LOS C during the AM peak period and LOS E during the PM peak period.

Analysis of the Farrington Highway/Access 3 intersection also shows that there is adequate capacity to serve the projected traffic demand at this unsignalized intersection. The Access 3 northbound approach would be LOS C during the AM peak hour and LOS E during the PM peak hour. The southbound approach would operate at LOS A during the AM peak hour and LOS D during the PM peak hour. The westbound and eastbound left turn traffic into Access 3 would be at LOS A during both peak hours.

The eastbound on-ramp at Makakilo Interchange was analyzed as a two-lane on-ramp onto a six-lane H-1 Freeway (see Table 5); the critical merge volume would be at LOS E during the AM peak period and at LOS D during the PM peak period. The freeway volume after the merge would be at LOS C during the AM peak period and LOS D during the PM peak period. As in Case 1, the proposed project will have minimal impact on ramp merge or freeway conditions.

MITIGATION MEASURES

The increased traffic generated by the proposed project can be accommodated with improvements to the highway system. For Case 1 conditions, mitigation measures to increase capacities on the existing roadway network include:

- The signalized intersection of Makakilo Drive/Farrington Highway should be modified from the present two-phase operation to eight-phase operation, in which separate, protected phases are provided for left turn movements. As an actuated eight-phase signalized intersection, the overall operation of this intesection would be LOS D during both peak hours (see Table 4).

- Three eastbound freeway lanes will be required to serve projected future PM peak hour traffic volumes, even without the project's traffic. Designation of the third eastbound lane on H-1 for high occupancy vehicle (HOV) use during peak periods should be reevaluated if the projected mixed traffic volumes are realized.

For Case 2, significant improvements to the roadway system will be necessary with or without the proposed project. The development of Kapolei Village will require that Farrington Highway be widened from the existing two-lane highway to five lanes (two lanes in each direction and a left turn lane) between Access 1 and Makakilo Drive.

The proposed project roadways should be coordinated with the development of Kapolei Village, in order to align the local streets which intersect with Farrington Highway. Although the unsignalized intersections are expected to have adequate capacities at the completion of the proposed project, very long delays could be experienced by southbound traffic leaving the project site and wishing to turn left onto Farrington Highway.

At the signalized Farrington Highway/Makakilo Drive intersection, multiple-phase operation, along with additional width to accommodate double turn lanes, will provide adequate capacity.

Improvements to Makakilo Interchange that would be needed to serve Kapolei Village include lengthening the eastbound on-ramp lane, double left turn lanes from the westbound off-ramp to Makakilo Drive at a signalized intersection, and restriping of Makakilo Drive at the overpass of H-1. The westbound off-ramp should also include a separate lane for right turns. The approaches on Makakilo Drive should be restriped to include two northbound through lanes and three southbound through lanes. If the right lane of the southbound approach is striped to allow free movement through the signal for traffic entering the H-1 Freeway on the Honolulu-bound loop on-ramp, this intersection would function at LOS D and LOS C during the AM and PM peak hours, respectively. Table 7 shows the findings of the analysis for this intersection with and without the project.

The third freeway lane presently planned for HOV use should begin downstream of the Makakilo Interchange on-ramp to provide adequate capacity for the merging traffic at the interchange. The eastbound on-ramp from the south should be extended so that its traffic can enter the freeway separately from the traffic using the eastbound loop on-ramp from the north.

TABLE 7

INTERSECTION ANALYSIS

	FUTURE WITHOUT PROJECT				FUTURE WITH PROJECT			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
SIGNALIZED INTERSECTIONS	C	B	C	B	C	B	C	B
CASE 1:								
Makakilo Drive/H-1 off-ramp								
Overall level of service								
Average Delay (seconds)								
Westbound approach	25.0	13.5	34.6	21.3	34.7	12.6	39.9	20.9
Northbound approach	7.3	12.0	11.7	19.3	7.3	12.4	11.8	21.6
Southbound approach	17.6	10.1	36.4	8.5	18.8	10.1	43.4	8.6
CASE 2:								
Makakilo Drive/H-1 off-ramp								
Overall level of service	D	C	D	C	D	C	D	C
Average Delay (seconds)								
Westbound approach	34.6	21.3	39.9	20.9	39.9	20.9	39.9	20.9
Northbound approach	11.7	19.3	11.8	21.6	11.8	21.6	11.8	21.6
Southbound approach	36.4	8.5	43.4	8.6	43.4	8.6	43.4	8.6

CONCLUSIONS AND RECOMMENDATIONS

The proposed project will increase traffic volumes along Farrington Highway and at Makakilo Interchange. With no other development in the Kapolei area, the two-lane highway and unsignalized intersections at the project access roadways would adequately serve future traffic. At the signalized Farrrington Highway/Makakilo Drive intersection, changes to the phasing and timing should provide sufficient capacity. Minor impacts would occur at Makakilo Interchange. Localized widening of Farrington Highway at the approaches to the project access roads will provide for separate left turn lanes to serve traffic entering the project site. The access roads should be of adequate width to allow separate lanes for right and left turns.

Other development, however, has been proposed in the area between H-1 and NAS Barbers Point. Major roadway improvements will be needed to accommodate the traffic demands. The proposed project will increase volumes at critical locations by approximately five percent of the volumes projected without the project. Improvements which serve the other development, such as the larger Kapolei Town Center and Kapolei Village projects, would serve future traffic with the Lusk-Kapolei project; longer delays and increased congestion are the expected impacts. Restriping, as indicated earlier, may be needed on Makakilo Drive.

If Kapolei Village is developed, Farrington Highway will need widening to two lanes in each direction between Makakilo Drive and the Access 1 intersection. A separate left turn lane should be provided for eastbound Farrington Highway traffic wishing to turn left into the project. Beyond 1995, traffic volumes at the Farrington Highway/Access 1 intersection should be monitored to determine if signalization should be considered as other additional development could increase traffic demands on Farrington Highway or produce excessive side street delays.

REFERENCES

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3. Transportation Research Board, National Research Council, Highway Capacity Manual, Special Report 209, Washington, D.C., 1985.

4. Housing Finance and Development Corporation with the Department of Housing and Community Development, Kapolei Village Master Plan Report, December 1987.

5. Institute of Transportation Engineers, Trip Generation, Third Edition, Washington, D.C., 1982.

6. Parsons Brinckerhoff Quade and Douglas Inc., Kapolei Village - Traffic Impact Study, October 1987.

APPENDIX

The Highway Capacity Manual defines six Levels of Service, labelled A through F, from best to worst conditions. Levels of Service for signalized and unsignalized intersections are defined in terms of average user delays. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

Unsignalized Intersections

For unsignalized intersections, the Highway Capacity Manual evaluates gaps in the major street traffic flow and calculates capacities available for left turns across oncoming traffic and for left and right turns onto the highway from the minor street.

LEVEL OF SERVICE A: Little or no delay.
LEVEL OF SERVICE B: Short traffic delays.
LEVEL OF SERVICE C: Average traffic delays.
LEVEL OF SERVICE D: Long traffic delays.
LEVEL OF SERVICE E: Very long traffic delays.
LEVEL OF SERVICE F: Demand volume exceeds capacity, resulting in extreme delays with queuing that may cause severe congestion and affect other movements at the intersection.

Signalized Intersections

For signalized intersections, the Operational Analysis measures signal operations by two separate indicators, volume-to-capacity (v/c) ratios and Level of Service. The v/c ratios provide a comparison of the traffic demands to the theoretical capacity of the intersection while levels of service are determined from the estimated delay. These two indicators do not necessarily correlate to each other.

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 delays 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 average delays.

LEVEL OF SERVICE C: This level describes operations with delays 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 as the number of vehicles stopping is significant; many vehicles, however, still pass through the intersection without stopping.

LEVEL OF SERVICE D: This level describes operations with delays in the range of 25.1 to 40.00 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from a 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 delays 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 (queued vehicles do not clear in one cycle) are frequent occurrences.

LEVEL OF SERVICE F: This level describes operation 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 length may also be major contributing causes to such delay levels.

Freeway System

Levels of Service for freeways and ramps are related to vehicular volumes and densities. Maximum flow rates equal to 2,000 passenger cars per hour per lane are used to determine levels of service, as shown below.

FREEWAY AND RAMP LEVEL OF SERVICE

LEVEL OF SERVICE	Vm: MERGE FLOW RATE (pcph)	Vf: FREEWAY FLOW RATE (pcph) 60-MPH DESIGN SPEED	
		4-Lane	6-Lane
A	0 - 600	*	*
B	601 - 1,000	0 - 2,000	0 - 3,000
C	1,001 - 1,450	2,001 - 2,800	3,001 - 4,200
D	1,451 - 1,750	2,801 - 3,400	4,201 - 5,100
E	1,751 - 2,000	3,401 - 4,000	5,101 - 6,000
F	> 2,000	> 4,000	> 6,000

Note: pcph = passenger cars per hour
* = Level of Service not attainable at given design speed

Freeways

LEVEL OF SERVICE A: This service level represents unrestricted free-flow conditions. Minor incidents or breakdowns on the freeway will have little effect on the traffic at this level.

LEVEL OF SERVICE B: This service level is characterized by smooth or stable free-flow conditions. Flow deterioration due to minor incidents or breakdowns is slightly more severe than LOS A.

LEVEL OF SERVICE C: Freeway flows are stable but are more sensitive to increases in traffic volumes. Restriction of manueverability becomes noticeable at this level. Minor incidents or breakdowns may cause queues to form which will have a significant impact on traffic flow.

LEVEL OF SERVICE D: This service level borders on unstable flow on the freeway. Driver manueverability becomes very limited. Minor incidents or breakdowns can cause substantial queuing.

LEVEL OF SERVICE E: This service level describes capacity conditions. The operation of the freeway becomes very unstable because usable gaps in the traffic stream are virtually non-existent. At this LOS, the traffic stream loses its ability to dissipate minor disruptions.

LEVEL OF SERVICE F: Capacity of the freeway is exceeded and motorists experience forced flow conditions.

Ramps

LEVEL OF SERVICE A: Merge or diverge movements have little effect on freeway flows as drivers operate under unrestricted conditions. Merge movements fill gaps smoothly with only minor speed adjustments; diverge movements experience no or very little turbulence.

LEVEL OF SERVICE B: Freeway flows are generally smooth and stable, and vehicles not directly involved in merge or diverge movements remain unaffected. Merging vehicles must adjust speed to fill gaps; diverging vehicles operate without significant turbulence.

LEVEL OF SERVICE C: Overall speed and density of freeway flow remain stable, but the lane adjacent to the lanes directly involved in merging and diverging movement may be affected by these movements. Both lanes approaching a merge must adjust speed to provide smooth merging and minor ramp queuing may occur with large on-ramp volumes. Vehicles may also decrease speeds in diverge areas.

LEVEL OF SERVICE D: Several freeway lanes are affected by turbulence from merge and diverge movements. Disruptive queues may form at ramps with large demand volumes. Vehicles in merge lanes must adjust speeds to avoid conflicts as smooth merging becomes difficult to attain. Vehicles in diverge areas also encounter distinct decreases in speed.

LEVEL OF SERVICE E: This service level represents capacity conditions. Vehicles are significantly affected by turbulence, but do not create noticeable freeway queuing. Vehicles not directly involved in ramp movements attempt to avoid the turbulence by moving towards the median lanes. On-ramp queues may be significant and queues may also form in diverge areas. Diverging movements experience a significant decrease in speeds.

LEVEL OF SERVICE F: Considerable turbulence is created by ramp movements and vehicles attempting to change lanes to avoid ramp areas. Long delays are encountered in the vicinity of ramp terminals and may possibly extend for some distance upstream of the freeway. Merging lanes experience extensive breakdowns as merge movements occur on a stop-and-go basis. Traffic conditions change constantly and vary widely, resulting in unstable conditions with waves of alternatively good and forced flows.

APPENDIX B

Air Quality Study
For the Proposed
Lusk-Kapolei Residential Development
Kapolei, Ewa, Oahu

by

Barry D. Root
Air Pollution Consultant

January 18, 1988

AIR QUALITY STUDY

FOR THE PROPOSED

LUSK-KAPOLEI RESIDENTIAL DEVELOPMENT

KAPOLEI, EWA, OAHU

Prepared by:

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January 18, 1988

TABLE OF CONTENTS

SECTION		PAGE
1.	INTRODUCTION	1
2.	AMBIENT AIR QUALITY STANDARDS	2
3.	PRESENT AIR QUALITY	3
4.	SHORT TERM DIRECT AND INDIRECT IMPACTS OF PROJECT CONSTRUCTION	5
5.	LONG TERM DIRECT IMPACT	6
6.	LONG TERM INDIRECT IMPACT OF PROJECT-RELATED TRAFFIC	7
7.	CARBON MONOXIDE DIFFUSION MODELING	8
8.	REGIONAL CONSIDERATIONS	12
9.	MITIGATIVE MEASURES	13
	REFERENCES	14

TABLES

1.	SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS	15
2.	AIR POLLUTANT MEASUREMENTS CAMPBELL INDUSTRIAL PARK BARBERS POINT, OAHU 1971-1986	16
3.	ESTIMATED ANNUAL EMISSIONS OF AIR POLLUTANTS TO MEET DEMANDS OF LUSK-KAPOLEI PROJECT FOR ELECTRICAL ENERGY AND SOLID WASTE DISPOSAL AFTER 1995	17
4.	RESULTS OF MORNING PEAK HOUR CARBON MONOXIDE MODELING	18
5.	ESTIMATED MAXIMUM EIGHT HOUR CARBON MONOXIDE CONCENTRATIONS	19

FIGURE

1.	LOCATION MAP	20

1. INTRODUCTION

The Lusk Company is proposing to construct approximately 500 single-family residential units and appurtenant infrastructure on about 79.5 acres in Kapolei as shown on Figure 1. The Lusk-Kapolei project is expected to be completed in 1995, before other larger projects (Kapolei Town Center and Kapolei Village) which are also planned for the area.

The purpose of this study is to assess the potential air quality impact of constructing the proposed project as planned and to suggest possible measures to mitigate these impacts where applicable.

2. AMBIENT AIR QUALITY STANDARDS

State of Hawaii and Federal Ambient Air Quality Standards (AAQS) have been established for six classes of pollutants as shown in Table 1. An AAQS is a pollutant concentration not to be exceeded more than once per year over a specified sampling period which varies from as little as one hour to a year for each pollutant depending upon the type of exposure necessary to cause adverse effects. Each of the regulated pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration.

Federal AAQS have been divided into primary and secondary levels for particulates and sulfur dioxide. For these pollutants, primary AAQS are relevant to the prevention of adverse health impacts, while secondary AAQS refer to public welfare impacts such as decreased visibility, diminished comfort levels, or other potential damage to the natural or man-made environment, e.g. soiling of materials or other economic impact.

State of Hawaii AAQS have been set at a single level which is in some cases significantly more stringent than Federal AAQS. In particular, the State of Hawaii one-hour AAQS for carbon monoxide is four times more stringent than the comparable Federal AAQS. In Table 1 the one-hour and eight-hour AAQS for carbon monoxide are listed in both milligrams per cubic meter and parts per million (ppm) since carbon monoxide concentration measurements are reported in this study in milligrams per cubic meter while modeling results are presented in ppm.

Under the provisions of the Federal Clean Air Act [1], the U.S. Environmental Protection Agency (EPA) is required to periodically review and re-evaluate Federal AAQS in light of research findings more recent than those which were available at the time the standards were originally set. Periodically new standards are created as well. Most recently the Federal standard for particulate matter has been revised to apply only to particulates 10 microns or less in diameter (PM-10) [2]. The State of Hawaii has not addressed the question of whether to set more stringent limits for this category of air pollutant, but Federal AAQS prevail where States have not set their own more stringent levels.

3. PRESENT AIR QUALITY

Present air quality at Kapolei is likely the be affected by air pollutants from four different types of sources: natural, industrial, agricultural, and vehicular. Natural air pollutant producers which could affect Kapolei air quality include the ocean (sea spray), plants (aero-allergens), dust (from wind blowing over unvegetated areas or from agricultural or construction activities), and perhaps a distant volcanic eruption on the island of Hawaii.

Industrial emissions affecting Kapolei would most likely come from the direction of Campbell Industrial Park. The nearest long term State of Hawaii air pollution monitoring station to the project site is located in the Campbell Industrial Park at Barbers Point, about 3.5 miles southwest of Kapolei. A summary of measurements from the Barbers Point monitoring station are presented in Table 2. Starting in 1971, total suspended particulates, sulfur dioxide and nitrogen dioxide were all measured over 24-hour sampling periods. In March 1972 the sampling location was moved from the Barbers Point lighthouse to the Chevron oil refinery, about one mile inland, because the particulates being monitored were mostly sea salt from evaporated spray. Nitrogen dioxide monitoring was discontinued throughout the state in 1976 and in August 1979 the Barbers Point sampling station was moved to a rooftop location at the Chevron refinery. In November 1985 a new PM-10 monitor was installed at this site and particulate readings from 1986 onward will be for PM-10 rather than total suspended particulates. Of note, the number of times State of Hawaii AAQS were exceeded is listed in Table 2 with reference to State standards in the year reported. Until March 1986 the State of Hawaii limit for total suspended particulates was 100 micrograms per cubic meter. In March 1986 this limit was changed to 150 micrograms per cubic meter. This new limit has been reached only rarely in recent years. Judging from the first full year of PM-10 measurements, about half the particulate pollution monitored at Barbers Point must be larger than 10 microns in aerodynamic diameter. Larger particulates are considered to have less potentially harmful impact on the human respiratory system than particles under 10 microns. Judging from the data in Table 2, present levels of particulates, sulfur dioxide, and nitrogen dioxide (the primary industrial pollutants) are estimated to be well within allowable standards in the project area.

Fugitive dust from sugar cane cultivation and heavy truck movements over unpaved cane haul roads as well as smoke from field burning at harvest time constitute the major types of agricultural air pollution sources likely to affect present air quality at Kapolei. The cane fires set at harvest time produce particulates, carbon monoxide and trace amounts of other organics. The most thorough review of air quality impacts from this source are contained in a Masters Thesis by the author of this study [3]. The subject has recently been revisited by an EPA study of cane burning on Maui [4]. Fortunately cane fires occur only every other year or so for any given field and the fire itself generally lasts for less than an hour. Relatively high levels of both particulates and carbon monoxide can occur for a mile or more down wind from such fires, however, and while brief, these periodic impacts on air quality are not necessarily insignificant. In the case of this project, the proposed residential development will be taking place on lands currently used for sugar cane cultivation and other proposed developments in the area will be removing large adjacent areas from cane cultivation.

Unfortunately there are no nearby long term measurements of carbon monoxide, ozone, or lead in the immediate vicinity of Kapolei, so the current burden of vehicular emissions is difficult to evaluate. Measurements of lead from sites in urban Honolulu indicate that most recent levels are barely above the threshold of detection for current measuring techniques. Airborne lead is thus not considered to be a problem at any Oahu location.

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 up 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 peak traffic conditions. Carbon monoxide would thus be the pollutant most likely to cause difficulty in meeting allowable AAQS as a result of new residential development in leeward Oahu.

4. SHORT TERM DIRECT AND INDIRECT IMPACTS OF PROJECT CONSTRUCTION

There will be two types of short term direct air quality impact from project construction: fugitive dust and on-site emissions from construction equipment. There will also be a short term indirect impact from slow moving construction equipment traveling to and from the project site as well as a temporary increase in local traffic caused by commuting construction workers.

Fugitive dust emissions will arise from grading and dirt moving activities within the project site and from any off-site dirt hauling as well. The quantative rate of emission for this type of emission is almost impossible to estimate because the potential for such emissions will vary greatly from day to day depending upon the amount of dirt-disturbing activity taking place and the moisture content of exposed soil in work areas. The EPA has provided a rough estimate for fugitive dust emissions from construction activity [5]: 1.2 tons per acre per month of activity under conditions of "medium" activity, moderate soil silt content (30%), and a precipitation/evaporation (P/E) index of 50. The project site is slightly drier than the stated P/E index, thus slightly increasing the potential for fugitive dust generation from this project. State of Hawaii Air Pollution Control Regulations [6] require that visible fugitive dust emissions from construction activity be esentially nil.

Adequate fugitive dust control can usually be accomplished by establishment of a frequent watering program to keep bare-dirt surfaces in work areas from becoming significant dust generators. Control regulations also require that open-bodied trucks be covered at all times when in motion if they are transporting materials likely to give rise to airborne dust. Paving parking areas and establishing landscaping as early in the construction process as possible as well as good housekeeping on the job site have also proven to be helpful in abating fugitive dust emissions.

On-site mobile and non-mobile construction equipment will also emit some air pollutants in the form of engine exhausts. The largest equipment is usually diesel-powered. Nitrogen dioxide emissions from this type of equipment can be significant, but carbon monoxide emissions are rarely more than those from a single automobile, and the overall air quality impact of emissions from construction equipment should be insignificant compared to vehiclular emissions from the H-1 Freeway and other roadways nearby.

Indirectly, slow moving construction vehicles on roadways adjacent to the project, primarily the two lane Farrington Highway, can obstruct the normal free flow of traffic to such an extent that overall vehiclular emissions are increased, but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume on the roadways affected. Likewise the schedules of commuting workers can be adjusted slightly to avoid peak traffic hours in the project vicinity. Thus most potential short term air quality impacts from project construction should be relatively easy to mitigate.

5. LONG TERM DIRECT IMPACT

A. ON-SITE

Once construction has been completed, the on-site direct air quality impact of the proposed Lusk-Kapolei residential project will be minimal. Smoke from cooking, emissions of pesticides and other products used in home landscaping, and occasional visits from roof-repairing trucks with hot tar trailers will be the only noticeable air pollution emanations.

