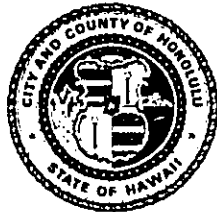


DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

RECEIVED

'96 JAN 23 P12:52

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

96-12-0042

January 22, 1996

Mr. Gary Gill
Director
Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Mr. Gill:


Subject: Kamehameha Highway Drainage Improvements, Final Environmental Assessment (EA), Haleiwa, Oahu, Hawaii, Tax Map Key: 6-6-09: 25 and 26

The City and County of Honolulu, Department of Public Works, has reviewed the comments received during the public comment period which began on April 8, 1993. The department has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the February 8, 1996, OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Should you have any questions, please contact Ms. Laverne Higa of the Division of Engineering at 527-6246.

Very truly yours,


KENNETH E. SPRAGUE
Director and Chief Engineer

Encl.

cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

1995-02-08-0A-PEA - Kamehameha Hwy. Drainage Improvement, Haleiwa FEB 8 1996

FILE COPY

**FINAL
ENVIRONMENTAL ASSESSMENT
FOR
KAMEHAMEHA HIGHWAY
DRAINAGE IMPROVEMENTS
HALEIWA, OAHU, HAWAII**

Prepared for: City and County of Honolulu
Department of Public Works

Prepared by: Wilson Okamoto and Associates, Inc.

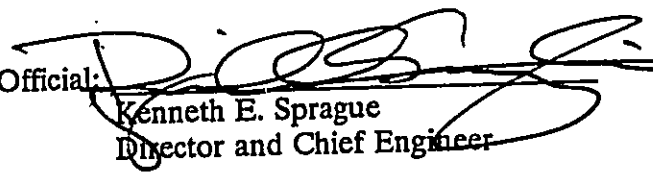
January 1996

FINAL ENVIRONMENTAL ASSESSMENT
FOR
KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS
HALEIWA, OAHU, HAWAII
Tax Map Key 6-6-09: 25 and 27

This environmental assessment was prepared pursuant to
Chapter 343, Hawaii Revised Statutes

Approving Agency: City and County of Honolulu
Department of Public Works

Responsible Official:


Kenneth E. Sprague
Director and Chief Engineer

1/23/96
Date

Prepared by:

Wilson Okamoto and Associates, Inc.
Engineers and Planners
Honolulu, Hawaii

January 1996

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DETERMINATION

This Environmental Assessment (EA) has been prepared pursuant to the requirements of Chapter 343 HRS and Chapter 200 of Title 11 in order to document the environmental effects from the implementation of the Kamehameha Highway Drainage Improvements. The proposed project is an agency action by the City and County of Honolulu Department of Public Works.

No significant adverse impacts are anticipated as a result of the proposed project. Therefore, a negative declaration is determined to be appropriate for the proposed Kamehameha Highway Drainage Improvements project.

Potential short-term impacts are associated with construction activities and include potential impacts on water quality, flora and fauna, noise, air quality, traffic and utilities. These impacts will be minimized by mitigation measures discussed in Section VI Potential Impacts and Mitigation Measures. No adverse long-term impacts are anticipated.

The proposed project will improve drainage conditions and alleviate flooding for residents in the vicinity of the project site.