B. OFF-SITE

ELECTRICAL ENERGY GENERATION AND SOLID WASTE INCINERATION

Residents of the 500 single family dwelling units proposed for the project will generate an annual demand for electrical energy of about 3.6 million kilowatt hours. In the worst case this demand would be met by burning additional fuel oil in existing power plants, primarily the Kahe Power Plant on the Waianae coast. This new energy requirement could be reduced significantly by installing solar heaters on all new homes and by incorporating solar design features into all construction plans, e.g. use of landscaping to provide afternoon shade to cut down on use of air conditioning and positioning of windows to maximize indoor light without unduly increasing indoor heat.

It is also possible that the new demand can be met by means other than burning fuel oil. In fact, an operating wind farm has been developed on the north shore of Oahu, and other low-pollution energy generating systems might be developed in coming years. At this writing it appears that the proposed City and County resource recovery facility (H-POWER) is likely to be constructed at Campbell Industrial Park. Energy from this facility could contribute to providing some of the new energy demand generated by the proposed Lusk-Kapolei project. This system is not air pollution free, however, and even with the use of on-site wet scrubbing and electrostatic precipatation, emissions from this source could be significant. Furthermore, the Hawaiian Electric Company has evidently decided that purchasing power from new coal-fired power plants to be constructed in Campbell Industrial Park would provide the most economical means for meeting future Oahu energy demands. Even with latest technology control devices on these new plants, air pollution emissions in the Campbell Industrial Park would appear to be approaching allowable limits with the addition of these new facilities.

Using EPA estimates for emission rates for low sulfur fuel combustion in electrical power plants and assuming that all Lusk-Kapolei electrical demands will be met by burning low sulfur fuel and that all project-related solid waste will be disposed of by incineration in the H-POWER plant yields the annual emission rates listed in Table 3. H-POWER emission factors were estimated using values in the EIS for the West Loch Project [6].

6. LONG TERM INDIRECT IMPACT OF PROJECT-RELATED TRAFFIC

By serving as an attraction for increased motor vehicle traffic in the area the proposed Lusk-Kapolei residential 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, so few vehicles now require leaded gasoline that the EPA is proposing a total ban on lead in gasoline to take effect immediately. Even without a ban on lead in gasoline, reported quarterly averages of lead in air samples collected at the Department of Health building on Punchbowl and Beretania Streets in urban Honolulu have been zero since early 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 and increases in traffic levels after 1995 will result in directly proportional increases in vehicle-related pollutant emissions.

In order to evaluate the potential air quality impact of increased traffic from the proposed Lusk-Kapolei project in view of these decreasing emission rates per vehicle, a detailed modeling effort was carried out. Carbon monoxide was selected for modeling because it is both the most stable and the most abundant of the motor vehicle generated pollutants and it is also likely to be the pollutant with the greatest likelihood of violating present AAQS.

7. CARBON MONOXIDE DIFFUSION MODELING

Eleven receptor sites near significant current or planned intersections in the project area were selected for analysis. The locations of these sites are shown on Figure 1. Each of them is within 10 meters of the edge of the roadway. The modeling study was designed to yield carbon monoxide concentrations at these sites which could be compared directly to allowable State and Federal Ambient Air Quality Standards. The traffic impact study for the project [7] indicated that these intersections would be likely to have various degrees of increased traffic following Lusk-Kapolei project development. Traffic volumes near most of these sites were highest during the morning peak hour and worst case meteorological diffusion conditions are also most likely to occur at that time. Thus all one-hour computations were performed for the morning rush hour situation. While each of these sites can be considered to have levels of carbon monoxide consistent with the definition of ambient air, none of them is currently a site where a person would be expected to spend an hour. Virtually all the sites are along the edges of cane fields or undeveloped land.

Modeling was performed for 1987 and for 1995 (the planned year of completion for Lusk-Kapolei). There are actually four 1995 scenarios identified in the traffic report: 1995 without Lusk-Kapolei Development but with other approved projects such as Ko 'Olina (formerly West Beach) and continued expansion of Makakilo; 1995 with the above projects and Lusk-Kapolei but no changes to existing roadway widths (Case 1); 1995 with the completion of Lusk-Kapolei and other Case 1 developments and the addition of traffic from the proposed Kapolei Town Center and Kapolei Village projects slated to be partially developed by that time (Case 2); 1995 with all Case 2 traffic plus all suggested roadway modifications contained in the traffic report. Suggested roadway modifications included changing the two-way signal at the Makakilo Drive/Farrington Highway Intersection to an eight way signal with significant widening of all legs of the intersection; widening Farrington Highway in the project area to five lanes instead of two; and installing a traffic signal at the intersection of the off ramp from the H-1 Freeway at Makakilo Drive.

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% light duty diesel-powered trucks, 1% diesel powered trucks and buses, and 1% motorcycles. The same vehicle mix was assumed for the 1987 and 1995 emission rate calculations.

Vehicle speeds were assumed to be 15 to 25 mph on the H-1 Freeway during rush hour, with ramp speeds of 5 to 15 mph. At traffic signals, vehicle speeds were dropped to 1 mph in the upstream queue from red lights and 15 mph in downstream lanes or turns. Unrestricted flow on Farrington Highway and Makakilo Drive was assumed to proceed at 25 mph. A cold winter morning temperature of 58 degrees F was assumed for morning rush hour conditions, but a less frigid 68 degrees was assumed for late afternoon peak computations.

Vehicle operating characteristics were computed assuming that 20.6 percent of the vehicles equipped with catalytic converters and 20.6 percent of the vehicles without catalytic converters would be operating in the "cold start" mode and that 27.3 percent of all vehicles would be operating in the hot start mode. The EPA computer model MOBILE3 [8] was run using the above parameters to produce vehicluar carbon monoxide emission estimates for each of the years studied. National averages for "mis-fueling" were assumed.

The computer model CALINE3 [9] was used for calculating carbon monoxide concentrations at each site for each scenario studied. Stability category 6 was used for determining diffusion coefficients. This stability category represents the most stable (least favorable) atmospheric condition that can be used for these computations. For all scenarios a surface roughness of 100 was assumed since this value is closest to that that which occurs over suburban countryside.

To simulate worst case wind conditions a uniform wind speed of one meter per second was assumed with the worst case wind direction for each location determined by which wind direction produced the highest concentration of carbon monoxide. For each receptor site, concentrations were computed at a height of 1.5 meters above ground in order to estimate levels that would exist within the normal human breathing zone. Differences in roadway elevations such as the Makakilo Drive bridge over the H-1 Freeway were included in the roadway geometry. Fourteen links were required to adequately describe the roadway configuration.

Background contributions not directly considered in the carbon monoxide computations were assumed to be 1 ppm for all one-hour scenarios and 0.6 for the eight-hour case.

Results of the peak hour carbon monoxide analysis are summarized in Table 4. Current peak hour carbon monoxide levels under the worst case assumptions used in this study are within allowable State of Hawaii AAQS at all sites except those at the intersection of Makakilo Drive and Farrington Highway. This situation is not expected to change significantly by 1995 under the Case 1 scenario with no change in roadway configurations and no new traffic sources considered other than those already approved for the Ewa area and the proposed Lusk-Kapolei development. When the Case 2 scenario is considered and 1995 traffic from the proposed Kapolei Town Center and Kapolei Village projects are included with no changes to the roadway configuration, allowable State of Hawaii AAQS are violated at a number of additional locations including sites at the Barbers Point Access Road intersection with Farrington Highway, near the H-1 off ramp at Makakilo Drive and along the Honolulu-bound lanes of the H-1 Freeway (site 4).

Widening the roadways at the Farrington Highway intersection and adding signals at the H-1 off ramp and Makakilo Drive tends to exacerbate the situation. Adding a signal anywhere creates traffic queues that do not exist without the signal and widening roadways increases the number of slow moving vehicles that are operating in close proximity to the selected receptor sites.

Widening Farrington Highway near the proposed Lusk-Kapolei access road tends to ameliorate the situation there, however, because no signalization is proposed for this site and traffic flow will be less impeded by left turn movements when these movements are segregated into separate turn lanes.

Computed worst case one-hour carbon monoxide concentrations are well within Federal AAQS under all scenarios considered.

Eight hour carbon monoxide levels are estimated by multiplying peak hour values by a "meteorological persistence factor" of 0.6 which is recommended in EPA modeling guidelines [10] 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 over an eight hour period than they are for a one hour period. Because the peak eight hours will occur in the daytime, however, it is not appropriate to use morning peak hour meteorological dispersion conditions as a basis for the computation since stability category 6 is to be used only during nighttime or within an hour of sunrise or sunset. For this reason late afternoon peak hour traffic volumes were used in the model along with stability category 4 (the least favorable category suitable for daytime use), in order to generate peak hour values which could serve as the basis for estimating worst case eight hour levels. The results of these computations are presented in Table 5.

Computed worst case eight-hour carbon monoxide concentrations are within both State of Hawaii and Federal AAQS under all scenarios considered.

It is important to note that the worst case peak hour values presented here have different probabilities of occurrence depending upon the wind direction necessary to produce highest levels in the vicinity of a given roadway configuration. A 30-year record of wind data by direction and speed category for different periods of the day at the Honolulu International Airport [11] was reviewed in order to determine the annual frequency of occurrence of the particular wind direction and speed necessary to cause maximum peak hour concentrations at each site studied. These frequencies are listed in Table 3. None of them are greater than seven days per year and some are less than once per year. Furthermore these frequencies of occurrence are based on hourly observations which include just a small portion (about 5 minutes) of the hour for which the report is made. When windspeeds are as light as one meter per second (the speed which yields highest computed carbon monoxide values), the wind direction is usually quite variable, thus significantly reducing the probable frequency of occurrence of the worst case values presented. Nor does the wind generally blow at a steady one meter per second for a whole hour. If windspeeds were increased to two meters per second, for example, computed carbon monoxide concentrations would be half the values shown. Finally, while there is a tendency for lowest temperatures to occur under low wind speeds, temperatures as low as the 58 degrees F used for computing worst case morning peak hour emission factors occur less frequently than some of the wind direction/speed combinations used in the computations.

Since it has become fashionable of late for EIS reviewers to comment on the fact that carbon monoxide modeling does not address the levels of carbon monoxide that might occur inside automobiles, a few comments on that subject have become necessary. Levels of carbon monoxide found inside automobiles do not constitute ambient air concentrations and thus are not covered by ambient air quality standards. There is no existing EPA-recommended standard methodology for estimating carbon monoxide concentrations inside automobiles, nor can it be shown that these values are exclusively determined by ambient air quality at any particular location. While it is true that levels of carbon monoxide in automobiles are likely to be higher than prevailing levels outdoors, a person would have to be exposed to these levels over a one hour period in order to suffer any of the adverse effects associated with the one-hour AAQS. Except under emergency conditions (such as Hawaii's recent famous rush hour tsunami alert), a motorist would not be likely to spend one hour in his automobile in the vicinity of any of the receptor sites considered. He would not be likely, in fact, to spend one hour in his automobile in the immediate vicinity of the project. Thus it becomes unclear how one is to evaluate the probable air quality impact of a project such as this based on levels of carbon monoxide inside automobiles. On the other hand, it is fair to say that as the number of automobiles operating on Oahu increases, traffic congestion is likely to increase, leading to longer commute times and greater exposure of commuters to peak hour levels of carbon monoxide. This project and all future projects like it can only exacerbate that situation.

8. REGIONAL CONSIDERATIONS

Aside from potential indirect air quality impacts in the immediate project vicinity, there are potential regional scale impacts to be considered as well. Carbon monoxide computations carried out as part of air quality impact studies for other projects in the leeward area of Oahu 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 Federal one-hour limit of 40 milligrams per cubic meter have been computed for worst case conditions. Any proposed project which has the potential to increase traffic volumes along this corridor can only serve to intensify the magnitude of this problem.

The Lusk-Kapolei project could add as many as 100 peak hour vehicles to existing levels along this critical corridor. This represents only about one percent of existing traffic, however, and peak hour contribution of Lusk-Kapolei traffic alone would be less than 0.4 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 increements of nearly 6 milligrams per cubic meter to worst case carbon monoxide levels along the corridor. In this light, the potential regional air pollution impact of traffic from the Lusk-Kapolei project would appear to be relatively small.

9. MITIGATIVE MEASURES

A. SHORT TERM

From an air quality standpoint, the major short term impact of project construction will be potential emissions of fugitive dust. Strict compliance with State of Hawaii Air Pollution Control Regulations regarding establishment of a regular watering program and covering dirt-hauling trucks should effectively mitigate this concern.

B. LONG TERM

On-site air pollutant emissions from the proposed Lusk-Kapolei residential project are likely to be minimal once the project is completed and occupied. Off-site, there will be impacts generated because of new residential demands for electrical energy and waste incineration. Electrical 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 the project. Project developers have no control over the emission levels of individual vehicles, but the total number of project-related vehicles operating on Oahu roadways could conceivably be reduced by provision of a park and 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 the proposed Lusk-Kapolei residential development 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 the program. If that were to occur then expected emission reductions might be eliminated or postponed and carbon monoxide levels presented in this study could be lower than those that actually occur. On the other hand, future innovations in vehicle design could lead to power systems that produce no significant air pollution.

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TABLE 1

SUMMARY OF STATE OF HAWAII AND
FEDERAL AMBIENT AIR QUALITY STANDARDS
(AAQS)
(micrograms per cubic meter except where noted)

POLLUTANT	SAMPLING PERIOD	FEDERAL PRIMARY	FEDERAL SECONDARY	STATE OF HAWAII
Total Suspended Particulate Matter. (TSP)	Annual Geometric Mean	75	60	60
	24 Hour	260	150	150
PM-10 Particulates <10 microns in diameter	Annual Mean	50	50	50
	24 Hour	150	150	150
Sulfur Dioxide	Annual Mean	80		80
	24 Hour	365		365
	3 Hour		1300	1300
Nitrogen Dioxide	Annual Mean	100		100
Carbon Monoxide (milligrams per cubic meter)	8 Hour	10		5
	1 Hour	40		10
(parts per million)	8 Hour	9		4.5
	1 Hour	35		9
Photochemical Oxidants (as Ozone)	1 Hour	240		100
Lead	Calendar Quarter	1.5		1.5

Federal AAQS: U.S. Government, Code of Federal Regulations, Title 40, Protection of Environment, Part 50, National Primary and Secondary Ambient Air Quality Standards.

State of Hawaii AAQS: State of Hawaii, Title 11, Administrative Rules, Chapter 59, Ambient Air Quality Standards, as amended, April, 1986.

TABLE 2

AIR POLLUTANT MEASUREMENTS
CAMPBELL INDUSTRIAL PARK
BARBERS POINT, OAHU
1971-1986
(micrograms per cubic meter)

YEAR	TSP RANGE	TSP MEAN	TSP >AQS	SULFUR DIOXIDE RANGE	SULFUR DIOXIDE MEAN	SULFUR DIOXIDE >AQS	NITROGEN DIOXIDE RANGE	NITROGEN DIOXIDE MEAN	NITROGEN DIOXIDE)AQS
1971	18-471	125	54	<5-16	<5	0	<20-49	29	0
1972	24-155	55	4	<5-7	<5	0	<20-49	21	0
1973	14-129	50	1	<5-5	<5	0	<20-33	<20	0
1974	23-132	47	1	<5-10	<5	0	<20-40	25	0
1975	13-137	52	1	<5-11	<5	0	<5-25	11	0
1976	12-101	40	1	<5-7	<5	0	<5-29	14	0
1977	25-134	54	1	<5-18	<5	0			
1978	22-127	48	1	<5-40	<5	0			
1979	23-223	76	10	<5-27	<5	0			
1980	29-158	53	2	<5-10	<5	0			
1981	26-188	51	2	<5-40	<5	0			
1982	15-63	41	0	<5-12	<5	0			
1983	28-193	54	2	<5-95	<5	1			
1984	17-112	50	1	<5-<5	<5	0			
1985	24-138	57	3	<5-25	<5	0			
	PM-10								
1986	7-66	26	0	<5-10	<5	0			

Source: State of Hawaii Department of Health

Note: >AQS = number of times State of Hawaii AAQS exceeded
TSP = total suspended particulates

TABLE 3

ESTIMATED ANNUAL EMISSIONS OF AIR POLLUTANTS
TO MEET DEMANDS OF LUSK-KAPOLEI PROJECT
FOR ELECTRICAL ENERGY AND SOLID WASTE DISPOSAL
AFTER 1995

POLLUTANT	EMISSIONS (Tons/Year) POWER PLANTS	H-POWER
Particulate Matter	1.0	0.3
Sulfur Dioxide	9.9	0.6
Nitrogen Dioxide	13.1	3.0
Carbon Monoxide	0.6	2.7

TABLE 4

RESULTS OF MORNING PEAK HOUR CARBON MONOXIDE MODELING
(Parts per Million)

SITE	LOCATION	WIND DIR	FREQ (Days /Year)	YEAR/SENARIO 1987	1995/A	1995/B	1995/C	1995/D
1	Makakilo Dr. & H-1 Off Ramp	ENE	3.5	6.4	8.3	8.5	10.7	17.4
2	H-1 Off Ramp & Makakilo Dr.	E	4.3	5.5	7.2	7.4	9.0	9.8
3	H-1 @ Makakilo On Ramps	WNW	1.5	3.5	4.8	4.9	5.2	7.7
4	H-1 Honolulu Bound	NE	6.4	7.5	8.8	9.0	9.6	9.6
5	Makakilo Dr. @ H-1 Loop Ramp	SSE	0.7	6.3	6.4	6.6	8.5	8.3
6	Makakilo Dr. @ H-1 On Ramp	SE	1.0	5.8	6.1	6.3	8.6	8.4
7	East Corner Makakilo Dr. & Farrington Hwy.	E	4.3	9.2	9.2	9.6	20.4	23.5
8	North Corner Makakilo Dr. & Farrington Hwy.	SSW	0.2	9.7	9.3	9.6	13.7	15.7
9	South Corner Barbers Pt Rd. & Farrington Hwy.	NNE	4.6	5.9	6.4	6.4	10.6	10.7
10	West Corner Barbers Pt Rd. & Farrington Hwy.	WNW	1.5	5.3	4.7	5.0	11.0	12.3
11	Project Access Rd S @ Farrington Hwy.		0.9	2.4	2.3	2.4	4.2	3.0

1995 SCENARIOS: A. WITHOUT PROJECT B. WITH PROJECT - CASE I
C. WITH PROJECT - CASE II D. WITH PROJECT - CASE II + WIDENING

STATE OF HAWAII AAQS: 9
FEDERAL AAQS: 35

NOTE: See Figure 1 for location of receptor sites. See text, Section 7, for description of scenarios, models, and assumptions.

TABLE 5

ESTIMATED MAXIMUM EIGHT HOUR CARBON MONOXIDE CONCENTRATIONS
(Parts per Million)

SITE	LOCATION	YEAR/SENARIO 1987	1995/A	1995/B	1995/C	1995/D
1	Makakilo Dr. & H-1 Off Ramp	1.4	1.6	1.7	2.1	2.9
2	H-1 Off Ramp & Makakilo Dr.	1.5	1.9	1.9	2.3	2.4
3	H-1 @ Makakilo On Ramps	1.4	1.7	1.8	1.9	2.6
4	H-1 Honolulu Bound	2.3	2.7	2.7	2.9	2.9
5	Makakilo Dr. @ H-1 Loop Ramp	1.8	1.8	1.9	2.3	2.2
6	Makakilo Dr. @ H-1 On Ramp	1.7	1.7	1.8	2.3	2.2
7	East Corner Makakilo Dr. & Farrington Hwy.	1.9	1.9	1.9	3.6	4.1
8	North Corner Makakilo Dr. & Farrington Hwy.	2.6	2.5	2.6	3.5	4.0
9	South Corner Barbers Pt Rd. & Farrington Hwy.	1.8	1.9	1.6	2.9	3.0
10	West Corner Barbers Pt Rd. & Farrington Hwy.	1.3	1.2	1.2	2.2	2.4
11	Project Access Rd @ Farrington Hwy.	0.9	0.9	0.9	1.3	1.0

1995 SCENARIOS: A. WITHOUT PROJECT B. WITH PROJECT - CASE I
C. WITH PROJECT - CASE II D. WITH PROJECT - CASE II + WIDENING

STATE OF HAWAII AAQS: 4.5
FEDERAL AAQS: 9

NOTE: See Figure 1 for location of receptor sites. See text, Section 7, for description of scenarios, models, and assumptions.