I. INTRODUCTION**A. Project Location**

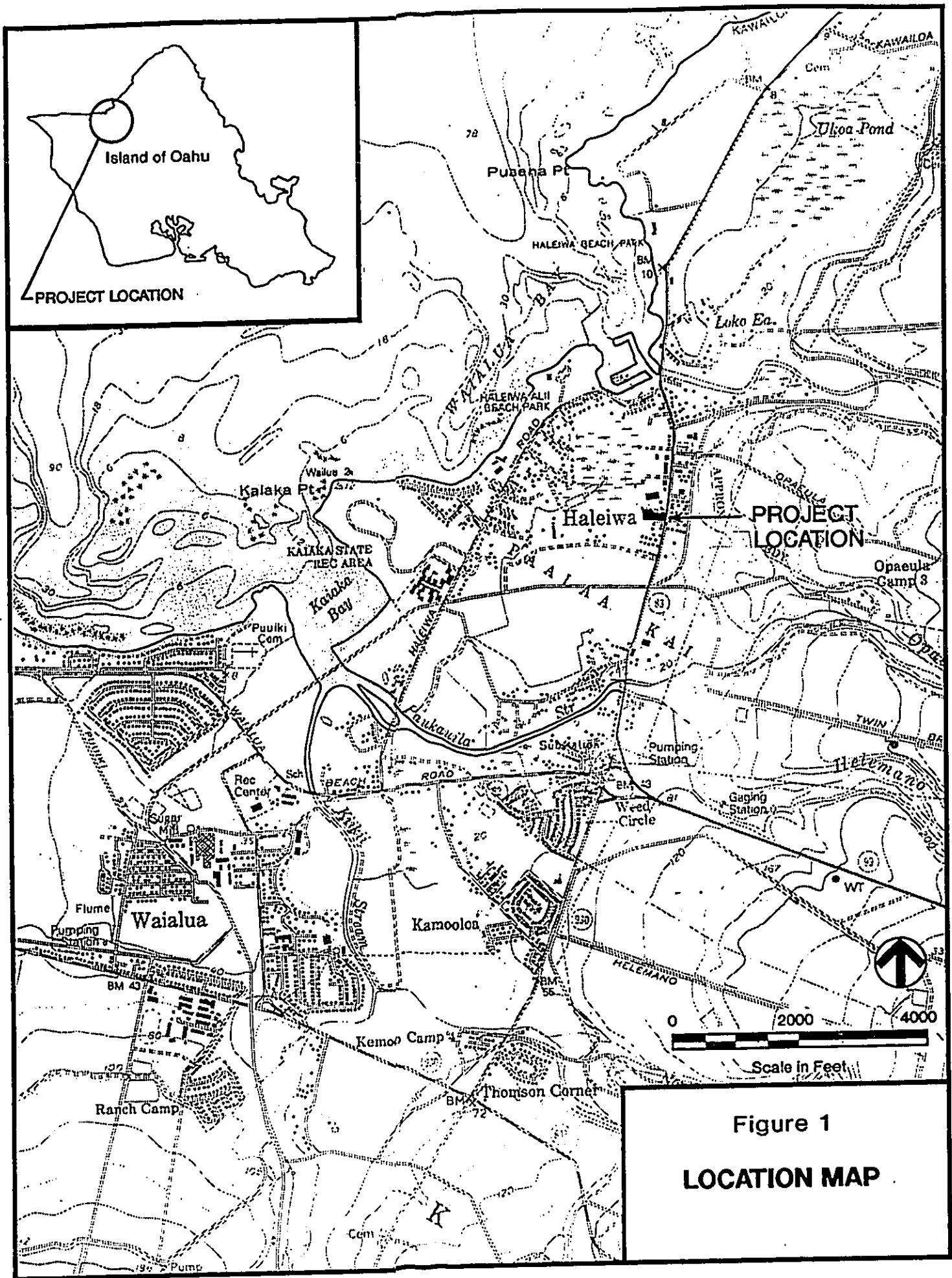
The City and County of Honolulu Department of Public Works is proposing to construct drainage improvements along a 100-foot section of Kamehameha Highway in Haleiwa Town on the North Shore of Oahu (see Figure 1). From the highway, the proposed improvements will extend to the west along the southern boundary of two residential properties, and then discharge runoff into a marshy area behind the residences. The areas affected by flooding occupy Tax Map Key (TMK) parcels 6-6-09:25 and 26 for a total project area of approximately 33,600 square feet or 0.77 acre (see Figure 2). The drainage improvements themselves will occupy an area of approximately 800 square feet.

B. Land Ownership

TMK parcel 6-6-09:25 is owned by John P. Moon and parcel 6-6-09:26 is owned by George and Margaret Kuba. The City owns the portion of Kamehameha Highway which fronts the project site. The City is planning to acquire a 5-foot wide easement along the southern boundary of the two parcels to construct and maintain the drainage improvements. The marshy area behind the residences which will receive the runoff, TMK 6-6-09:2, is owned by Castle & Cooke, Inc.

C. Existing Land Use

TMK parcel 6-6-09:26 is presently the site of a single family residence. Parcel 6-6-09:25 is a flag lot which is occupied by three single-family residences; two along its southern boundary and another to the north.