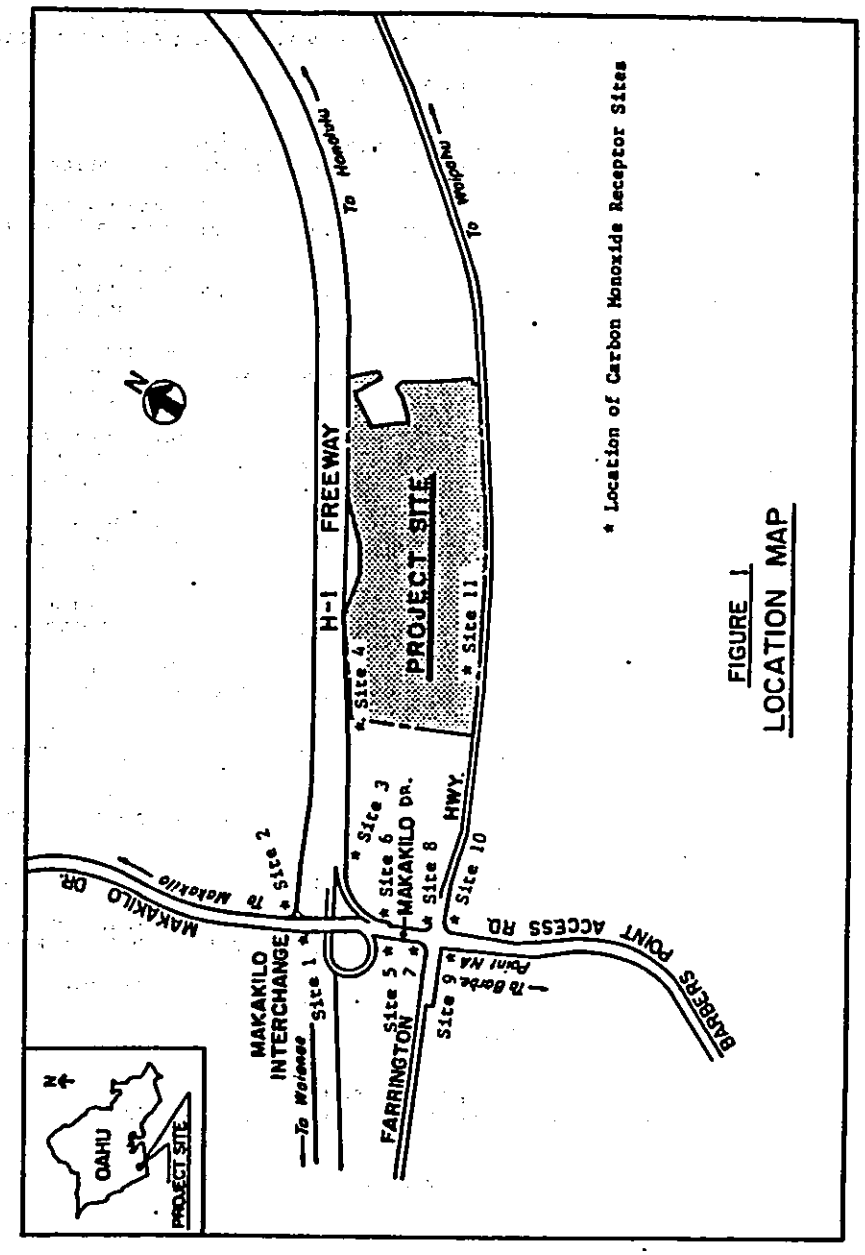


FIGURE 1
LOCATION MAP

APPENDIX C

Noise Impact Study For the Proposed Lusk-Kapolei Project

by

Y. Ebisu & Associates

January, 1988

NOISE IMPACT STUDY
FOR THE PROPOSED
LUSK-KAPOLEI PROJECT

PREPARED FOR
ENVIRONMENTAL COMMUNICATIONS, INC.

BY
Y. EBISU & ASSOCIATES

JANUARY, 1988

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NO.
	LIST OF FIGURES	ii
	LIST OF TABLES	iii
I.	SUMMARY	1
II.	PURPOSE AND METHODOLOGY	3
III.	NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY	5
IV.	EXISTING NOISE ENVIRONMENT	12
V.	FUTURE TRAFFIC AND AIRCRAFT NOISE ENVIRONMENTS	22
VI.	DISCUSSION OF POTENTIAL NOISE IMPACTS	26
VII.	POSSIBLE NOISE MITIGATION MEASURES	28
A.	REFERENCES	30
B.	EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE	31
C.	WORKSHEETS	33

LIST OF FIGURES

NUMBER	FIGURE TITLE	PAGE NO.
1	LAND USE COMPATIBILITY WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVEL AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED	8
2	RANGE OF EXTERIOR BACKGROUND AMBIENT NOISE LEVELS	10
3	EXISTING TRAFFIC NOISE LDN CONTOURS AND NOISE MEASUREMENT SITES	14
4	AIRCRAFT FLIGHT TRACKS USED IN DEVELOPING AIRCRAFT NOISE CONTOURS	19
5	EXISTING AIRCRAFT NOISE LDN CONTOURS AND NOISE MEASUREMENT SITES	21
6	FUTURE (CY 1995) TRAFFIC NOISE LDN CONTOURS	23

LIST OF TABLES

NUMBER	TABLE TITLE	PAGE NO.
1	EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)	6
2	EFFECTS OF NOISE ON PEOPLE (RESIDENTIAL LAND USES ONLY)	7
3	DECEMBER 29-30, 19877 TRAFFIC NOISE MEASUREMENTS....	13
4	COMPARISONS OF EXISTING AND FUTURE TRAFFIC NOISE LEVELS IN PROJECT ENVIRONS	15
5	EXISTING AND FUTURE DISTANCES TO 60, 65, AND 70 Ldn CONTOURS	16
6	PROJECT AND NON-PROJECT TRAFFIC NOISE INCREASES	17
7	SUMMARY OF DECEMBER 29-30, 1987 AIRCRAFT NOISE MEASUREMENTS	18

I. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed Lusk-Kapolei Project were evaluated for their potential impact on present and future residences in the project environs. The traffic noise level increases along H-1 Freeway and Farrington Highway were calculated for the CY 1995 time period, and traffic noise increases associated with project and non-project traffic were assessed. Increases in traffic noise of 3.3 to 3.6 Ldn are predicted to occur as a result of project and non-project traffic on H-1 Freeway. Traffic noise increases of 0.3 Ldn are projected to occur as a result of project traffic on H-1 Freeway. Along Farrington Highway, total project and non-project traffic noise increases are expected to be relatively small at 0.3 to 1.2 Ldn, with project traffic contributing less than 0.5 Ldn to the increases.

Future traffic noise impacts on Lusk-Kapolei residents can be minimized by the use of buffer zones of adequate depth along H-1 Freeway, Farrington Highway, and along the internal roadways of the development. In order to not preclude federal assistance on the project, it is suggested that minimum setback distances to the future 65 Ldn contour be used when practical in siting future residential units. Because these setback distances are large along some sections of H-1 Freeway and Farrington Highway, the use of other noise mitigation measures may be desirable. These other measures include the construction of sound attenuating berms or walls along the high volume roadways, or the use of sound attenuating windows for two story homes.

Because of noise from military aircraft operations in the vicinity of the project site, there is a moderate risk of adverse impacts from aircraft noise in the southwestern portion of the project site. However, because future aircraft noise levels are not expected to exceed 60 Ldn, and may be less than 55 Ldn, these risks are not considered to be severe or unmanageable. Recommendations are provided for adequate disclosure of the aircraft noise

environment to potential residents, for providing the option of air conditioning selected units, and for adjusting the helicopter flight track which currently crosses over the project site.

II. PURPOSE AND METHODOLOGY

The purposes of this noise study were to predict the traffic noise level increases associated with the proposed Lusk-Kapolei Project, and to evaluate possible noise impacts on the surrounding area resulting from the project's traffic noise sources. Additionally, the possible noise impacts of highway traffic as well as aircraft noise sources on future residents of the proposed subdivision were evaluated.

Traffic noise predictions were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (REFERENCE 1), and traffic assignments from the traffic study for the project (REFERENCE 2). Historical traffic counts obtained by the State Department of Transportation at stations on H-1 Freeway and Farrington Highway (REFERENCES 3 thru 5) were used to develop the relationships between peak hour Leq(h) and daily Ldn traffic noise levels, as well as the traffic mix on H-1 Freeway. (See Worksheets #1 and #2 of APPENDIX C). Spot traffic counts obtained in conjunction with noise measurements at the project site were used to obtain the estimated vehicle mix along Farrington Highway. Natural shielding effects from the terrain features along H-1 Freeway were included in the traffic noise prediction model. As-built plans of the highway were used to obtain roadway and Right-of-Way elevations. Receptor elevations were assumed to be 5 FT above existing terrain.

Aircraft noise predictions on the project site were performed using the basic Ldn methodology of REFERENCE 6, supplemented by military aircraft noise data from Wright-Patterson AFB and by aircraft noise measurements on site. Receptor elevations were assumed to be at 155 FT MSL, with military aircraft pattern altitudes of 1,000 and 500 FT MSL in the vicinity of the project site. The operational assumptions contained within the 1984 AICUZ (REFERENCE 7) for Naval Air Station, Barbers Point (NASBP) and CY 2005 operations forecasts for Honolulu International Airport were used to predict future aircraft noise levels over the project

site. Although the 1984 AICUZ for NASBP is currently being updated (REFERENCE 8), forecasted operations at the navy facility were not available, and it was suggested that the 1984 AICUZ assumptions be used in the interim (REFERENCE 9).

Aircraft noise and traffic noise measurements were also obtained at five locations in December, 1987 to calibrate the noise prediction models, and to refine future traffic and aircraft noise predictions. The relative noise contributions from project and non-project motor vehicle traffic were obtained from the traffic projections of REFERENCE 2 for the 1995 time period. Additionally, the project plus non-project traffic volumes for the 1995 time period contained in REFERENCE 2 were used to describe the future traffic noise environment along H-1 Freeway and Farrington Highway. Potential traffic noise impacts resulting from non-project and project traffic in CY 1995 were identified, and possible noise mitigation measures were described.

Aircraft noise contours over the project site were developed using the Wright-Patterson AFB noise data base. Comparisons of measured aircraft noise levels were also made with the Wright-Patterson AFB data to determine if the predicted noise contours were representative of actual conditions on site. Additionally, a determination was made as to the probable location of the 60 and 55 Ldn aircraft noise contours in the vicinity of the project site utilizing the 1984 AICUZ operational assumptions as well as CY 2005 aircraft operations forecasts for Honolulu International Airport.

III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

Two noise descriptors currently used to relate outdoor noise levels to land use compatibility, and to assess environmental noise in general, are the Equivalent Noise Level (Leq) and the Day-Night Average Sound Level (Ldn). Both of these descriptors are averages of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. In traffic noise evaluations, the averaging period for the Leq descriptor is usually an hour, and more specifically, the peak hour of traffic. In all evaluations, the minimum averaging period for the Ldn descriptor is 24 hours (by definition), with the recommended averaging period being one year for land use compatibility evaluations. Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the Ldn descriptor. The Ldn descriptor was selected for use in this study for evaluating potential noise impacts from both aircraft and motor vehicle traffic noise sources. A glossary of acoustical descriptors is contained in APPENDIX B.

TABLE 1, which was derived from information contained in REFERENCE 10, presents current federal standards and acceptability criteria for residential land uses exposed to various levels of environmental noise. TABLE 2, which was extracted from REFERENCE 10, presents the general effects of noise in residential use situations. FIGURE 1, which was extracted from REFERENCE 11, contains suggested land use compatibility vs. Ldn guidelines for a broader spectrum of land uses. As a general rule, noise levels of 55 Ldn or less occur in rural areas or urbanized areas which are shielded from high volume streets. In urbanized areas, Ldn levels generally range from 55 to 65 Ldn, and are usually controlled by motor vehicle traffic noise. Buildings which front major roadways are generally exposed to levels of 65 Ldn, and as high as 72 Ldn when the roadway is a high speed freeway. Due to noise shielding

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 10.

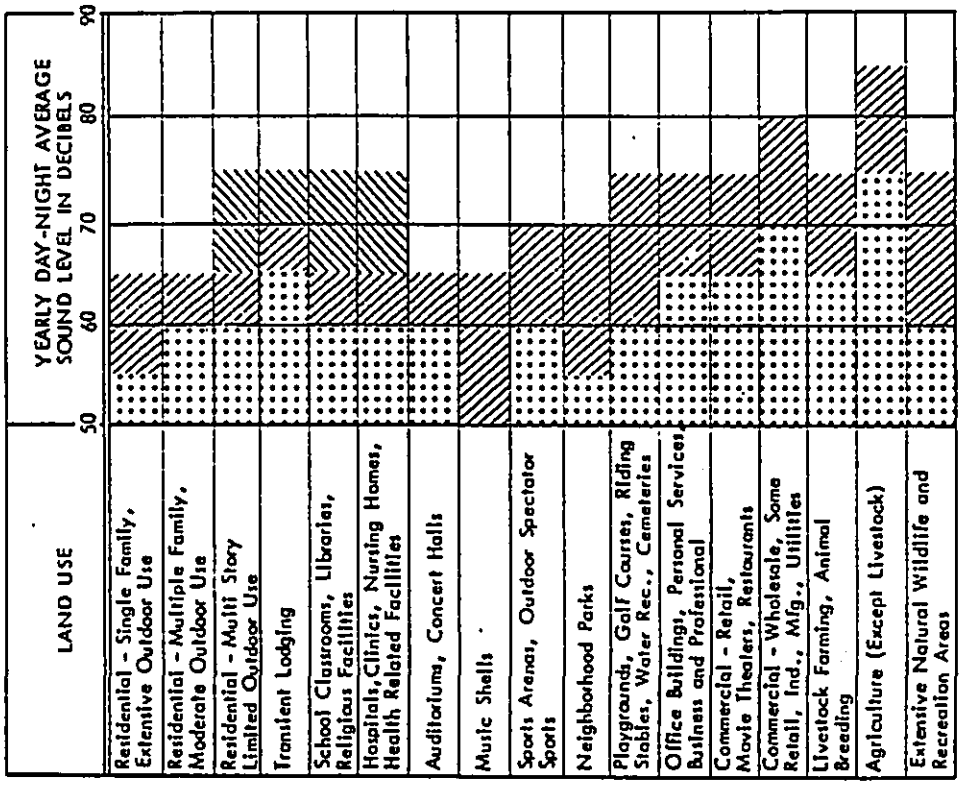


FIG. 1. Land use compatibility with yearly day-night average sound level at a site for buildings as commonly constructed. [For information only; not a part of American National Standard for Sound Level Descriptors for Determination of Compatible Land Use S1.23-1980.]

TABLE 2

EFFECTS OF NOISE ON PEOPLE
(Residential Land Uses Only)

Effects[1] / Day-Night Average Sound Level in Decibels	Hearing Loss	Speech Interference		Annoyance[2]	Average Community Reaction[4]	General Community Attitude Towards Area
		Indoor	Outdoor			
	Qualitative Description	% Sentence Intelligibility	Distance in Meters for 95% Sentence Intelligibility	% of Population Highly Annoyed[3]		
75 and above	May Begin to Occur	96%	0.5	37%	Very Severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will Not Likely Occur	99%	0.9	25%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will Not Occur	100%	1.5	15%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will Not Occur	100%	2.0	9%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will Not Occur	100%	3.5	4%		Noise considered no more important than various other environmental factors.

1. "Speech interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."
2. Depends on attitudes and other factors.
3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.
4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE: Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.

effects from intervening structures, buildings which are located within interior lots are exposed to lower exterior noise levels of 60 Ldn or less. FIGURE 2 contains the typical range of Ldn values within communities on Oahu.

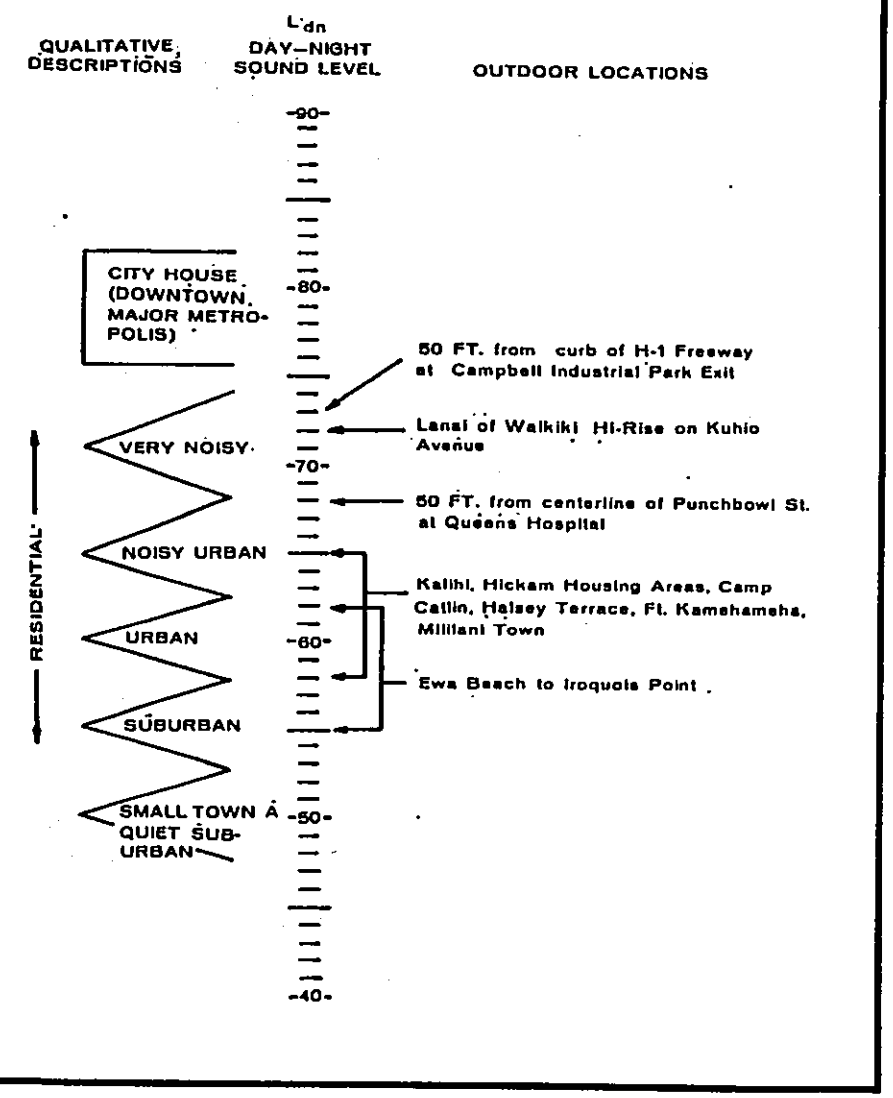
For the purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 Ldn or lower is considered acceptable for residential developments. This standard is applied nationally (see REFERENCE 12), including Hawaii. Because of our open living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior to interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 Ldn in local residential neighborhoods does not eliminate all risks of noise impacts. For these reasons, and as recommended in REFERENCE 13, a lower level of 55 Ldn is considered as the "Unconditionally Acceptable" (or "Near Zero Risk") level of exterior noise for residential uses. However, after considering the cost and feasibility of applying the lower level of 55 Ldn, government agencies such as FHA/HUD and VA have selected 65 Ldn as a more appropriate regulatory standard.

For commercial and light industrial developments, exterior noise levels in the order of 65 to 75 Ldn are considered acceptable. Note from FIGURE 1 that for commercial land uses, "Compatible" (or "Unconditionally Acceptable") noise levels are approximately 10 Ldn higher than for residential uses. This is due to the generally higher tolerance for noise in nonresidential settings, and the higher probability of total closure and air conditioning of commercial structures. Federal agencies utilize similar land use compatibility guidelines (TABLE 2 of REFERENCE 10) for commercial and light industrial developments.

For the purposes of this study, exterior noise contours of 60 thru 70 Ldn were constructed and used for the evaluation of traffic noise impacts. Reduction of the traffic noise contours due to natural terrain features and other existing shielding effects were included in the traffic noise contours. However, additional noise

Figure 2

RANGE OF EXTERIOR BACKGROUND AMBIENT NOISE LEVELS



shielding effects and reductions in the traffic noise contours due to the proposed improvements on the project site were not included in the future traffic noise contours.

For aircraft noise impact evaluations, aircraft noise contours of 50 thru 60 Ldn were developed over the project site and used to form the basis of the noise impact evaluations. Naturally ventilated residential or other noise sensitive uses outside the 55 Ldn contour (between 55 and 50 Ldn, or outside the 50 Ldn contour) were considered to be "Unconditionally Acceptable," while those noise sensitive uses between the 55 and 60 Ldn contour were considered to be "Marginally Acceptable" (see FIGURE 1).

IV. EXISTING NOISE ENVIRONMENT

Along the H-1 Freeway and Farrington Highway Rights-of-Way, existing traffic noise levels are in the "Significant Exposure, Normally Unacceptable" category. Existing setback distances to the 65 Ldn contour line are estimated at 276 FT and 110 FT from the centerlines of H-1 Freeway and Farrington Highway, respectively, under unobstructed line of sight conditions to either roadway. (see FIGURE 3). However, due to noise shielding effects from terrain features, the elevated freeway sections, and the existing roadway cuts, in the vicinity of the proposed Lusk-Kapolei project, actual setback distances to the H-1 Freeway's 65 Ldn contour are significantly less than 276 FT, and are in the order of 125 to 150 FT.

The results of the December, 1987 highway noise measurements are summarized in TABLE 3. The locations of the measurement sites and their relationships to the existing Ldn contours are shown in FIGURE 3. The agreement between the measured highway noise and the computed values was good at all four traffic noise measurement Sites 1, 2, 4, and 5, as indicated in the last two columns of TABLE 3. Noise along Farrington Highway was dominated by heavy haul truck traffic, which accounted for approximately 25 percent of the total traffic volumes during the noise measurement periods.

TABLE 4 presents the existing traffic noise levels on H-1 Freeway and Farrington Highway during the AM peak hour. Resulting Ldn levels and worst case setback distances to the existing 60, 65, and 70 Ldn traffic noise contours are presented in TABLES 5 and 6. These tables were constructed to provide the comparative results between the existing and future traffic noise levels.

The results of the aircraft noise measurements are summarized in TABLE 7. P-3 aircraft conducting touch and go operations during trade wind conditions were generally south of the project site at closest point of approach, which is consistent with the Flight Track #7 of the 1984 AICUZ (see FIGURE 4). During kona wind conditions, however, the P-3 aircraft were observed to be as

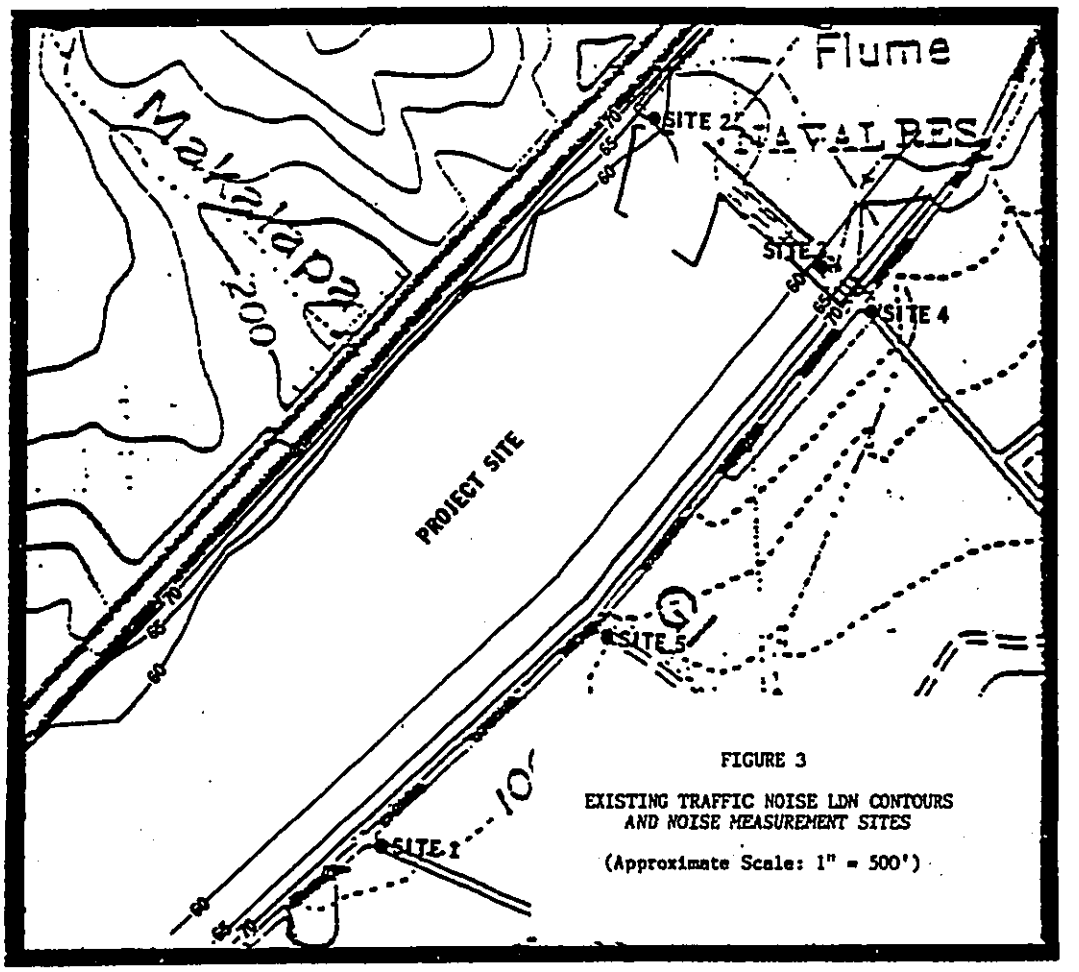


FIGURE 3

EXISTING TRAFFIC NOISE LDN CONTOURS
AND NOISE MEASUREMENT SITES

(Approximate Scale: 1" = 500')

-14-

TABLE 3

DECEMBER 29-30, 1987 TRAFFIC NOISE MEASUREMENTS

LOCATION	TIME OF DAY (HRS)	AVE.SPEED (MPH)	EQUIVALENT ——HOURLY TRAFFIC VOLUME—— Auto	Med.Truck	Heavy Truck	MEASURED Leq (dB)	PREDICTED Leq (dB)
1. 50 FT from centerline of Farrington Hwy. at west end of project site.	1000 TO 1100	45	194	5	67	67.0	67.3
1. 50 FT from centerline of Farrington Hwy. at west end of project site.	1030 TO 1145	45	163	7	90	69.1	68.7
2. 200 FT from baseline of H-1 Freeway at east end of project site.	1125 TO 1225	55	3,398	71	71	64.3	65.5
4. 50 FT from centerline of Farrington Hwy. at east end of project site.	1300 TO 1400	45	180	5	62	67.2	67.0
5. 50 FT from centerline of Farrington Hwy. near center of project site.	1204 TO 1300	45	228	6	78	66.7	68.0

-13-

TABLE 5

EXISTING AND FUTURE DISTANCES TO 60, 65, AND 70 Ldn CONTOURS

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
H-1 Freeway (C-1)	567	917	276	447	134	218
H-1 Freeway (C-2)	567	1,113	276	517	134	240
West Farrington Hwy. (C-1)	237	262	110	122	51	57
West Farrington Hwy. (C-2)	237	284	110	132	51	61
West Project Entrance Road	-	61	-	28	-	13
Center Farrington Hwy. (C-1)	237	255	110	118	51	55
Center Farrington Hwy. (C-2)	237	266	110	123	51	57
East Project Entrance Road	-	51	-	24	-	11
East Farrington Hwy. (C-1)	237	248	110	115	51	53
East Farrington Hwy. (C-2)	237	257	110	119	51	55

Notes: All setback distances are to the roadway centerlines. See TABLE 4 for traffic assumptions. Setback distances are for unobstructed Line-of-Sight conditions. Ldn assumed to be 1.5 dB greater than AM Peak Hour Leq(h).

TABLE 4

COMPARISONS OF EXISTING AND FUTURE TRAFFIC NOISE LEVELS IN PROJECT ENVIRONS

LOCATION	SPEED (MPH)	VPH	*** HOURLY LEQ IN DB @ 50'*** AUTO.	MT	HT	ALL VEH	DB INCREASE
EXISTING AM PEAK HR. TRAFFIC:							
H-1 Freeway	55	2,263	67.3	62.4	66.3	70.6	-
Farrington Highway	45	358	56.9	52.4	68.2	68.6	-
FUTURE (CY 1995) AM PEAK HR.TRAFFIC:							
H-1 Freeway (C-1)	55	7,010	70.6	65.7	69.7	73.9	3.3
H-1 Freeway (C-2)	55	7,600	71.0	66.0	70.0	74.2	3.6
West Farrington Hwy. (C-1)	45	868	61.5	56.3	68.2	69.3	0.7
West Farrington Hwy. (C-2)	45	1,330	63.6	58.1	68.2	69.8	1.2
West Project Entrance Road	35	255	57.5	49.1	55.0	59.8	59.8
Center Farrington Hwy. (C-1)	45	720	60.6	55.5	68.2	69.1	0.5
Center Farrington Hwy. (C-2)	45	948	62.0	56.7	68.2	69.4	0.8
East Project Entrance Road	35	195	56.3	47.9	53.8	58.6	58.6
East Farrington Hwy. (C-1)	45	575	59.5	54.5	68.2	68.9	0.3
East Farrington Hwy. (C-2)	45	760	60.9	55.7	68.2	69.2	0.5

Notes:

1. H-1 noise levels are at 100 FT from center (Baseline) of H-1 Freeway.
2. Assumed traffic mix of 95% Autos, 2.5% Medium Trucks, and 2.5% Heavy Vehicles on H-1 Fwy., and 98% Autos, 1% Medium Trucks, and 1% Heavy Vehicles on Project Entrance Roads. Heavy truck volumes on Farrington Hwy. assumed to remain at current levels (see TABLE 2).
3. C-1 and C-2 refer to Cases 1 and 2 of Traffic Study for project.

TABLE 6

PROJECT AND NON-PROJECT TRAFFIC NOISE INCREASES

LOCATION	EXISTING LDN	FUTURE LDN CASE 1	FUTURE LDN CASE 2	PROJECT INCREASE
H-1 Freeway	72.1	75.4	75.7	0.3
West Farrington Highway	70.1	70.8	71.3	0.5
West Project Entrance Road	-	59.9	61.3	59.9
Center Farrington Highway	70.1	70.6	70.9	0.3
East Project Entrance Road	-	60.1	58.4	60.1
East Farrington Highway	70.1	70.4	70.7	0.1

Note: Ldn values calculated at 100 FT from H-1 Freeway centerline, and at 50 FT from other roadways' centerlines.

TABLE 7

SUMMARY OF DECEMBER 29-30, 1987 AIRCRAFT NOISE MEASUREMENTS

SITE	AIRCRAFT	OPERATION/LOCATION	MEASURED Lse VALUES IN dB	ENERGY AVERAGE LSE (dB)
1	P-3	Touch/Go to south.	70.3, 68.7	69.6
1	DC-10	To HNL south of site.	70.3	
1	F-4	Southwest of site.	79.2	
1	B-747	To HNL south of site.	84.5	
1	C-130	Touch/Go to southwest.	87.1, 84.9	86.1
1	UH-1	Transit west of site.	79.2	
2	P-3	Touch/Go and overhead.	86.1, 82.4, 84.6, 84.3, 83.9, 83.2, 84.0	84.2
2	P-3	Touch/Go to southwest.	76.9, 81.1, 79.3, 78.7	80.1
2	C-130	To NASBP to southwest.	83.8	
2	C-141	To HNL west of site.	78.4	
2	H-53	Transit north of site.	78.7	
3	P-3	Touch/Go to southwest.	78.4, 81.3, 79.2, 75.3, 78.4, 78.0	78.8
3	DC-10	To HNL west of site.	73.9	
4	P-3	Touch/Go and overhead.	85.2, 83.9, 84.8, 83.1	84.3
4	P-3	Touch/Go to southwest.	74.6, 81.0, 78.6, 80.5	79.3
4	B-747	To HNL south of site.	81.6	
5	P-3	Touch/Go and overhead.	82.1, 81.5, 81.1	81.6
5	P-3	Touch/Go to southwest.	81.2, 82.4, 77.4, 81.2, 77.9, 75.9, 74.0, 82.4, 80.7, 73.5, 81.7, 81.6	80.1
5	C-141	To HNL south of site.	75.0	
5	DC-10	To HNL south of site.	85.7, 77.9	83.4

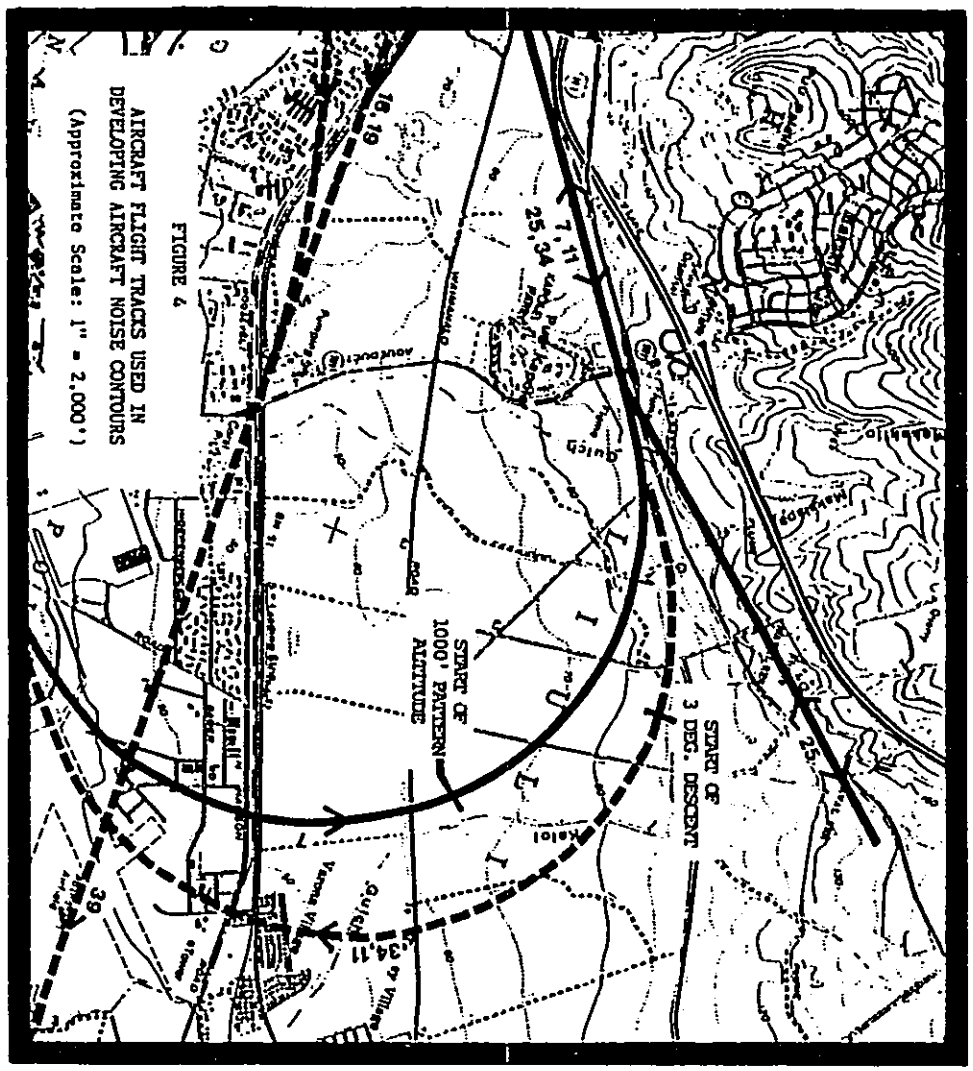


FIGURE 4
AIRCRAFT FLIGHT TRACKS USED IN DEVELOPING AIRCRAFT NOISE CONTOURS
(Approximate Scale: 1" = 2,000')

far north as over noise monitoring Site #2. Measured noise levels from P-3 flybys were approximately 5 to 10 dB less than those suggested by the Wright-Patterson AFB noise data base, and were in the range of 60 to 78 dB (Lmax). Aircraft landing at Honolulu International Airport were also audible, and those civilian aircraft which were north of the ILS approach to Honolulu were measured at levels similar to those of the military aircraft operating at NASBP. Measured hourly average (Leq) noise levels attributable to aircraft sources at the 5 measurement sites ranged from 52 to 59 dB.

FIGURE 5 depicts the existing aircraft noise contours over the project site utilizing the 1984 AICUZ operational assumptions and the Wright-Patterson AFB aircraft noise data base. FIGURE 4 depicts the primary flight tracks used by aircraft operating a NASBP as well as Honolulu International Airport. Based on the December, 1987 aircraft noise measurements, the aircraft noise contours do not appear to be unreasonable, and are at worst, 5 Ldn units greater than actual conditions. It is unlikely that the 60 Ldn aircraft noise contour crosses into the project site, and it is probable that the 55 Ldn aircraft noise contour crosses into the project site. The southwest corner of the project site may be exposed to annually averaged aircraft noise levels greater than 55 Ldn. The central, northern, and eastern portions of the project site are predicted to be exposed to aircraft noise levels below 55 Ldn. These conclusions are expected to remain valid into the foreseeable future as long as annually averaged equivalent (daytime and nighttime) NASBP operations on flight tracks #7, #11, #25, and #24 do not increase significantly (by 100 percent or more) over the levels in the 1984 AICUZ, and as long as the percentage mix of jet aircraft operations on the above flight tracks do not increase above 1984 AICUZ levels.

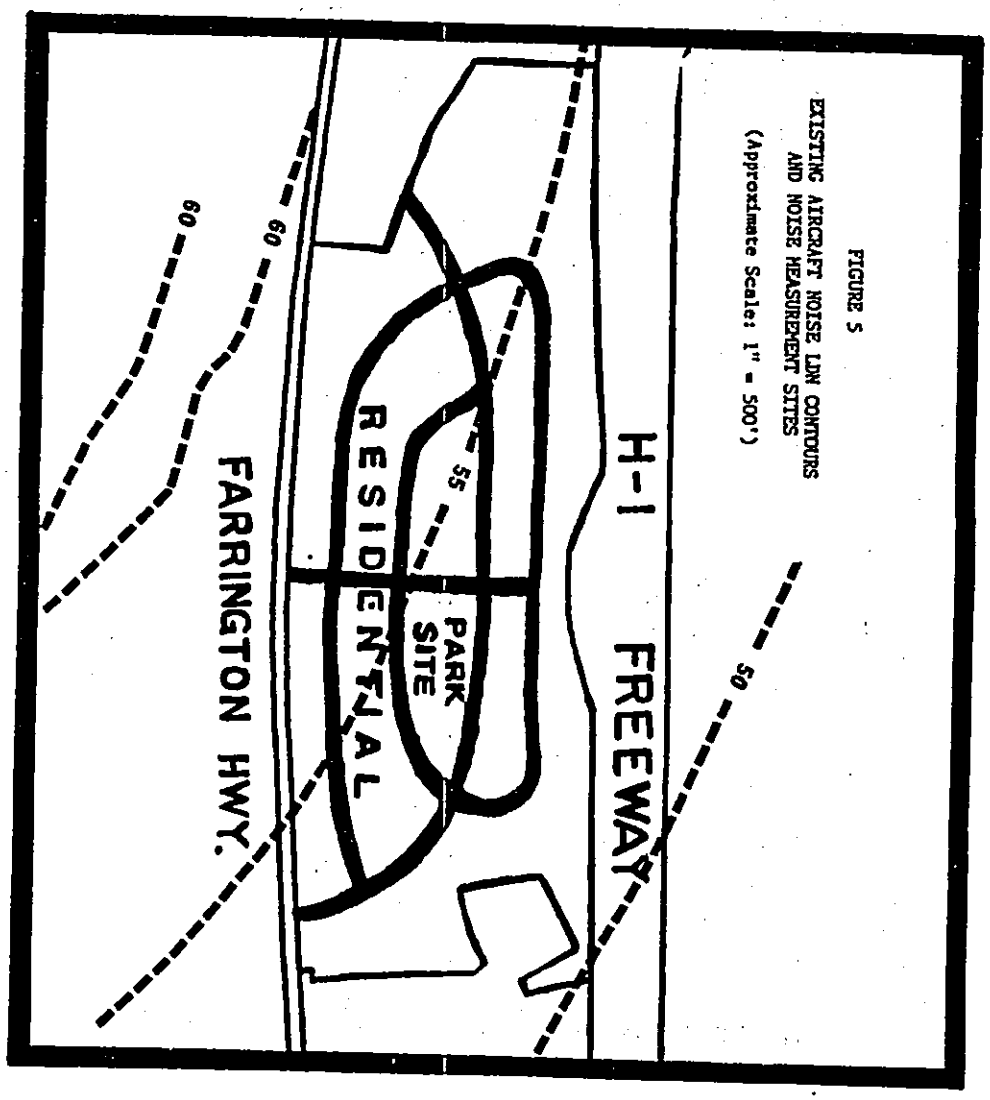


FIGURE 5
EXISTING AIRCRAFT NOISE LDN CONTOURS AND NOISE MEASUREMENT SITES
(Approximate Scale: 1" = 500')

V. FUTURE TRAFFIC AND AIRCRAFT NOISE ENVIRONMENTS

Predictions of future traffic noise levels were made using the traffic volume assignments for the 1995 time period under the two conditions of regional development (Cases 1 and 2) contained in REFERENCE 2. The predicted increases in AM peak hour traffic noise levels from the present to CY 1995 for Cases 1 and 2 are shown in TABLE 4 for the various sections of H-1 Freeway and Farrington Highway in the project environs. TABLE 5 presents the predicted increases in the setback distances to the 60, 65, and 70 Ldn traffic noise contours under unobstructed line-of-sight sound propagation conditions, and with the project traffic included. As noted in TABLE 5, the difference between Ldn and peak hour Leq(h) was assumed to be equal to 1.5 dB. By CY 1995, the setback distances to the 65 Ldn contour are predicted to be approximately 450 to 500 FT along H-1 Freeway, and approximately 115 to 130 FT along Farrington Highway at the south portion of the project. It should be noted that the predicted noise contour setback distances are the result of both project and non-project traffic.