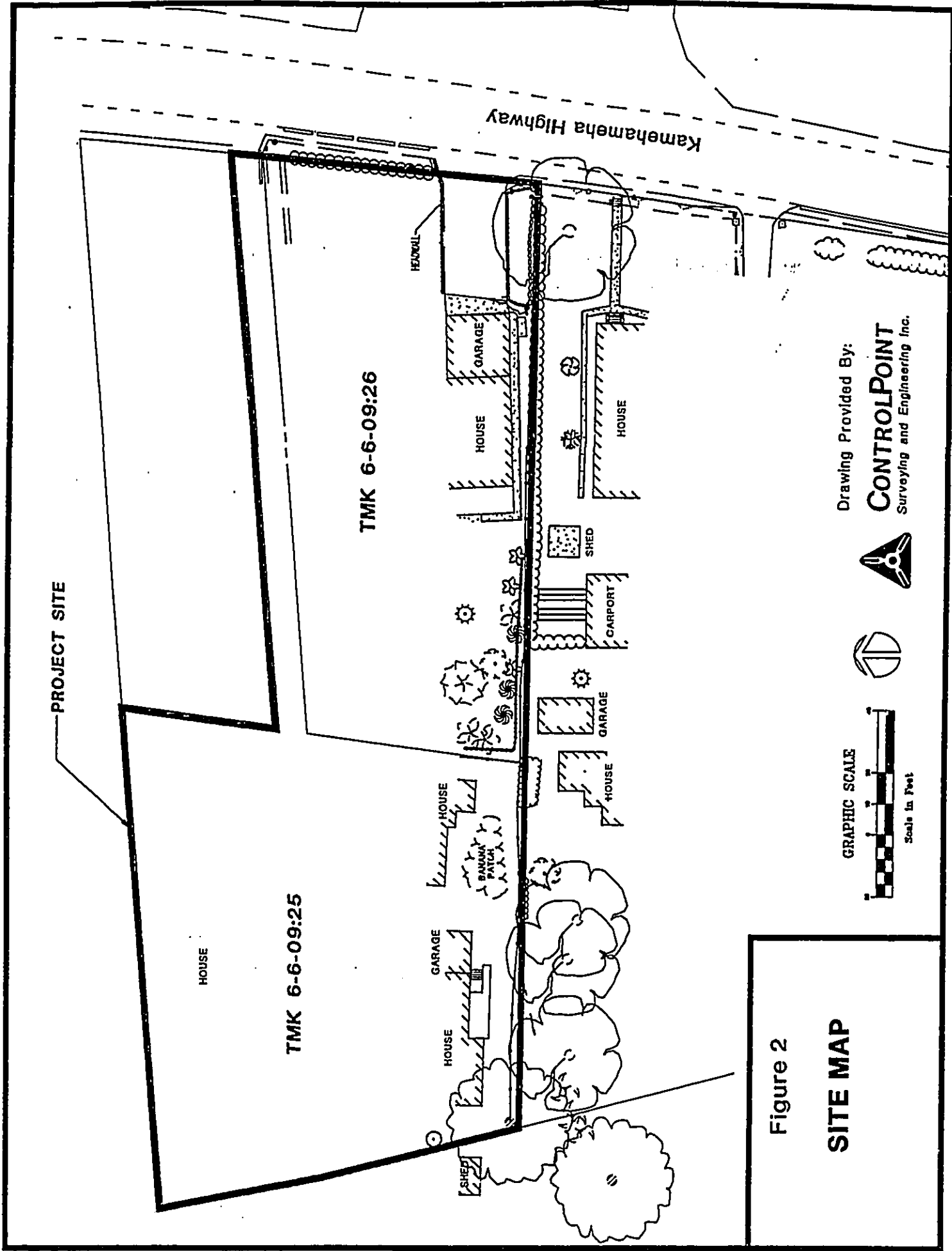


Figure 2
SITE MAP

Drawing Provided By:
CONTROLPOINT
 Surveying and Engineering Inc.