FIGURE 6 depicts the future traffic noise contours on the project site following project completion by the Year 1995, and after assuming the worst case noise conditions associated with Case 1 or Case 2. The contours of FIGURE 6 do not include the sound attenuation effects of sound barriers or berms which may be incorporated into the project, or the shielding effects of other structures planned on the project site. The contours do include the shielding effects from natural terrain features as well as from the elevated roadway shoulders. In general, the northern portions of the project are expected to benefit from noise shielding effects due to terrain features and the elevated H-1 Freeway construction, while the southern portion is not expected to benefit from natural noise shielding effects to Farrington Highway. The first row of planned residential units fronting H-1 Freeway and Farrington Highway may be in the "Significant Exposure, Normally Unacceptable" category, with traffic noise levels exceed-

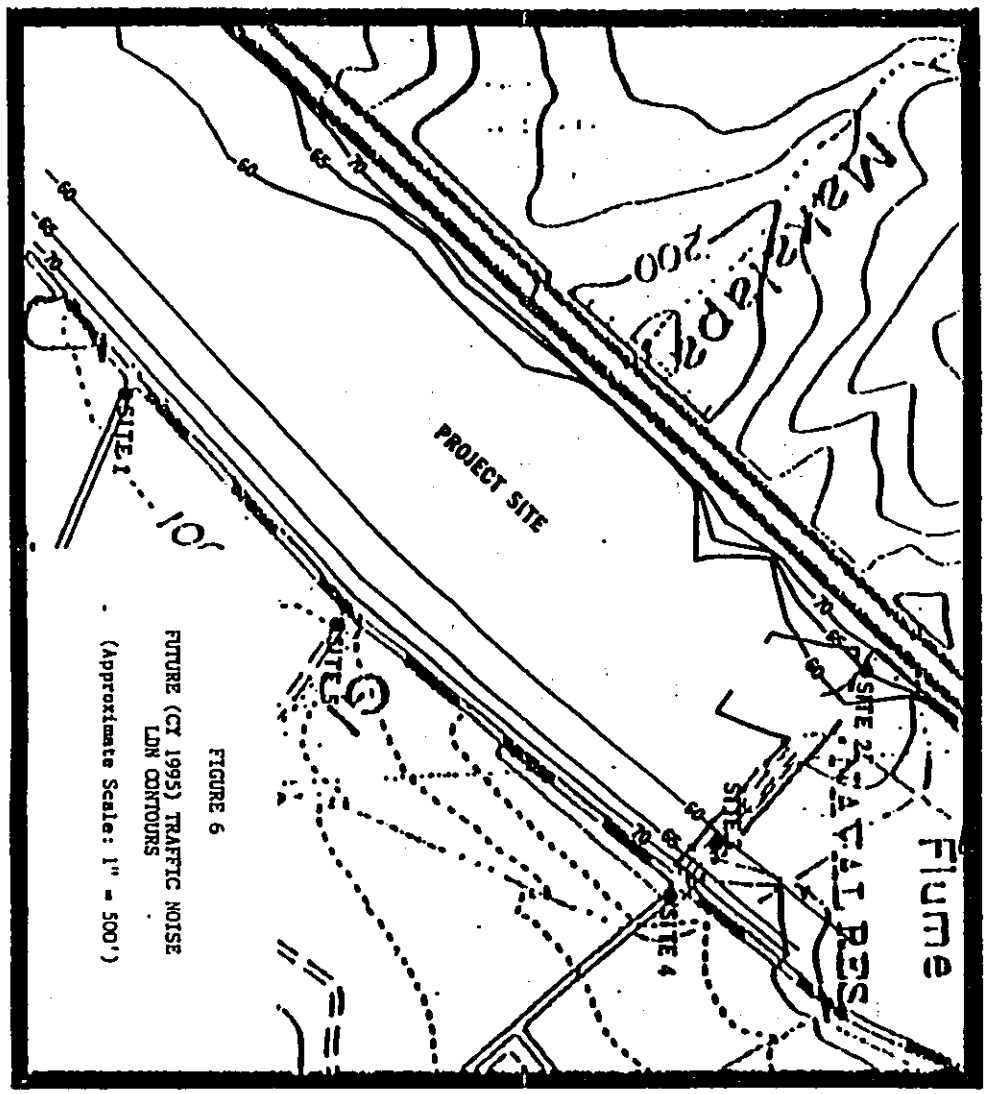


FIGURE 6
FUTURE (CY 1995) TRAFFIC NOISE LDN CONTOURS
(Approximate Scale: 1" = 500')

ing 65 Ldn unless noise mitigation measures are incorporated into the project.

Future traffic noise levels were also calculated separately with and without the project traffic in CY 1995. The contributions of project and non-project traffic to the total noise (project plus non-project) levels were calculated. TABLE 6 presents the anticipated increases in traffic noise levels, and the contribution of project traffic to these increases. As indicated in TABLE 6, increases in traffic noise levels associated with project traffic are predicted to range from 0.1 to 0.5 Ldn by CY 1995 along H-1 Freeway and Farrington Highway. Project traffic are predicted to cause insignificant increases of 0.5 Ldn or less on both major highways expected to service the project. The greatest increases in project related traffic noise are predicted to occur along the two new entrance roads to the project, which is an expected result. However, noise levels along these two entrance roadways are expected to be relatively low, with traffic noise in the "Moderate Exposure, Acceptable" category at setback distances exceeding 28 FT from the centerlines of these two entrance roadways. Along the internal circulation roadways of the proposed subdivision, traffic noise levels should not exceed FHWA or FHA/HUD criteria at 28 FT setback distance (from the roadway centerline) for the projected maximum AM peak hour volume of 255 VPH and at an average speed of 35 MPH or less.

The future aircraft noise environment is expected to be controlled by future aircraft operations at NASBP, and in particular, by the future aircraft flight operations in the immediate vicinity of the project site. The influence of forecasted aircraft operations at Honolulu International Airport, and in particular, the forecasted arrivals in the Year 2005 was examined by including the Honolulu arrivals in the development of the future noise contours. No significant change in the existing aircraft noise contours over the project site (see FIGURE 5) resulted from the inclusion of forecasted CY 2005 Honolulu International Airport arrivals. This was an expected result, due to the large distances

between the project site and the Honolulu International Airport flight tracks, and the relatively small distances between the project site and the NASBP flight tracks (see FIGURE 4). For these reasons, the aircraft noise contours depicted in FIGURE 5 are believed to be representative of the future conditions, which for the purposes of this study, have been defined as the NASBP operations as described in the 1984 AICUZ plus the CY 2005 aircraft operations forecasts for Honolulu International Airport.

VI. DISCUSSION OF POTENTIAL NOISE IMPACTS

Without noise mitigation measures, future traffic noise levels are expected to be in the "Significant Exposure, Normally Unacceptable" noise exposure category along portions of the north section of the project which front H-1 Freeway, and along the south sections which front Farrington Highway. If development of Lusk-Kapolei residences within the future 65 Ldn contour (see FIGURE 6) is necessary due to the difficulties in achieving adequate setback distances from the highways, adverse traffic noise impacts on future residents may occur unless noise mitigation measures are incorporated into the project.

Increases in traffic noise and the associated impacts resulting from project traffic are predicted to be insignificant along H-1 Freeway and Farrington Highway, with project related traffic noise increases predicted to be in the order of 0.1 to 0.5 Ldn. For this reason, the project is not expected to generate adverse noise impacts on non-project receptors along H-1 Freeway and Farrington Highway.

Possible aircraft noise impacts resulting from aircraft operations at NASBP may occur if the operational and aircraft noise level assumptions contained in the 1984 AICUZ for NASBP remain valid for the future period. As depicted in FIGURE 5, the southwest portion of the project site may be exposed to aircraft noise levels above 55 Ldn but less than 60 Ldn. Applying the most conservative EPA recommendation of 55 Ldn, there is a moderate risk of adverse noise impacts from aircraft noise, particularly in the southwest corner of the project site. The northern and northeastern portions of the project site are expected to be exposed to aircraft noise levels below 55 Ldn, with correspondingly minimal risks of adverse impacts from aircraft noise, If the December, 1987 measured data of aircraft noise levels on the project site are more representative of actual site conditions than the aircraft noise contours of FIGURE 5 (which used the 1984 AICUZ operational assumptions and the Wright-Patterson AFB noise data base),

then actual noise levels on the project site may be less than 55 Ldn. In any event, aircraft noise levels on the project site are not expected to exceed 60 Ldn in the foreseeable future, and potential noise impacts resulting from aircraft noise at those levels are considered to be manageable and not excessive.

VII. POSSIBLE NOISE MITIGATION MEASURES

The results of this noise study indicate that sufficient setback distances may not exist to meet FHA/HUD noise criteria at residential lots which front H-1 Freeway and Farrington Highway. Minimum barrier heights of 6 to 9 FT will probably be required along the highway Rights-of-Way to reduce future traffic noise levels below 65 Ldn. If two story homes are located within the 65 Ldn contour of FIGURE 6, the upper level spaces will not be adequately shielded by a 6 to 9 FT high wall, and the use of other mitigation measures, such as air conditioning of affected rooms or the installation of window sound attenuators, may be employed.

If two story homes are constructed within the 65 to 70 Ldn contours of FIGURE 6, the use of sound attenuating windows at the upper floor is the recommended mitigation measure. The first floor should be adequately shielded by the sound barrier described previously. Examples of sound attenuation windows are at Kalakaua Homes on Oahu, and at the Skill Village and Hale Noho Subdivisions on Maui.

Because proposed project residences are not expected to be exposed to aircraft noise levels greater than 60 Ldn, and may be exposed to levels less than 55 Ldn, special sound attenuation measures for aircraft noise are not considered necessary. However, because there is a possible risk of adverse noise impacts from aircraft noise levels between 55 and 60 Ldn, it is recommended that complete disclosure of the aircraft noise environment be provided to future residents of the subdivision. This mitigation measure will tend to minimize the number of adverse reactions from the new residents who may be located in the "Marginally Compatible" aircraft noise exposure zone between 55 and 60 Ldn. Additionally, provisions should be made for the optional installation of room air conditioning units by the owners of the residential units within the 55 to 60 Ldn contours of FIGURE 5. Other special sound attenuation measures are not required for aircraft noise.

The oval flight tracks (AICUZ Tracks #7, #11, and #34) are

frequently utilized by P-3 aircraft, but are south of the project site. The minimization of low level overflights of the project area by military aircraft on these local flight tracks should be possible if the assumptions of the 1984 AICUZ remain valid in the future. The itinerant departure and arrival Track #25 crosses over the project site, and is utilized by military helicopters at an average frequency of approximately 2 flyovers per day. Although total noise exposure from these helicopter overflights do not exceed the critical value of 55 Ldn, the use of the Farrington Highway or H-1 Freeway corridors are suggested as possible future locations for these itinerant tracks to the northeast.

A. REFERENCES APPENDIX A

(1) Barry, T. and J. Reagan; "FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108; Federal Highway Administration; Washington, D.C.; December 1978.

(2) "Traffic Impact Study - Lusk-Kapolei Project;" Parsons Brinkerhoff Quade and Douglas, Inc.; December, 1987.

(3) September 9-10, 1985 Vehicle Type Classification, Station H-8-A, H-1 Freeway at Waikele Bridge (Between Kunia Road and Waiawa Interchange); State Department of Transportation.

(4) June 24-25, 1986 24-Hour Traffic Counts, Station TS86-1, H-1 Freeway East of Palailai Interchange; State Department of Transportation.

(5) January 23-24, 1986 24-Hour Traffic Counts, Station 11-M, Farrington Highway at Makakilo Drive and Barbers Point Access Road; State Department of Transportation.

(6) "Developing Noise Exposure Contours for General Aviation Airports;" Bolt, Beranek and Newman, Inc.; prepared for FAA, AD/A-023429; December, 1975.

(7) "Air Installations Compatible Use Zone Plan, Naval Air Station Barbers Point, Oahu, Hawaii;" Pacific Division, Naval Facilities Engineering Command, Pearl Harbor, Hawaii; 1984.

(8) Letter from Commander, Naval Base Pearl Harbor dated September 24, 1987 (Ser N5B/2250) describing non-applicability of 65 Ldn noise contour to the north of NAS Barbers Point.

(9) Phonecon between Yoichi Ebisu and Bill Liu, Civil Engineer at Naval Base Pearl Harbor.

(10) "Guidelines for Considering Noise in Land Use Planning and Control;" Federal Interagency Committee on Urban Noise; June 1980.

(11) American National Standard, "Sound Level Descriptors for Determination of Compatible Land Use;" ANSI S3.23-1980; Acoustical Society of America.

(12) "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.

(13) "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.

APPENDIX B

TEXT

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 LAdn.

Although not included in the tables, it is also recommended that "L_{PN}" 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., deci).

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 CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

TABLE I: A-Weighted Recommended Descriptor List

Term	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

TERM	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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HOUR	SPEED (MPH)	VPH	% AUTOS	% MT	% HT	**** HOURLY LEQ IN dB @ 100 FT. AUTO	MT	HT	ALL VEH
0000-0100	55	238	95	2.5	2.5	55.1	50.1	54.1	58.3
0100-0200	55	154	95	2.5	2.5	53.2	48.2	52.2	56.4
0200-0300	55	103	95	2.5	2.5	51.4	46.4	50.4	54.7
0300-0400	55	111	95	2.5	2.5	51.7	46.8	50.8	55.0
0400-0500	55	417	95	2.5	2.5	57.5	52.5	56.5	60.7
0500-0600	55	1,468	95	2.5	2.5	63.0	58.0	62.0	66.2
0600-0700	55	2,263	95	2.5	2.5	64.8	59.9	63.8	68.1
0700-0800	55	1,787	95	2.5	2.5	63.8	58.8	62.8	67.1
0800-0900	55	1,393	95	2.5	2.5	62.7	57.7	61.7	66.0
0900-1000	55	1,347	95	2.5	2.5	62.6	57.6	61.6	65.8
1000-1100	55	1,250	95	2.5	2.5	62.3	57.3	61.3	65.5
1100-1200	55	1,343	95	2.5	2.5	62.6	57.6	61.6	65.8
1200-1300	55	1,330	95	2.5	2.5	62.5	57.5	61.5	65.8
1300-1400	55	1,440	95	2.5	2.5	62.9	57.9	61.9	66.1
1400-1500	55	1,512	95	2.5	2.5	63.1	58.1	62.1	66.3
1500-1600	55	1,897	95	2.5	2.5	64.1	59.1	63.1	67.3
1600-1700	55	2,014	95	2.5	2.5	64.3	59.3	63.3	67.6
1700-1800	55	1,651	95	2.5	2.5	63.5	58.5	62.5	66.7
1800-1900	55	1,234	95	2.5	2.5	62.2	57.2	61.2	65.5
1900-2000	55	848	95	2.5	2.5	60.6	55.6	59.6	63.8
2000-2100	55	724	95	2.5	2.5	59.9	54.9	58.9	63.1
2100-2200	55	711	95	2.5	2.5	59.8	54.8	58.8	63.1
2200-2300	55	552	95	2.5	2.5	58.7	53.7	57.7	62.0
2300-2400	55	412	95	2.5	2.5	57.4	52.5	56.4	60.7
TOTAL VPD:		26,199				LDN @	100 FT:		69.6

H-1 FREEWAY EAST OF PALAILAI INTERCHANGE, STA. TS86-1, TWO-WAY TRAFFIC (6/24-25/86)

APPENDIX C: WORKSHEET #1

HOUR	SPEED (MPH)	VPH	% AUTOS	% MT	% HT	**** LEQ(H) IN dB @ 50' **** AUTO	MT	HT	ALL VEH
0000-0100	45	20	96	2	2	45.6	39.9	44.7	48.8
0100-0200	45	26	96	2	2	46.7	41.1	45.9	49.9
0200-0300	45	17	96	2	2	44.8	39.2	44.0	48.1
0300-0400	45	16	96	2	2	44.6	38.9	43.8	47.8
0400-0500	45	31	96	2	2	47.5	41.8	46.6	50.7
0500-0600	45	120	96	2	2	53.3	47.7	52.5	56.6
0600-0700	45	355	96	2	2	58.0	52.4	57.2	61.3
0700-0800	45	358	96	2	2	58.1	52.4	57.3	61.3
0800-0900	45	290	96	2	2	57.2	51.5	56.3	60.4
0900-1000	45	310	96	2	2	57.5	51.8	56.6	60.7
1000-1100	45	371	96	2	2	58.2	52.6	57.4	61.5
1100-1200	45	368	96	2	2	58.2	52.6	57.4	61.4
1200-1300	45	366	96	2	2	58.2	52.5	57.3	61.4
1300-1400	45	393	96	2	2	58.5	52.8	57.7	61.7
1400-1500	45	423	96	2	2	58.8	53.2	58.0	62.0
1500-1600	45	530	96	2	2	59.8	54.1	59.0	63.0
1600-1700	45	442	96	2	2	59.0	53.4	58.2	62.2
1700-1800	45	308	96	2	2	57.4	51.8	56.6	60.6
1800-1900	45	248	96	2	2	56.5	50.8	55.7	59.7
1900-2000	45	166	96	2	2	54.7	49.1	53.9	58.0
2000-2100	45	124	96	2	2	53.5	47.8	52.6	56.7
2100-2200	45	116	96	2	2	53.2	47.5	52.4	56.4
2200-2300	45	71	96	2	2	51.1	45.4	50.2	54.3
2300-2400	45	53	96	2	2	49.8	44.1	49.0	53.0
TOTAL VPD:		5,522				59.5	53.9	58.7	62.7

FARRINGTON HWY. @ MAKAKILO DR. & NAS,BP. Road; STA. 11-M; 1/23-24/86

APPENDIX C: WORKSHEET #2

AIRCRAFT TYPES	#7	#11	#25 DEP DAY	#25 DEP NITE	#25 APP DAY	#25 APP NITE	#34 DAY	#34 NITE
	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ AIRUZ TRACK NUMBERS ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆							
P-3	14.543	0.808					0.262	0.027
C-130	4.467	0.372					0.142	0.016
C-135								
C-118							0.003	
C-141							0.003	
A-4	0.245	0.003					0.048	
F-4	0.084	0.011					0.013	
T-33	0.154	0.021					0.006	
S-3	0.003	0.001					0.003	
H-52/53	2.595	0.577	0.048		0.172		0.146	
H-2/3			0.075	0.009	0.057	0.006	0.225	0.025
CH-46/47	0.581	0.130	0.065		0.233		0.193	
H-1/58	1.155	0.257	0.021		0.078		0.063	
CIVIL	4.239	0.255	0.212		0.764		0.380	
U-11	0.166	0.010					0.009	
O-2	0.247	0.030					0.006	
C-12	0.067	0.005					0.003	
C-7	0.089	0.005					0.013	
MISC	0.084	0.003					0.006	
OPS/DAY:	28.720	2.517	0.421	0.009	1.304	0.006	1.506	0.068

AIRCRAFT TYPES	HIA APPROACH TRACK SEGMENTS (CY 2006) 39	17	16	19
C-130	1.30		1.30	
K/C-135	4.30	2.15	2.15	
C-5A	2.02	0.96	1.06	
C-141	6.40	3.15	3.25	
F-15	8.64		4.17	4.47
F-4	0.96		0.46	0.50
B-747	24.69	10.90	13.79	
DC-10/L1011	18.49	17.47	1.02	
B-757	22.96		22.96	
B-737	6.68		6.68	
DC-9	4.35		4.35	
DC9-80	15.65		15.65	
F-28	7.73		7.73	
DASH 7	18.20		18.20	
DASH 6	2.97		2.97	
OPS/DAY:	145.34	34.63	105.74	4.97

APPENDIX C: WORKSHEET #3 – DAILY OPERATIONAL ASSUMPTIONS ON AIRCRAFT FLIGHT TRACKS

APPENDIX D

Environmental Aspects of Storm Water Runoff
Lusk-Kapolei Project
Ewa, Oahu, Hawaii

by

Gordon L. Dugan, Ph.D.
Environmental Consultant

December, 1987

ENVIRONMENTAL ASPECTS OF STORM WATER RUNOFF

LUSK-KAPOLEI PROJECT

EWA, OAHU, HAWAII

December, 1987

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TABLE OF CONTENTS

	Page
LIST OF FIGURES	iii
LIST OF TABLES	ii
INTRODUCTION	1
PURPOSE AND SCOPE	8
METHODOLOGY	9
SURFACE WATER RUNOFF ALTERNATIONS	14
Quantity	14
Quality	16
SUMMARY AND CONCLUSIONS	20
REFERENCES	25

LIST OF FIGURES

Figure No.		Page
1	Hydrologic and Geologic Characteristics of Oahu ...	2
2	Site Location for Proposed Lusk-Kapolei Project, Ewa, Oahu, Hawaii	3

LIST OF TABLES

Table No.		Page
1	Representative Storm Water Quality Data for Honolulu	13
2	Estimated Storm Water Runoff and Constituent Changes due to the Proposed Lusk-Kapolei Project, Ewa, Oahu, Hawaii	15

INTRODUCTION

The proposed Lusk-Kapolei Project, located on the Ewa Plain of Southern Oahu, as shown in Figure 1, consists of approximately 77 acres for single family housing units. The project, outlined in Figure 2, is situated between the H-1 Interstate Highway and Farrington Highway with the western edge (kaena point side) of the proposed project being approximately 0.3 mile from the Makakilo/Barbers Point Access Road Interchange. The Barbers Point Naval Air Station is located approximately 1½ miles directly makai of the proposed project. Between the proposed project site and the Barbers Point Naval Air Station,the State of Hawaii and City and County of Honolulu are jointly proposing the development of Kapolei Village, which consists of nearly 4900 housing units, an 18 hole golf course, schools, parks as well as other accompanying community facilities, on 830 acres of land.

Geologically the proposed project site is considered to be located at the mauka edge of Ewa Plain and the vast water restricting caprock that is predominant along Southern Oahu. Farrington Highway is generally considered to represent the approximate mauka boundary of the Ewa Plain caprock. The caprock boundary is also roughly indicated in Figure 1. The elevation at the project site ranges from near 100 ft to about 255 ft above mean sea level.

The U.S. Navy operates the Barbers Point freshwater well, which is located in the indentation area, labeled Industrial,

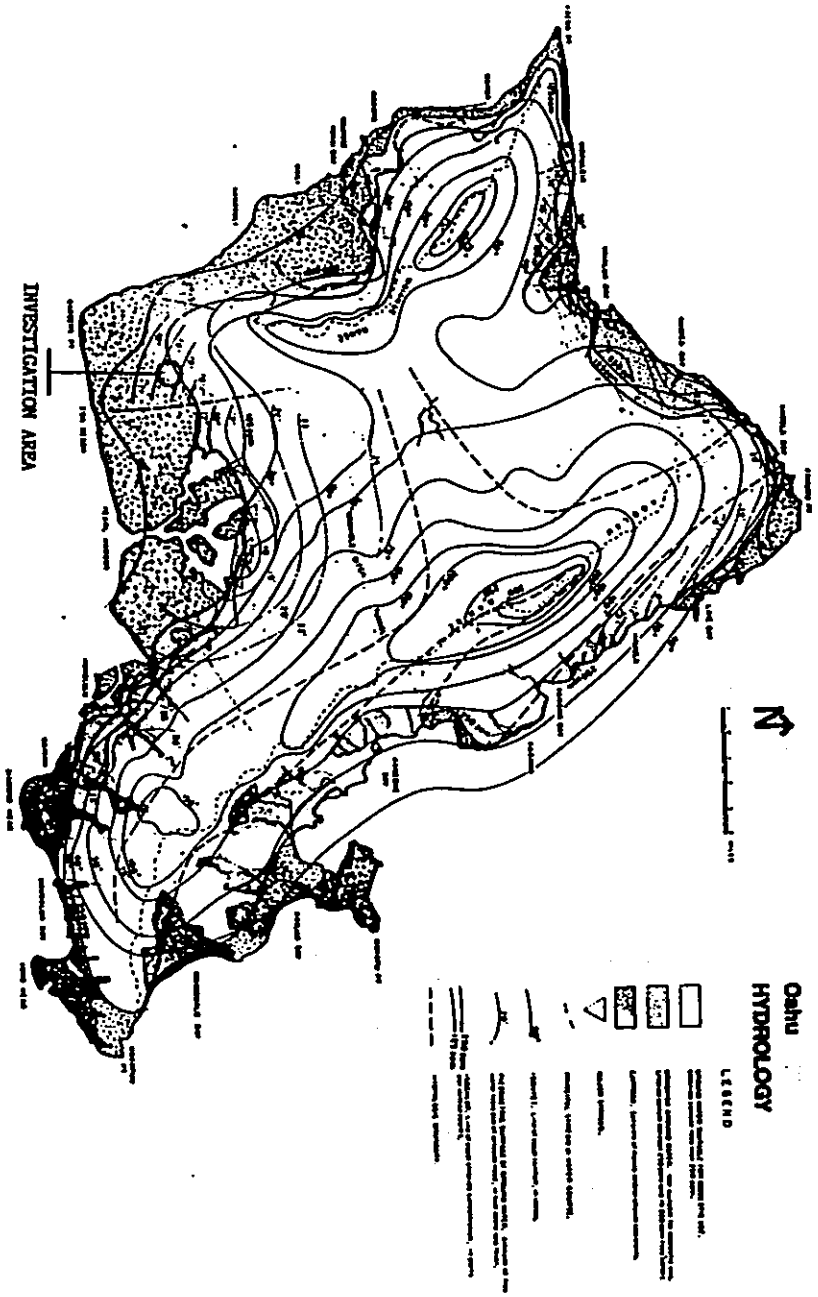

Figure 1. Hydrologic and Geologic Characteristics of Oahu

(Source: "2020 Plan," Board of Water Supply, City and County of Honolulu, 1971, Page 13)

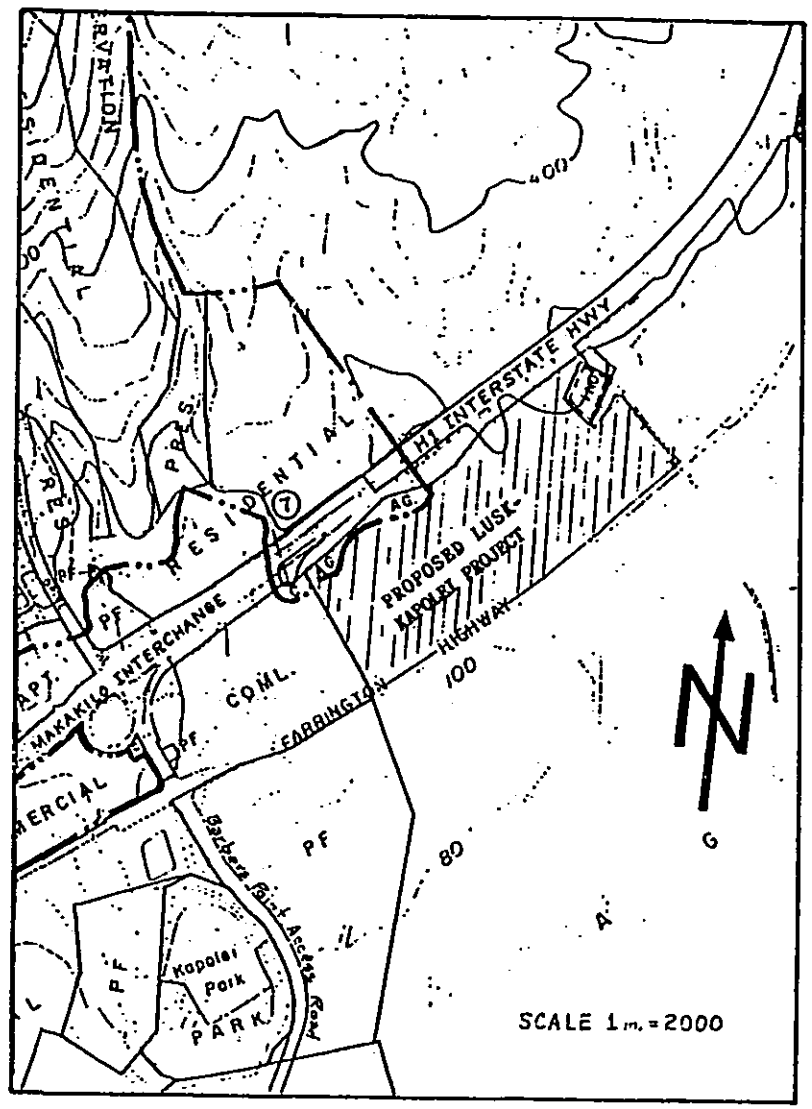

Figure 2. Site Location for Proposed Lusk-Kapolei Project, Ewa, Oahu, Hawaii

(Source: Modified from reference R.M. Towill Corp., 1987)

just beyond the project boundary at northeast corner of the project site (Figure 2). A 24-in. diameter surface layed water pipe from the well presently traverses the upper proportion of the project site. According to a telephone conversation with personnel at the U.S. Navy's Waiawa Pumping Station (November 27, 1987) the pumping rate from the Barbers Point Well ranges from 1 to 2 MGD. As can be noted in Figure 1 the groundwater in the vicinity of the Barbers Point well has a chloride level of near 250 mg/L (as shown by the 250 mg/L isochlor line of Figure 1), which is considered the upper recommended limit for drinking water, because of taste problems (U.S. Environmental Protection Agency, 1979).

Four separate soil series, Ewa, Lualualei, Mahana, and Molokai, as well as land designated as "stony steep land" are included within the 77 acre Lusk Company-Kapolei ~~Village~~ Project. Of the four soil series only Lualualei is not considered as being well drained, and stony steep land is not rated. The relationship of these soil series to storm water runoff will be discussed in a later section of the report. Approximately 33 acres of the northwest protion of the project site are presently (November 1987) cultured in a heavy growth of sugarcane while the remaining site is covered with grasses, weeds, some brush, and Kiawa and Koa haole, particularly on the upper portion of the project along the H1 Interstate Highway. The annual median rainfall around the project site and the Ewa Plain in general is near 20 in. (Giambelluca, et al., 1984), which is considered relatively dry for Oahu.

The Tributary area mauka of the proposed 77 acre project site, the head of Makalapa drainageway, which only consists of approximately 200 acres, is directed under the H-1 Interstate Highway by culverts to continue down the natural drainageway to the terminus of Makalapa drainageway through the mid section of the project site, (Community Planning Inc. 1987). The drainage from the project site, with the exception of approximately 8 acres from the western portion that flows into Makakilo drainageway eventually flows into Makalapa drainageway either onsite or a short distance below the project site. A portion of the drainage from the eastern side of the project drains to an unnamed drainage path that traverses around the eastern section of the project and converges with Makalapa drainageway.

The present Makalapa drainageway crosses Farrington Highway in a underground box culvert. During moderate storms the drainage waters not only flow through the box culvert, but because of its limited capacity the storm runoff also flows over Farrington Highway to makai streams and plantation ditches. Eventually the storm water flows makai to a coral pit located just inside the Barbers Point Naval Station's northern boundary with the major portion surcharging the groundwater through percolation, however, during heavy storms the floodwaters floved across the Naval Air Station as no defined outlet to the ocean exists. Culvert improvements are being planned for the crossing at Farrington Highway (Community Planning, Inc., 1987).

Inasmuch as it is assumed that urban development of agricultural and undeveloped land increases storm water runoff, the

developers plan to incorporate retention basins within the golf course area of the 830 acre Kapolei Village Development, makai of Farrington Highway. If the construction of the golf course is delayed due to scheduling alterations or other reasons the developers plan to install an interim silting and retention basin within the 77 acre project area or within the area of the future golf course. Thus, the additional runoff assumed to be generated during and after construction of the 77 acre proposed project should not increase the quantity of the present flow to the Barbers Point Naval Air Stations coral pit disposal/surcharge area (Community Planning Inc., 1987).

A development project as the one being herein proposed generally produce alterations in surface water runoff as a result of modifying existing ground conditions. 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 the 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 nutrient loads, and its probable effect on subsequent receiving waters (groundwater below coral pit at northern boundary of Barbers Point Naval Air Station and occasionally the fronting ocean waters) 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 approximately 77-acre Lusk-Kapolei Project as it relates to storm generated 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 present and full 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 management, vegetation, soil, and soil moisture conditons, 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. Three of the soils series within the project, Ewa, Mahana, and Holokai, which cover approximately 50 acres of the land area, are classified as "B". The other soil series are Lualualei, Class "D", which covers 9 acres, while the remaining 18 acres of the project are classified as "stony steep land". For conservative reasons the stony steep land was included in the Class "B" designation. The HESL method also included the use of data derived from Hawaii (Cooley and Leonard, 1980) and the rainfall-frequency for given recurrence and duration storms (Giambella et al., 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 has been established, it is necessary to determine the runoff quality for present and full development conditions.

The quality parameters of storm water runoff considered the most representative to identify potential changes under diff-

erent land management practices (i.e. present and full development conditions) are: total nitrogen; total phosphorus; and suspended solids (sediments). Unfortunately, there are no water quality data from the intermittent streams within and around the project site area.

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 phophorus values of 3.0 and 0.3 lb/acre-yr, respectively, were divided by the median annual rainfall of 20 in. and a rainfall-runoff coefficient of 0.30 to result in concentration values of 2.20 and 0.22 mg/L, respectively, for pre-project development conditions.

Representative suspended solids values in storm water runoff from the presently developed (1987) project site area are again difficult to determine, inasmuch as it is commonly presumed, by mainly indirect methods, that the majority of the annual suspended solid load is carried by the heavy storm water runoff events which tend to occur on an infrequent basis. For the present study the concentration of suspended solids was based on composite measured and estimated suspended solids

load per unit area from various Oahu streams, including those out of the entire Kaneohe Bay Drainage Basin, as reported by Jones et al., (1971). Following this reasoning the suspended solids concentration value for the present development conditions for comparative purposes was set at 1000 mg/L.

Quality data for storm water runoff from developed areas are sparce, both locally and nationally. Loehr (1974) compiled urban storm water 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 1. These values compare favorably with similar situations from the continental U.S.

For the present study, the quality results of the storm water from the Honolulu residential area of Table 1 for nitrogen, phophorus, 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 storm water runoff constituent concentrations for nitrogen, phosphorus, and suspended solids for present development (1987) and full development conditions can then be applied to the present and full development 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

Table 2

Estimated Storm Water Runoff and Constituent Changes due to the Proposed Lusk-Kapolei Project, Ewa, Oahu, Hawaii

Storm[a]			Storm Water Runoff												
			Hydraulic			Nitrogen[b]			Phosphorus[c]			Suspended Solids[d]			
			Development			Development			Development			Development			
Duration	Recurrence Interval	Quantity	1987	Full	Δ	1987	Full	Δ	1987	Full	Δ	1987	Full	Δ	
hr	yr	in.	AF event	AF event	AF event	AF event	AF event	AF event	AF event	AF event	AF event	ton event	ton event	ton event	
1	2	1.3	0.0	2.1	+ 2.1	0.0	3.5	+ 3.5	0.0	3.3	+ 3.3	0.00	0.72	+ 0.72	
1	10	1.8	0.1	4.2	+ 4.1	0.8	6.8	+ 6.0	0.1	6.5	+ 6.4	0.19	1.42	+ 1.23	
1	50	2.3	0.7	6.6	+ 5.9	4.0	10.7	+ 6.7	0.4	10.2	+ 9.8	0.92	2.23	+ 1.31	
1	100	2.4	0.8	7.1	+ 6.3	4.9	11.5	+ 6.6	0.5	10.9	+ 10.4	1.12	2.40	+ 1.28	
24	2	4.5	6.2	18.7	+ 12.5	36.9	30.5	- 6.4	3.7	28.9	+ 25.2	8.40	6.35	- 2.05	
24	10	7.5	18.3	36.8	+ 18.5	109.8	60.0	- 49.8	11.0	57.0	+ 46.0	24.00	12.51	- 12.39	
24	50	10.4	32.6	54.8	+ 22.2	195.3	89.5	- 105.8	19.5	85.0	+ 65.5	44.39	18.64	- 25.75	
24	100	11.7	39.5	63.0	+ 23.5	236.5	102.8	- 133.7	23.6	97.7	+ 74.1	53.75	21.42	- 32.33	

a) From "Rainfall Frequency for Oahu" (Giambelluca, et al, 1984).

b) Based on a nitrogen value of 2.20 mg/L for 1987 conditions and 0.60 mg/L for full development.

c) Based on a phosphorus value of 0.22 mg/L for 1987 conditions and 0.57 mg/L for full development.

d) Based on a suspended solids value of 1000 mg/L for 1987 conditions and 250 mg/L for full development.

Note: Constituent load results based on the hydraulic load prior to rounding-off to one decimal point.

SURFACE WATER RUNOFF ALTERATIONS

Quantity

The estimated storm water runoff and constituent changes due to the proposed 77 acre Lusk-Kapolei 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 the mauka drainage area, which only consisted of approximately 200 acres in this situation.

As can be readily observed in Table 2, there is no calculated storm water runoff volume for present (1987) conditions for the 77 acre Kapolei Project for the 2 yr, 1 hr duration storm, whereas, for full development conditions the volume calculates out to be 2.1 acre-ft. However, as the storm duration and recurrence interval increases, the difference reduces down to approximately 59% times greater for the 100 yr, 24 hr storm,which was the greatest calculated incremental storm water runoff volume, as expected. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs.

The calculated increased runoff from the project area correspondingly indicates less potential groundwater recharge within the site of the project; however, in this situation

potential recharge of the caprock aquifer will occur as the storm water runoff flows along the makai streams and plantation ditches to the terminus disposal in the coral pit area, just inside the northern boundary of Barbers Point Naval Air Station, except for the portion that apparently overflows during heavy storm events across the Station to the fronting ocean. In addition, aquifer recharge as well as sediment removal will be enhanced by the use of the interim and/or permanent retention basin(s) being planned within or makai of the proposed 77 acre project site in the Golf Course area of the proposed 830 acre Kapolei Village Project.

These runoff 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 of 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 on Oahu for streams and/or drainage courses 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) development for storms of 1 and 24 hr duration at recurrence intervals of 2, 10, 50, and 100 yr are shown in Table 2, along with the correspondingly previously discussed expected volumes for specific storms. 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 and suspended solids loads increase slightly for the 1 hr duration storms and decrease for the 24 hr storms, while phophorus increases for all levels of storms. Any potential impact of these increases is significantly negated by the use of sedimentation-retention/percolation basins which would tend to filter out the sediment and reduce a significant portion of the phosphorus and non-oxidizable forms of nitrogen by adsorption. The caprock groundwater below the Barbers Point Naval Air Stations coral disposal pit is too brackish (Figure 1) for drinking water without resorting to expensive desalination and/or significant blending with fresher water.

The hydrologic and water quality aspects of the surface water runoff were only considered for the present and projected full development 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, such as those outlined in the City and County of Honolulu (1981) ordinance relating to grading, grubbing, and stockpiling and/or the U.S. SCS's Erosion and Sediment Control Guide for Hawaii (Soil Conservation Service, 1981).

Other water quality constituents of general concern include biocides and heavy metals. Typically, the biocides in general use tend to break down 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, however, for a comparison basis, although it is not directly applicable for storm water runoff, only lead and iron (by a slight margin) actually exceed the primary (Department of Health, 1981) and secondary (U.S. Environmental Protection Agency, 1979) drinking water standards, respectively. Inasmuch as essentially all new automobiles have switched over to unleaded gasolines since the mid-1970's it would be expected that the concentration of lead in residential storm water runoff would be steadily decreasing. Iron's concern in drinking water is due to its potential for staining fixtures and producing tastes.

For most development projects being considered, the major water quality concern is the potential impairment of receiving surface waters, such as freshwater streams, lakes, reservoirs, estuaries, bays, or the oceans, and/or underlying potable groundwater supplies. However, these concerns are significantly negated for the proposed 77 acre Lusk-Kapolei Project, with the possible exception of the U.S. Navy's Barbers Point Well, located near the northeast boundary of the proposed project. In this situation all but possibly less than 2 acres of the proposed 77 acre project site should be located down gradient (groundwater table) of the well. Thus, except for an unduly heavy pumping drawdown condition, which is not usually the situation on Oahu, the potential affects on the quality of the groundwater being pumped from the well would not be expected to be detectably influenced by the development of the proposed 77 acre project.

SUMMARY AND CONCLUSIONS

The proposed 77 acre Lusk-Kapolei Project is situated between H-1 Interstate Highway and Farrington Highway with the western edge of the project being about 0.3 mile from the Makakilo/Barbers Point Access Road Interchange. The Barbers Point Naval Air Station is located approximately 1½ miles directly makai of the proposed project. Between the proposed 77 acre project and the Barbers Point Naval Air Station the State of Hawaii and City and County of Honolulu are jointly proposing the development of 830 acres, which consists of approximately 4900 housing units, an 18 hole golf course, schools, parks, as well as other accomping community facilities.

The U.S. Navy operates the Barbers Point freshwater well which is located in an indentation area just beyond the northeast corner of the project's boundary. The well presently produces approximately 1 to 2 mgd. A 24-in. diameter surface layed water pipe from this well currently traverses the upper portion of the project site. Approximately 33 acres of the nothwest portion of the project site are presently (November, 1987) cultured in a heavy growth of sugarcane, while the remaining site is covered grasses, weeds, some brush, and kiawa and Koa haole. The elevation of the project site ranges from near 100 ft to about 255 ft above mean sea level, while the annual median rainfall around the project site and the Ewa Plain in general is near 20 in.

The tributary area mauka of the 77 acre project site, the head of Makalapa drainageway, which only consists of approximately 200 acres, is directed under the H-1 Interstate Highway by culverts

to continue down the natural drainageway to the terminus of Makalapa drainageway through the mid section of the project site. Nearly all the drainage from the project flows into Makalapa drainageway, either on site or a short distance below, and then on into a coral pit, located just inside the Barbers Point Naval Air Station northern boundary. There is no defined outlet to the ocean for this drainageway. To accommodate the additional expected storm runoff from the development of the project, a silting and retention basin(s) will be incorporated into the golf course of the proposed makai 830 acre development project, or installed on an interim basis on-site, depending on the timing of the two separate projects.

The purpose of this study is to evaluate the environmental impact of the proposed 77 acre project as it relates to surface water runoff. To this end the study identified changes in total runoff volume, 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 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.

The results of the storm water runoff volumes indicated that there is no calculated storm water runoff for the present (1987) conditions for the 77 acre Kapolei Project for the 2 yr, 1 hr duration storms, whereas, for full development conditions the volume calculates out to be 2.1 acre-ft. However, as the storm duration and recurrence interval increases, the difference reduces down to approximately 59% times greater for the 100 yr, 24 hr storm, which was the greatest calculated incremental storm water runoff. At higher rainfall intensities and durations, soil saturation increases, thus more runoff occurs.

The calculated increased runoff from the project area correspondingly indicates less potential groundwater recharge within the site of the project; however, in this situation potential recharge of the caprock aquifer will occur as the storm water flows along the makai streams and plantation ditches to the terminus disposal in the coral pit area. In addition, aquifer recharge as well as sediment removal will be enhanced by the use of the interim and/or permanent retention basin(s) being planned.

Besides the changes in the volume of storm water runoff, the quality of the various constituents being transported is of equal, if not of more importance. The incremental changes per storm event for the pre-developed (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

and suspended solids loads increase slightly for the 1 hr duration storms and decrease for the 24 hr storms, while phosphorus increases for all levels of storms. Any potential impact of these increases is significantly negated by the use of sedimentation-retention/percolation basins which would tend to filter out the sediment and reduce a significant portion of the phosphorus and non-oxidizable forms of nitrogen by adsorption.

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 years; 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, for a comparison basis only, lead and iron (by a slight margin) are actually reported to exceed the primary and secondary drinking water standards, respectively. With essentially all new automobiles switching over to unleaded gasolines since the mid-1970's the concentration of lead would be expected to decrease with time. The concern with iron

concentrations in drinking water is due to its potential for staining fixtures and producing tastes.