D. Surrounding Land Uses

North of the flag lot driveway is a small commercial establishment. The flag lot shares a property line with the site of the historic Waialua Court House which has been boarded up and is now unused. To the west of the project site is a densely vegetated area known as Haleiwa Marsh. South of the project site are two more residences. Kamehameha Highway forms the project site's eastern boundary, across which are several more commercial establishments which are part of the town of Haleiwa.

II. DESCRIPTION OF THE PROPOSED PROJECT**A. Project Need****1. Current Drainage Conditions**

The town of Haleiwa is subject to heavy rainstorms during the winter season. At present, when these storms occur, runoff from higher elevations to the west flows into town and across Kamehameha Highway, a road without any drainage improvements. The subject property occupies a low spot along this highway. According to residents of the project site, when excess runoff crosses the highway, it pools in front of the Kuba property (TMK 6-6-09:26), then runs down an embankment and across the lot. The garage connected to the house nearest the highway has repeatedly been flooded despite the efforts of the homeowner, who has raised the floor of his carport.

Part of the flow also runs down the Moon property's driveway (TMK 6-6-09:25) until it reaches the flaglot to the rear of the project site. At this point, the flow courses beneath the two houses along the southern property boundary before ultimately draining into a marshy area behind the project site. The structural support of the house closest to the marsh has been undermined by these flows, which have eroded the soil beneath the home's post footings.

2. Recommendations

In order to direct storm runoff away from the affected residences and avoid potential serious property damage, the City and County of Honolulu is

proposing to install a trench drain in front of the property which will collect sheet flows from Kamehameha Highway, direct them via a concrete culvert along the southern boundary of the affected residences, and discharge runoff into the marsh west of the project area.

B. Proposed Project

1. Project Features

The proposed project will consist of a 2-foot wide, approximately 100-foot long trench drain within the City and County of Honolulu's Kamehameha Highway right-of-way in front of the Kuba residence. The trench drain will empty into a 2-foot wide, approximately 300-foot long concrete culvert located along the southern boundary of TMK 6-6-09:26 and 25. The trench drain and the 300-foot long concrete culvert will be covered with metal grating. The City and County of Honolulu will acquire a 5-foot wide maintenance easement for the culvert portion of the project. See Figure 3.

2. Project Construction

An existing chain-link fence on the Kuba property will need to be removed in order to construct the trench drain, and two water meters will need to be relocated. No other interruptions to utilities are anticipated. The sidewalk and existing AC curbs fronting the Kuba property will not be affected, or if they are, they will be returned to their present condition. Project construction will involve the use of a backhoe and other equipment to dig the concrete ditch and trench drains, and a concrete mixer truck to bring ready-mix concrete to the site. Due to the confined space along the southern