The concern with potential impairment of receiving surface waters and/or underlying potable groundwater supplies from the development of the 77 acre Lusk-Kapolei Project is significantly negated inasmuch as the present natural and developed aquifer recharge mechanisms are primarily underlaid by brackish caprock water makai of the project site, with the possible exception of the U.S. Navy's Barbers Point Well. In this situation all but possibly less than 2 acres of the proposed 77 acre project site should be located down gradient (groundwater table) of the well. Thus, except for an unduly heavy pumping drawdown condition, which is not usually the situation on Oahu, the potential affects on the quality of the groundwater being pumped from the well would not be expected to be detectably influenced by the development of the proposed 77 acre project.

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APPENDIX E

Kapolei Knolls
Demographic, Economic and Housing Impacts

by

Environment Capital Managers, Inc.

January 1988

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KAPOLEI KNOLLS

DEMOGRAPHIC, ECONOMIC AND HOUSING IMPACTS

Prepared for: The Lusk Company
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January 1988

TABLE OF CONTENTS

	Page
INTRODUCTION	1
INTENDED MARKET	2
DEMOGRAPHIC IMPACTS	3
Residential Population	3
Population Growth	3
Residential Population Projections	3
Character or Culture of the Neighborhood	5
Age Distribution	5
Ethnic Distribution	5
Household Size	5
Household Income	7
Impact Assessment	7
ECONOMIC IMPACTS	8
Economic Growth	8
Overview of the Economy	8
Hawaii's Economy by Major Sections	8
Visitor Industry	8
Federal Government	9
Agriculture	10
Construction	11
Forecast	12
Employment	13
Forecast	13
Regional Employment	14
Government Revenues From the Project	15
Impact Assessment	16
HOUSING IMPACTS	18
Housing Supply and Demand	18
Housing Supply	18
Housing Demand	19
The Housing Market	20
Affordable Units	24
Impact Assessment	27

Page

REFERENCES..... 28

APPENDIX Demographic Forecast Report

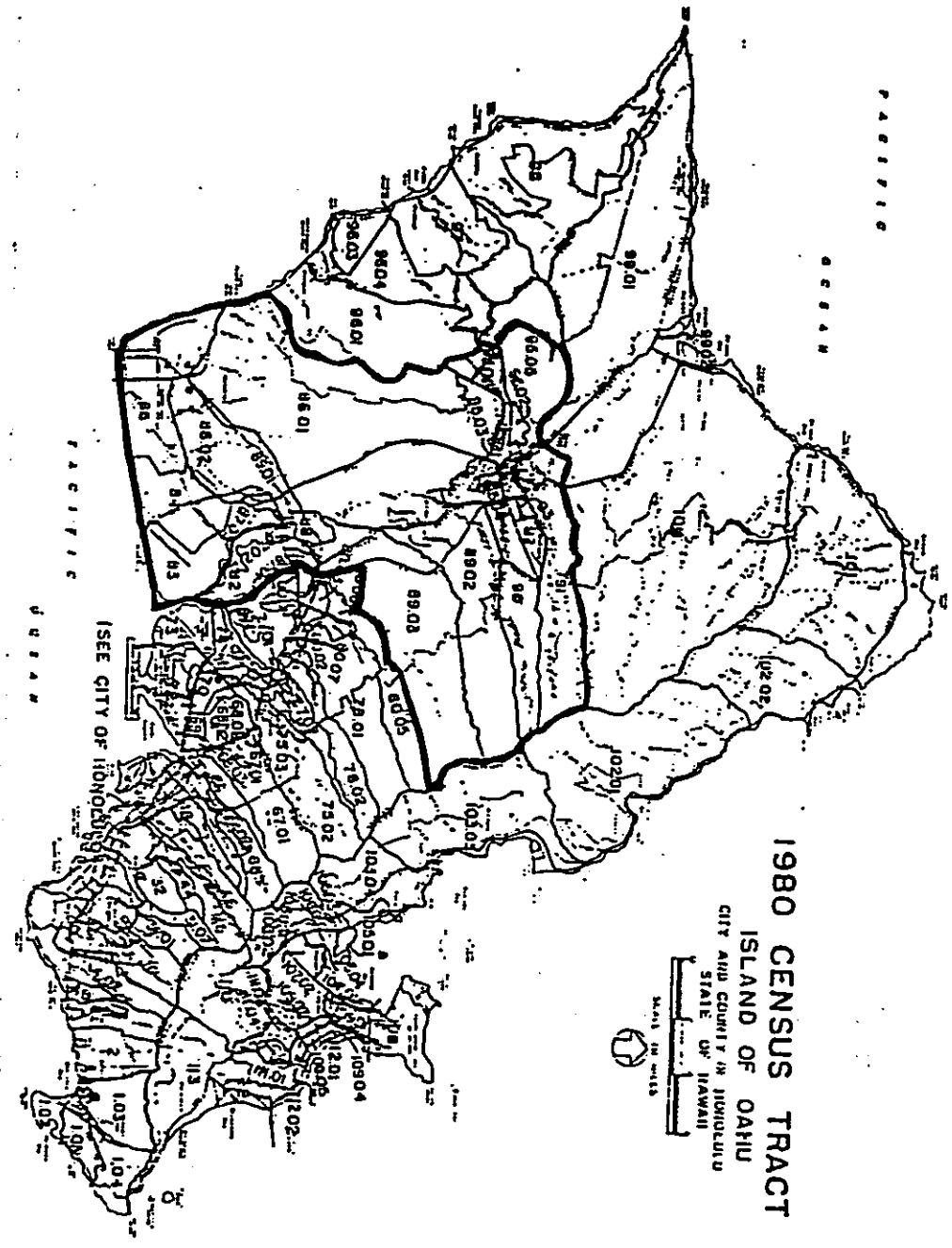
KAPOLEI KNOLLS, EWA, OAHU
Demographic, Economic and Housing Impacts

INTRODUCTION

The Lusk Company wishes to rezone some 79.5 acres of land from agriculture to residential use. This area will be used to construct approximately 500 residential units. The objective of this study is to analyze the proposed project located in Ewa, Oahu (TMK: 9-1-16: por. 4), with respect to the area's demographic, economic and housing impacts for incorporation into an application for Development Plan Amendment and an Environment Impact Statement for the proposed project.

The proposed development will consist primarily of 3 bedroom/2 bath and 4 bedroom 2-1/2 bath single-family units. The proposed development is a part of Campbell Estate's Secondary Urban Center Master Plan. The concept of the Secondary Urban Center was adopted by the Honolulu City Council and incorporated into the General Plan in 1977 to develop a generally self-contained community supported by urban facilities and services needed by business and community residents.

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 Ewa Development Plan Area, which includes Census Tracts 83 to 86, and the Central Oahu Development Plan Area, Census Tracts 87-95.



INTENDED MARKET

For the proposed project, the intended market will include buyers of 500 residential units comprised of largely single-family detached dwelling units. The units will be of 3 bedroom/2 baths and 4 bedroom/2-½ baths.

Based on the type of housing units and at an average 1987 price range of $160,000 proposed by the Lusk Company, the intended market would be probably be "step-up" buyers with dual wage-earners composed of small, combined households or the "starter-family" types, upgrading their housing from their current residential or apartment units.

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, 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	Ewa	Central Oahu
1950	8,958	26,451
1960	16,449	47,838
1970	24,087	67,580
1980	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 Ewa 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 Secondary Urban Center.

Resident Population Projections

Year	Ewa	Central Oahu	Oahu Total
1985	36,845	116,839	815,300
1990	47,617	123,108	859,300
1995	64,499	127,640	896,900
2000	71,842	134,851	925,700
2005	83,096	139,849	954,500

The two areas will account for about 50 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.

An alternative 5-year forecast based on data provided through CACI, Fairfax, VA., of the primary market area indicates that the Ewa Development Plan Area will exhibit the largest growth through 1992, both in absolute population and households. The alternative forecasts are provided below:

Resident Population Projections

DP Area	1987	1992	Annual Growth
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
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 median age of persons residing within the primary market area was 23.6 years, as compared to 28.1 years for Honolulu County.

For various Development Plan Areas, the 1980 Census and the CACI 5-year age distribution forecats are as follows:

Age of Population Forecast

Age	Ewa			Central Oahu			Oahu		
	1980	1987	1992	1980	1987	1992	1980	1987	1992
0-4	10.8%	10.4%	10.1%	11.0%	9.8%	8.7%	7.9%	7.7%	7.1%
5-11	15.1	13.6	13.3	12.5	13.1	12.9	10.5	10.2	10.2
12-16	10.3	9.8	8.9	7.9	8.4	8.6	8.0	7.2	6.9
17-21	10.5	9.3	8.9	12.8	10.2	8.9	10.7	8.9	8.4
22-29	16.5	14.5	13.8	18.8	15.0	12.7	16.7	14.2	12.5
30-44	22.1	25.1	24.0	20.2	24.6	25.1	20.6	24.6	25.1
45-54	7.3	8.6	11.1	7.6	8.1	10.2	9.8	9.5	11.3
55-64	4.4	4.9	5.6	5.2	5.9	6.0	8.5	8.6	8.1
65+	3.0	3.9	4.3	4.0	4.9	5.7	7.3	9.2	10.4
Median Age	23.6	25.8	27.1	24.1	26.5	28.1	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 Ewa was dominated by the "Asian and Pacific Islander" group, contained within the "Other" group, based on the 1980 Census. The "Caucasian" or "White" ethinic group was next dominant. The 1980 distribution is summaried below:

Ethnic Distribution

Ethnic Group	Ewa	Central Oahu	Oahu
White	42.0%	32.9%	33.1%
Black	2.1	6.5	2.2
Other	55.9	60.7	64.7

Household Size

The 1980 Oahu average household size was 3.15 persons. The Ewa area's average household size in 1980 was 3.87 persons, and Central Oahu's was 3.58. The significantly lower percentage of single person households Oahu-wide 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. Ewa is not expected to noticeably 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 will shift from a 3.12 persons per household in 1987, to a somewhat smaller 3.0 household size in 1992.

Household Income

In 1979, more than two-thirds of the households living within the Ewa area had reported incomes less than $25,000. In comparison, less than 60 percent of the Oahu's families had incomes within that range. The general distribution is provided below:

Household Income

	Ewa	Central Oahu	Oahu
Under $25,000	67.5%	60.4%	58.8%
$25,000 - $49,999	30.6	34.5	32.6
$50,000 or more	1.9	5.0	8.5

Overall, the median household income in 1979, was $19,485 for Ewa, $20,186 for Central Oahu and $21,123 for Oahu. In contrast, the family income medians were $19,281, $21,247, and $23,579 respectively.

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. 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 resident population of Ewa is projected to grow from an estimated 36,800 in 1985 to 71,800 in 2000. The proposed project will cause the in-migration of approximately 500 new households, or 1,700 to 1,900 persons. By itself, the proposed project will have a impact on the market area. However, within the context of the developing Secondary Urban Center, the impact of such a project would be mitigated by the development of the necessary infrastructure and ancillary services to support the anticipated population growth in that area.

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 industry 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)

			Diversified Agriculture	
Year	Sugar	Pineapple	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)

	Oahu Authorizations			State
Year	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 authorizations have been growing a healthy 18 percent since 1983.

For the years ahead, 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
1986-1990	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-P 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

Forecast

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.

Regional Employment

Based on previous studies conducted on behalf of Campbell Estate for the Ewa area, the development of the Secondary Urban Center will provide a significant number of new jobs for the labor force within the primary market area, as well as Oahu as a whole. It was estimated by Kenneth Leventhal & Company, that by the year 2005 there would be between 22,000 to 34,300 new jobs within the Ewa area. In a study by Community Resources, Inc., it was estimated that between 27,900 to 52,000 new jobs would be

created within the Ewa and Central Oahu areas due to the development of the Secondary Urban Center. A summary of the findings are provided below:

Leventhal's Employment Forecasts

Period	Low Range	Mid Range	High Range
1986 - 1990	9,732	10,322	12,115
1991 - 1995	14,272	16,128	21,863
1996 - 2000	18,567	21,411	28,742
2001 - 2005	21,992	26,170	34,315

Community Resource's Forecasts

Period	Planned Projects	Proposed Projects	Total
By 1993	14,285	9,180	23,456
By 1998	22,415	14,570	36,985
Ultimate Total	27,875	24,088	51,963

These forecasts were based upon the various projects which are anticipated to be in operation, including Ko Olina, Mililani Technology Park, Waikele Retail/Office/ Industrial Center, St. Francis/West Hospital, etc.

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.

Using various estimates provided by Lusk Hawaii, the approximate public revenue effects of the proposed development was calculated. The major assumptions made included the following:

1. The 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 $95,000 per unit.

3. Direct labor costs would be about one-third of sales revenues.

4. The average absorption rate for residential sales will be 8 units per month.

Using these assumptions, an estimate of the $8.5 million public revenues, by source, that could potentially accrue to the state and local governments was calculated. The various totals are given below:

General Excise Taxes
- Construction.....$1.9 million
- Residential Sales..... 3.2 million
- Personal Consumption..... 0.5 million

Income Taxes
- Corporate
  - Construction..... 0.3 million
  - Residential Sales..... 0.5 million
- Personal..... 2.1 million

Over the longer-term period, it is estimated that the City and County of Honolulu would accrue approximately $300,00 per year in additional property tax revenues due to the rezoning and revaluation of the subject property.

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.

Studies by Kenneth Leventhal & Company indicate that by the year 2005 there will be 22,000 - 34,300 new jobs in the Ewa area.

The project will contribute short-term employment and economic growth. The project, being an integral part of the overall Secondary Urban Center Master Plan, will provide a necessary portion of the community support in terms of needed housing within the primary market area, as well as the entire Island of Oahu.

HOUSING IMPACTS

Housing Supply and Demand

Housing Supply

Despite mortgage rate improvements during the previous year, the Bank of Hawaii's Construction in Hawaii 1987, reported that building permit 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 (Permits Issued)		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

Year	Single-Family House (sq.ft.)	Single-Family Price ($)	Multi-Family Living Area (sq. ft.)	Multi-Family Price ($)
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 increased.

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 single-family residential units within the various price ranges. In addition, the John Child & Company Inc. Market Assessment for West Loch Estates dated September, 1987, indicated that the current inventory of residential units within the Ewa and Central Oahu areas are minimal, as shown below:

Current Inventory in Major Projects

Project/Type	Units	Price Range
Mililani		
Single Family	506	$115,000 - 316,000
Multi-Family	330	78,000 - 160,000
Village Park		
Single Family	231	135,900 - 145,200
Makakilo		
Single Family	96	140,000 - 223,000
Multi-Family	24	78,000 - 134,000

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

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

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	Ewa	Central Oahu	Oahu
Less than $10,000	- 1.7%	- 2.1%	- 1.4%
$10,000 - $14,999	- 2.5	- 2.4	- 2.0
$15,000 - $24,999	- 0.3	0.7	- 0.5
$25,000 - $34,999	1.1	0.9	0.5
$35,000 - $49,999	2.1	0.1	0.3
$50,000 - $74,999	7.3	4.4	3.1
$75,000 and up	18.9	12.5	7.6
Median Income	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, in favor of owner-occupied units. This has increased the latent demand for owner-occupied housing. As stated by the Leventhal Report, "...there are a substantial number of Oahu renter households that are currently deterred from home ownership by high home prices. ..." Leventhal estimated that by the year 2000 there would be approximately 22,300 renters who would want to purchase their homes. A detailed summary of latend demand on Oahu is given below:

Income Range	Houses Afforded SF	Houses Afforded MF	1990	1995	2000
0 -$13,605	($37,167)	($34,064)	7,940	8,288	8,554
13,605 - 15,305	37,167	34,064	1,197	1,249	1,290
15,305 - 17,006	41,813	38,322	1,216	1,269	1,310
17,006 - 18,707	46,459	42,580	1,204	1,257	1,297
18,707 - 20,407	51,103	46,828	846	883	911
20,407 - 22,108	55,750	51,096	873	912	941
22,108 - 23,809	60,396	55,354	794	829	856
23,809 - 25,509	65,042	59,612	794	829	856
25,509 - 27,210	69,688	63,870	691	721	744
27,210 - 28,910	74,334	68,128	519	542	559
28,910 - 30,611	78,980	72,386	480	501	517
30,611 - 32,312	83,626	76,644	365	381	394
32,312 - 34,012	88,271	80,902	365	381	394

34,012 - 35,713	92,917	85,160	341	356	368
35,713 - 37,413	97,563	89,418	175	182	188
37,413 - 39,114	102,209	93,676	175	182	188
39,114 - 40,185	106,855	97,934	175	182	188
40,185 - 42,515	111,501	102,192	217	227	234
42,515 - 44,216	116,147	106,450	217	227	234
44,216 and up	116,147	106,450	2,146	2,240	2,312
Totals			20,732	21,639	22,334

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 in maintaining an inventory of affordable housing.

Based on the report by John Child & Company, units planned for under $120,000 would probably be minimal based on the proposed projects which were listed. A summary of the surveyed projects are provided below:

Proposed Residential Projects, Ewa and Central Oahu

	Project	Units	Price Range
Ewa			
	West Loch Estates	1,500	$130,000 -$190,000
	Soda Creek	413	N.A.
	Makakilo	3,000	119,000 - 190,000
	Kapolei Village	4,000	130,000 - 150,000
	Puuloa Estates	300-330	N.A.
	Ewa Marina	4,850	N.A.
	West Beach	9,200	N.A.
	Ewa by Gentry	7,000-8,000	135,000 (ave.)
	Ewa Town Center	N.A.	N.A.
Central Oahu			
	Mililani Mauka	5,630	118,000 - 280,000
	Waikele	8,000	130,000 - 200,000
	Village Park	3,480	120,000 - 195,000
	Waiawa Ridge	8,000	130,000 - 140,000

Impact Assessment

The current inventory of housing units within the Ewa and Central Oahu area is minimal. Construction activity over the next 3-5 years should provide a continued minimal supply of new residential units, especially the larger, 2-bedroom and over units.

The City projects a shortage of 46,000 dwelling units by the year 2005 which includes a shortfall of 8,000 units in Ewa and 10,600 units in Central Oahu.

As concluded by Leventhal, "[t]here is [a] significant latent demand from portions of current and future renter households that would purchase a home if enough homes were offered at affordable prices." Also, the future "step-up" and new homeowners, other than those in the latent demand category, would also add to the overall market demand in the area.

However, additions to the supply of "affordable" housing units would probably be practical through multi-family residential developments, based on the "affordable" income ranges illustrated above and the price ranges of housing units in the current inventory of residential units.

Based on the foregoing analysis, there is an adequate potential market for the proposed residential units. Additional housing within the primary market area is needed. The market should absorb the 500 additional housing units proposed by the developer. These proposed units will alleviate the pent-up demand for housing within the planned Secondary Urban Center.

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APPENDIX A

DEMOGRAPHIC FORECAST REPORTS

1980 Census, 1987 Update and 1992 Forecasts

Ewa, Central Oahu and Oahu

Source: CACI, Pairfax, VA, Pacific Economic Systems Consultants, and Environment Capital Managers.

APPENDIX

DEMOGRAPHIC FORECAST REPORTS
1980 Census, 1987 Update and 1992 Forecasts
Ewa, Central Oahu and Oahu

CT 83-86 EWA	1980 CENSUS	1987 UPDATE	1992 FORECAST	1987-1992 CHANGE	ANNUAL GROWTH
POPULATION	36234	41911	45515	3604	1.7%
HOUSEHOLDS	9139	10638	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	4.08	4.08	0.00	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	18.5	859	8.1	788	6.8
$ 10000-14999	1412	15.5	1116	10.5	985	8.5
$ 15000-24999	3061	33.5	2273	21.4	2242	19.3
$ 25000-34999	1943	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	1560	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	112770	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 $	25706 $	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	11093	9.8	10388	8.7
5-11	12664	12.5	14829	13.1	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	12165	10.2
55-64	5215	5.2	6694	5.9	7166	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	7893	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	253966	266908	12942	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	9009.9	10207.9	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	$ 33946	$ 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	41974	15.7
$ 35000-49999	33468	14.5	49127	19.3	49972	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 F

Agricultural Significance of the Lands in the Proposed Lusk Hawaii Kapolei Project Development

by

Evaluation Research Consultants

January 1988

AGRICULTURAL SIGNIFICANCE OF THE LANDS IN THE PROPOSED LUSK HAWAII KAPOLEI PROJECT DEVELOPMENT

January 1988

prepared by

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ENVIRONMENTAL COMMUNICATIONS, INC.

Agricultural Significance of the Lands in the Proposed Lusk Hawaii Kapolei Project Development

The proposed development involves 79.5 acres located on the Leeward side of Oahu on the Ewa plain. The property is bounded on the mauka side by the H1 Highway and on the makai side by Farrington Highway. It is located on the Honolulu side, but not adjacent to, Makakilo Drive. The majority of the lands, 55 acres, are currently planted to sugarcane. This cane is drip irrigated and scheduled to be harvested in April of 1988. Expected yields are 14.25 tons of sugar per acre.

The significance of the subject lands as part of the agricultural resources of the State of Hawaii can be evaluated by examining the potential uses of the land. These uses are determined by three sets of factors: (1) the physical, agronomic and environmental characteristics of the land; (2) economic variables such as the existence and location of markets for goods that can be feasibly produced on the land, the cost of inputs required to grow the goods, and the supply of similar products from other sources; and (3) the current and future demand of agricultural producers for land having the physical, environmental, agronomic, and economic characteristics of the subject lands.

Briefly, the majority of the subject parcel consists of fairly flat to gently sloping terrain with some steeper portions where the slope reaches 20 percent, elevation ranges between 100 and 200 feet; the prevailing winds are brisk to gentle, averaging 5 mph from the northeast; the area is exposed to long hours of direct sunlight for the greater portion of the year; rainfall averages between 15 and 20 inches rain per year, falling mainly between November and April, and the summers are hot and dry. Supplemental irrigation and windbreaks are required for most crops. The location is important agriculturally in that it is located on the same island as the major market in the State.

Soils found in the parcel include Molokai Silty Clay Loam (Mu), Ewa Silty Clay Loam (Ew), and smaller areas of Lualualei stony clay (LvA), stony steep lands, and gulches. The Molokai and Ewa soils are found on the productive portion of the parcel. The Molokai soils are a silty clay loam deposited over a substratum of soft weathered rock and the Ewa soils consist of alluvium deposited over coral limestone and consolidated calcareous sand. Stones are common in the surface layer and in the profile. These soils are deep, of moderately fine to fine texture, well drained, and of moderate to good machine

tillability.

The agricultural potential of the subject lands can be examined in terms of several different indices of productivity compiled by State of Hawaii and Federal agencies. The portion of the subject lands currently used for sugar, approximately 35 acres, are designated "Prime Agricultural Lands" by State of Hawaii Department of Agriculture except for a very small amount of "Other Important Agricultural Lands." The "Prime" designation means that the property has all the physical and climatic conditions which permit sustained high yields under economically advantageous operating conditions. Such lands are characterized by high yields with relatively low costs and little risk of damage to the physical environment. The category of "Other Important Lands" exhibits production problems such as flooding, erosion, etc. that require greater production costs, such as more drainage, more fertilizers, etc., and result in reduced yields.

The lands in sugar production were given a productivity ratings of "A" and "B" by the Land Study Bureau (LSB) if irrigated. Land Study Bureau ratings range from A to E with A being the highest or most productive. The crop capability classifications assigned by the Soil Conservation Service ranged from I to IV. Soils with a classification I have few if any limitations, II implies some limitations due to slope, shallowness, unfavorable texture, stoniness, or low water holding capacity, III implies severe limitations, and IV very severe limitations. For the subject parcel, the limitation in the Molokai soils is due to slope and the potential for erosion and in the Ewa soils the limitation is due to stoniness in the surface layers.

In terms of the proposed Land Evaluation Site Assessment (LESA) classification these lands have Land Evaluation (LE) ratings ranging from 59 to 90. The LE ratings vary between 12 and 96, the implication being that the higher the rating, the greater the production potential of the parcel. The LE ratings provide a summary of all the productivity ratings. In fact, the LE rating is a weighted average of five different productivity indices, including the three discussed above. All four of the ratings as well as the estimated acreage are summarized in Table 1.

All of the above productivity measures are based on irrigated production and assume that good water is available. If irrigation water was not available, the lands would not be productive. For example, all the LSB ratings would decline to E, the lowest possible score.

Table 1. Productivity Indices and Estimated Acreages

Soil Type	SCS	ALISH	LSB	LESA	Estimated Acres
MuA	I	Prime	A	90	16
MuC	IIIe	Prime	B	81	25
MuD	IVe	Other Important	D	59	1
EwA	IIs	Prime	B	85	22
Gulches	VII	NA	E	15	15

Mu - Molokai Silty Clay Loam
Ew - Ewa Silty Clay Loam
SCS - Soil Conservation Service classification
ALISH - Agricultural Lands of Importance to the State of Hawaii
LSB - Land Study Bureau
e - Limitations due to potential erosion
s - Limitations due to stoniness

The agricultural significance of the subject lands can be examined in terms of the total amount of existing lands of similar quality. The subject lands constitute a very small percentage of such lands. The subject lands with a rating of "Prime" are about 0.1 percent of the "Prime" lands on Oahu and the entire parcel is less than 0.1 percent of lands on Oahu rated "Other Important" or "Prime" (see Table 2). The acreage in question that has productive potential is also insignificant when viewed as a percentage of the lands currently being used for crop production. Currently 40,700 acres are being used for crop production on Oahu (Table 3) and thus the subject parcel represents about 0.13 percent of the lands currently cropped on Oahu. In terms of its current use, the subject lands account for about 0.2 percent of the sugarcane lands on Oahu.

Table 2. Inventory of Agricultural Lands: Subject Property, Oahu and State, By ALISH Classification

	Subject Property	Oahu	State
Prime	63	55,563	304,310
Unique	0	9,006	31,320
Other	1	29,990	642,544

Agricultural lands of similar or better quality are are not scarce. Such lands are found throughout the State. As of 1986, 261,200 acres in Hawaii were used for crop production (including sugarcane and pineapple). This is 53,300 acres less than were used for crop production in 1969. See Table 3. Since 1967, the total acreage used for crop production on Oahu has decreased by 18,600 acres to the current level of 40,600 acres (as of 1986).

Table 3. Crop Production Acreage in Hawaii and on Oahu, 1961 - 1986

Year	State				Oahu			
	Sugar-cane	Pine-apple	Other Crops	All Crops	Sugar-cane	Pine-apple	Other Crops	All Crops
	(1,000 acres)							
1961	227.0	74.0	15.2	316.2	34.2	22.0	2.4	58.6
1962	228.9	72.0	14.9	315.8	35.2	21.7	2.2	59.1
1963	231.3	69.0	14.5	314.8	35.8	21.5	1.9	59.2
1964	233.1	65.0	15.6	313.7	35.8	18.5	1.9	56.2
1965	233.6	65.0	16.4	315.0	36.0	19.0	1.9	56.9
1966	235.4	65.0	18.1	318.5	36.5	19.0	2.3	57.8
1967	237.2	65.0	19.4	321.6	37.8	19.7	1.8	59.3
1968	238.9	65.0	19.5	323.4	38.1	18.8	1.8	58.7
1969	241.4	64.0	19.4	324.8	37.5	18.8	1.7	58.0
1970	237.9	64.0	19.4	321.3	35.5	17.4	1.7	54.6
1971	232.1	60.9	22.9	315.9	32.4	17.4	2.0	51.8
1972	229.6	58.1	22.0	309.7	32.7	15.5	2.2	50.4
1973	226.1	57.5	25.0	308.6	32.7	15.5	3.0	51.2
1974	224.2	55.0	24.4	303.6	33.5	15.5	2.9	51.9
1975	221.4	50.0	26.7	298.1	34.3	15.5	3.2	53.0
1976	221.6	48.0	26.4	296.0	34.3	15.5	4.8	54.6
1977	220.7	45.0	27.4	293.1	34.2	13.0	3.5	50.7
1978	220.7	43.0	27.7	291.4	34.0	12.0	3.1	49.1
1979	218.8	44.0	28.0	290.8	33.6	12.0	3.5	49.1
1980	217.7	43.0	30.7	291.4	33.1	11.5	3.3	47.9
1981	216.1	41.0	33.2	290.3	32.7	11.0	4.4	48.1
1982	204.8	36.0	38.0	278.8	29.2	11.5	2.6	43.3
1983	194.3	36.0	41.2	271.5	27.2	11.5	3.6	42.3
1984	188.4	35.0	42.7	266.1	26.4	11.8	2.8	41.0
1985	187.9	34.5	42.6	265.0	27.1	11.5	2.7	41.3
1986	184.3	36.0	40.9	261.2	25.9	12.0	2.8	40.7

Source: Statistics of Hawaiian Agriculture, Hawaii Agricultural Reporting Service, various issues.

Potential Agricultural Uses

Even after subtracting the past conversions of crop land to urban usages and the projected increases in agricultural land use on Oahu in the year 2015 based on the projections in the LESA commission report, there are over 13,000 acres of land suitable for crop production not currently in production on Oahu (see Table 4). If more sugarcane lands become fallow, this number will increase.

Based on the physical, agronomic, and environmental characteristics of the subject parcel previously discussed, in combination with the history of crop production in Hawaii, the best agricultural use of the land is for the production of sugarcane. Besides sugarcane, the following 16 vegetable crops and 7 fruit and nut crops can be considered to have agronomic potential on the

subject lands: bittermelon, cucumbers, edible podded peas, eggplant, green peppers, green or snap beans, green onions, green peppers, lettuce (semi-head types only), oriental gourds, pumpkin and winter squashes, squash (zucchini), sweet corn, tomatoes, watermelon, avocado, bananas, guavas, limes, yellow passion fruit, macadamia nuts, and papaya. Root crops such as ginger root, potatoes, and onions will grow in this area but and not feasible because of the rocky soils. Forage, horticulture, and seed production are also agronomically possible. All of these activities, however, only have potential is adequate amounts of good water are available.

Table 4. Supply and Availability of Crop Lands

	State	Oahu	Neighbor Islands
Acreage Released from Crops	63,600	18,600	35,000
Converted to Urban Use[1]	6,250	4,350	1,900
Available	52,350	14,350	33,100
Projected Increase in Ag. Demand for Land[2]			
Year			
1990	6,423	-350	6,773
1995	14,089	453	13,636
2000	20,177	643	19,533
2005	26,396	834	25,562
2015	39,241	1,219	38,022

[1]Oahu total includes: Mililani 1,800 acres; Waipio Gentry 600 acres; H-2 50 acres; Waikele 500 acres; West Beach 300 acres; Waitec 550 acres; Miscellaneous 550 acres. Sugarcane withdrawals for the Pearl City area were largely compensated for by new plantings and are therefore excluded. State total is an estimate based on urbanization trends on the Neighbor Islands.

[2]Based on projected production goals in the LESA Commission Report, February 1986. The base year is 1983. The 1990 and 1995 acreages are taken from the LESA report. The data for 2000 to 2015 are based on the rate of increase implicit in Tables 2 and 3 of the LESA report. The increase in acreage reported above includes the projected increase in all agricultural land use (not just crops), except aquaculture. The most promising aquaculture activities are either brackish or saltwater systems, and these are not appropriate uses for good cropland, particularly if the lands overlay freshwater reserves.

However, agronomic potential (the crop will grow) and economic potential (the crop can be grown for a profit) are not the same. Some of the crops listed have been tried and found to be unprofitable, either because of high production costs, lack of markets, or the availability of less expensive

imports. Also, some of the crops that can be grown in the Ewa area could be grown elsewhere in the State more profitably.

The subject property has some economic advantages in the production of fruit and vegetables relative to other areas in the State. The primary advantage is that it is close to the principal market in Hawaii and to transportation links to overseas markets.

There are factors, however, which limit the economic potential of this area for the production of fruit and vegetables. One is the cost and supply of water. Most crops require about 5 acre feet of water per year (equivalent to 4,500 gallons per day per acre of crop), although some, such as daikon, sugarcane, and perennial crops, require more. If water were purchased from the City and County of Honolulu under current agricultural rates, 5 acre feet would cost $1,126, and this does not include delivery to the field.

Another set of factors limiting the growth of diversified agriculture relate to the size of the local market and the difficulties the State has experienced in developing crops for export. These factors are discussed below.

Evaluation of Potential Fruit and Vegetable Crops

Crops produced in Hawaii can readily be separated into two groups -- those that are produced for export and those that are produced for local consumption. In terms of crops that have export potential, papaya, guava, passion fruit, and macadamia nuts can all be produced on lands similar to the subject lands. However, papaya is the only export crop likely to economically feasible on the subject lands and then only if the problems with mosaic virus can be overcome. Recent trial planting of papaya on the Ewa plains near Campbell Industrial Park and on fallowed sugarcane lands in Palehua failed due to the virus infestation.

Passion fruit is uneconomical to produce because of the high cost of installing trellises. The market for guava is beginning to grow and new planting are planned on the Big Island. However, it is still too soon to recommend increases in commercial planting. Also, any increases in plantings are more likely to occur proximate to existing plantings in order to take advantage of existing processing facilities. Macadamia nuts can be produced more profitably elsewhere in the State. Production in Ewa would require irrigation and the nuts would have to be shipped off-island for processing or a processing facility would have to be constructed.

Several vegetable crops which are imported in great quantities are not

climatically suited for production in Ewa because they require cool temperatures for good quality and profitable yields. The following crops would be unsuitable for that reason: chinese head cabbage, head cabbage, carrots, cauliflower, celery, head lettuce, romaine lettuce, and potatoes. The good storage, long-day and medium-day length onions are also not suitable because they require longer day lengths for proper growth and curing. The high incidence of insect and disease infestations limit the feasibility of producing summer squash and melons except for zucchini and watermelon.

The fruit and vegetable crops which show some potential for commercial production in the Ewa area are listed in Table 5. Also given in Table 5 are the quantities of the product or similar products sold in the Honolulu wholesale market in 1986. These quantities provide a crude estimate of the current demand for these products. The estimates are crude because the data for Honolulu are for aggregates of similar products. For example, all types of bulb onions are listed as "dry onions" and both oriental and American types of cucumbers are listed as "cucumbers." These quantities thus will overestimate the demand for local products since local products are not identical to all imports.

The next three columns of Table 5 provide information on market conditions that can be used to estimate the potential demand for increased production of the crops. The third column lists the percentage of the goods sold in the Honolulu market which are supplied from in State sources. When local production already supplies the entire market, any increase in production via additional planting will have two immediate effects: (1) the price of the product will fall, making it less profitable or unprofitable to produce; and (2) production elsewhere in the State will decline. That is, there will be a shift in production patterns from regions currently producing the crop to new regions. The total impact of the new planting would be a decrease in the profitability of existing operations and a resulting reduction in scale and a shift in production to the new plantings. The following crops listed in Table 5 fall into this category: eggplant (long), green or snap beans, green onions, semi-head lettuce, oriental squash, and bittermelon.

TABLE 5. Agronomically Feasible Crops

Crop	Honolulu Demand (1,000 pounds)	Percent of Demand Met by Local Production	Maximum Percent of Monthly Local Demand Met by Local Products	Number of Months When Local Products Exceeds 70% of the Market
Crops for the Local Market				
Avocados	1,594	67	83	3
Bananas: Apple	802	100	100	12
Bluefield	56	100	100	12
Chinese	15,190	28	42	0
Beans, Green	881	64	100	7
Bittermelon	153	95	100	11
Corn, Sweet	695	23	100	0
Cucumbers	3,757	48	76	2
Eggplant: Long	557	98	100	12
Round	369	52	77	3
Lettuce, Semi-head	1,242	100	100	12
Limes	595	7	14	0
Onions: Dry	13,854	3	11	0
Green	832	80	87	12
Peas, Chinese	326	1	5	0
Peppers, Sweet	2,640	51	66	0
Pumpkins	1,075	7	100	4
Squash: Oriental	422	85	95	12
Italian	1,829	41	68	0
Tomatoes	14,687	26	44	0
Watermelon	12,523	95	100	8
Crops for Local and Export Markets				
Papayas	10,750	100	100	12

Source: Honolulu Arrivals: Fresh Fruits and Vegetables, 1986, Market News Service, Hawaii State Department of Agriculture, April 1986.

For several crops, the impact of new plantings will be similar to the above scenario even if local production is not currently satisfying the local market. For example, crops like tomatoes and some types of cucumbers can only be produced for a profit if they are marketed in the "off-season" when less expensive imports from the mainland and Mexico are not available. Other crops can only be economically produced during certain times of the year. The demand for some products is seasonal also. One example would be pumpkins. Local production satisfies the market except in the month of October. The orange gourds used for Jack-O-Lanterns are different from the pumpkins produced locally and the demand for these is met almost entirely by imports.

An indication of the seasonality of crops and potential demand for new plantings can be obtained by examining the market supply of local production relative to imports on a monthly basis. The fourth column of Table 5 gives the percentage of supply in Honolulu of the aggregate product group during the month when local production represents the largest percentage of supply, and the fifth column gives the number of months when local supply exceeds 70 percent of total market supply in Honolulu. Whenever local supply is greater than about 70 percent of market demand on an annual basis, any increase in supply from local sources can be expected to cause serious price declines. Whenever local production or demand is seasonal and current production provides over seventy percent of demand for some months this is an indication that increases in local production will start to depress prices. This price decrease will make the new planting a less attractive enterprise and reduce the earning for all plantings of the crop -- both the existing and new plantings. Green onions, pumpkins, and avocados are crops which are currently imported in significant quantities. However, increases in planting of these crops would be expected to depress market prices.

The two crops listed in Table 5 with the largest demands in the Honolulu market are tomatoes, and dry onions. Most of the demand for these products is currently met by imports. This, however, does not necessarily imply that there is a substantial potential for expanded local production of these products. The demand datum listed for dry onions includes several different varieties of onions. Most of the onions currently imported are the medium and long day varieties and are priced below what it would cost to produce bulb onions in Hawaii. The demand for locally produced onions, which must have a higher price in order to be profitable, is limited. The potential for increased acreages of bulb onions is therefore limited.

Tomatoes can be a very profitable crop when marketed during the times when imports from the mainland and Mexico are scarce. However, when imports are plentiful and cheap, it is difficult to produce them competitively in Hawaii. Thus, there is some room for expansion in the production of tomatoes. However, the crop would have to be managed so as to produce during the late fall and winter. This is not the best agronomic time to grow tomatoes in Hawaii so yields will be low.

The crops for which there is a potential demand for increased acreage and which can be produced in a region with the physical, agronomic, and climatic characteristics of subject property are listed in Table 6. The second column

gives the additional acreage required to meet the entire Honolulu demand for the broad product group. However, for the reasons stated above, meeting such demand is not likely to be economically viable. The figures in the third column take into account the mix of products contained within each product group, the seasonality of local production and demand, and the availability of low-priced competing products from sources outside the State during portions of the year. These numbers represent estimates of the number of acres that could be planted to the respective crop without significantly depressing prices in the local market.

Table 6. Feasible Crops for Expanded Plantings

Crop	Number of Acres Required to Meet 100 Percent of Honolulu Demand for Product Group	Number of Acres of New Plantings Estimated to be Economically Feasible
Avocados	90	0
Bananas, Chinese	546	382
Cucumbers	39	18
Eggplant, Round	5	1
Limes	54	43
Onions, Green	6	1
Peas, Chinese	22	17
Peppers, Sweet	42	29
Squash, Italian	42	26
Tomatoes	190	20
Watermelons	32	32
Total		579
Total excluding bananas		197

Excluding bananas, the total potential demand for new plantings of crops suitable for lands similiar to the subject parcel is 197 acres. From the viewpoint of the market, there is definitely a potential for increased production of bananas in the State. However, there are better places to produce bananas than Ewa. Banana production in areas such as Ewa would require irrigation. Production costs would be substantially less in areas such as Waianalo (Oahu), the Puna and Hilo regions of the Big Island, and on parts of Kauai.

Currently, there is little or no potential for expanded avocado production. Supplies on the mainland have increased dramatically and prices have declined drastically.

Such lands, however, are not only suitable for the production of fruits and vegetables. They also could be used for the production of floral and nursery products, the production of seed, the production of forage crops and livestock uses.

Floral and Nursery Products. The floral and nursery industry in Hawaii has been expanding rapidly during the recent years. This industry, however, produces a large volume of highly valued products from a very small land area and does not require large acreages. The average size of all floral and nursery operations in the State is under three acres. For these crops, climate is typically more important in choosing a site than land quality. Current expansion of this industry is limited only by market availability and management capability, not by the availability of land. Also, several of the Agricultural Parks being developed make specific provisions for nurseries.

Seed Production. Lands such as the subject parcel are suitable for the production of seed for crops such as corn if adequate irrigation water is available. The demand for land for the production of seed corn and other seeds tends to fluctuate depending on climatic conditions elsewhere in the world. It is difficult to plan on a long term demand for such a use and it appears that sufficient lands are available to meet current levels of demand.

Forage Crop Production. Large amounts of grains are imported into the State as livestock feeds. The production of feed grains has not proven to be economically viable in Hawaii. However, the production of forage crops for green chop has potential. Corn for green chop has been produced on the North Shore of Oahu. The principal potential market for the green chop and other forage crops on Oahu is the dairy industry. However, if forage could be produced cheaply enough, the feedlot in Campbell Industrial Park is also a potential user.

The subject property is well-suited for the production of forage crops if sufficient amounts of low-cost water are available. However, for the production of forage for green chop in the Ewa region to be an economically viable activity it should be located as close to the potential users as possible as forage for green chop is a very bulky product and thus expensive to transport. Most commercial forage operations are on lands adjacent to the place where the forage will be used. The current and potential users of green chop are the feedlot at Barbers Point and the dairies in Waianae and on the North Shore. Given the location of the parcel, the dairies are probably too far away to be viable users.

Livestock. The fields in Ewa could be used for the production of livestock. The production of swine and poultry, however, do not require large acreages and would not be limited if the subject lands were not available. The lands could also be used for grazing. However, grazing is a very extensive use of land and returns per acre are very low. The beef industry in Hawaii has been relatively stagnant during the past decade and is having a hard time competing with imported meat. Also, with the new feedlot and processing facilities in Hamakua, any likely expansion in the beef industry is most likely to occur on the island of Hawaii.

CONCLUSION

IT IS NOT THE AVAILABILITY OF LAND THAT IS LIMITING THE EXPANSION OF THE CROPS LISTED IN TABLES 5 AND 6, BUT RATHER THE SIZE OF THE MARKET FOR LOCALLY PRODUCED CROPS. The de facto population of the entire State is only slightly more than a million persons and in the principal market area (Oahu), the de facto population is only 825,000 persons. This is a very small market and it does not require substantial acreage to supply such a market, particularly when many popular foods either require temperate climatic conditions not found in Hawaii or can be produced more profitably elsewhere and imported for less than it costs to produce them locally.

The subject lands have the agronomic potential to be productive agricultural lands. However, due to market parameters, the declining importance of the sugar industry, and the availability of similar lands on Oahu, taking the subject lands out of agriculture will not have a significant impact on the agricultural sector of Honolulu County or the State. Lands of similar quality and economic potential are currently lying fallow and there are sufficient lands available to meet current and projected future agricultural needs.

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