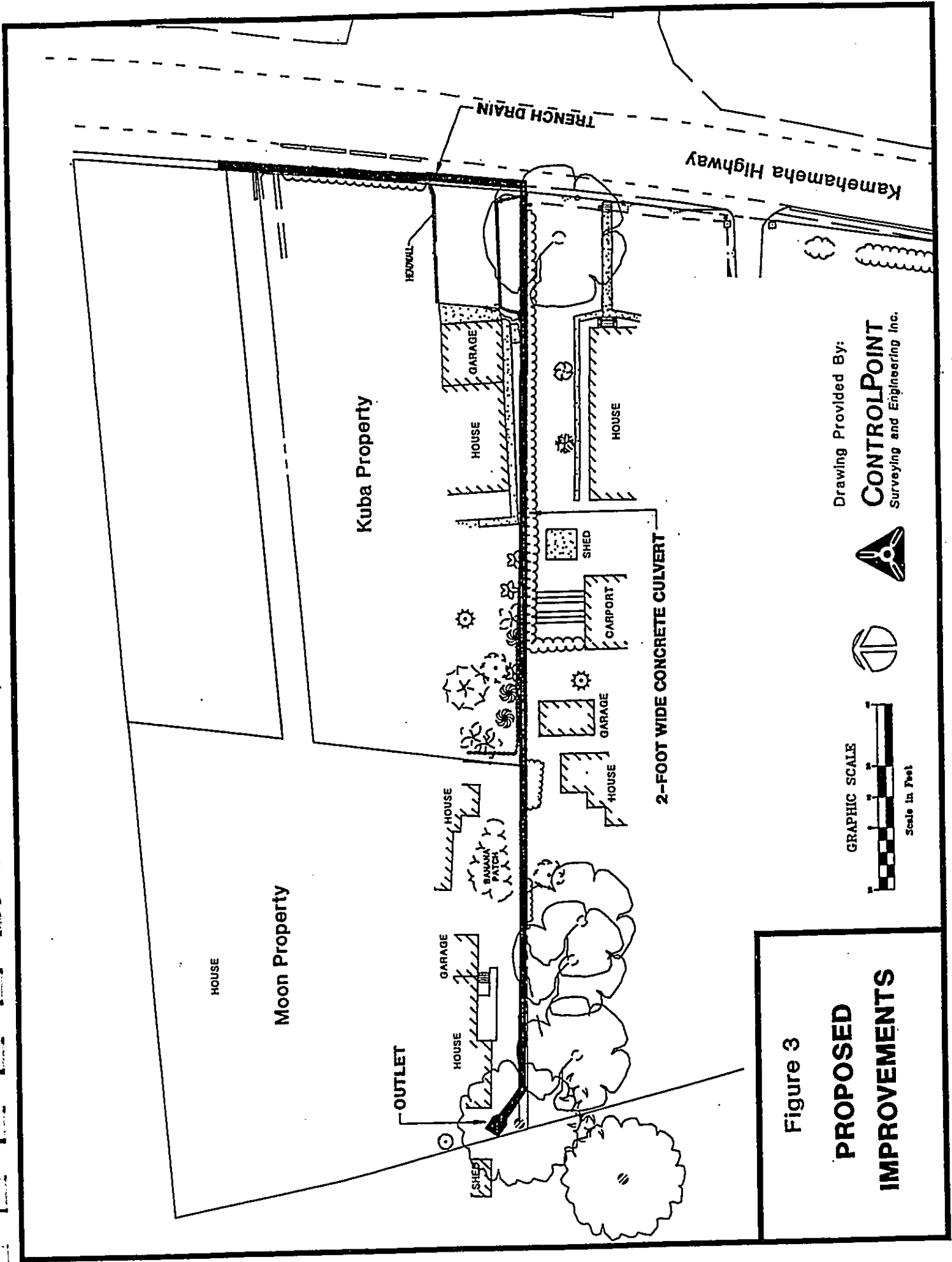


Figure 3

**PROPOSED
IMPROVEMENTS**

Drawing Provided By:
CONTROLPOINT
Surveying and Engineering Inc.



boundary of the project site, excavation for the approximately 300-foot long culvert will likely be accomplished by hand. Construction will be restricted to weekdays from 7:30 AM to 3:30 PM. No construction activities will occur on the project site during weekends and holidays.

3. Cost Estimate

The construction cost estimate for the proposed Kamehameha Highway Drainage Improvements is \$70,000 (1993 dollars). Construction will be funded by the City and County of Honolulu.

4. Development Schedule

The project is expected to take approximately 2 months to complete. No construction commencement date has been set for the project.

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. Geology

The Island of Oahu developed as lava flows from the Waianae volcanic shield on the west and the Koolau shield on the east coalesced to form a central plain known as the Schofield Plateau. Eroded material from the Waianae and Koolau volcanoes form extensive alluvial and colluvial deposits in the lowlands, including Haleiwa. Alluvium and marine sediments of sand and coral overlie lava flows and confine the underlying artesian aquifers to the coastal plain extending west of the Anahulu River. Sedimentary rocks form much of the soil parent material in and around the project area.

B. Topography

Topography of the site ranges from an elevation of 22 feet MSL along Kamehameha Highway to the east, to approximately 12 feet MSL at the project site's western boundary near the edge of the wetland. This 10 foot elevation difference occurs over a span of approximately 300 feet. Slope is approximately 3 percent.

C. Hydrology

An extensive fresh groundwater body is located in dike-free Koolau lava flows from Waialua to Waialeale. Recharge from rainfall in the Koolau Range maintains this lens. The water body is divided into two segments near the coastline, the Waialua-Haleiwa and the Kawailoa, by thick alluvial fill and weathered bedrock in the Anahulu River Valley. The movement of groundwater in the Waialua-Haleiwa area occurs in a seaward direction, and is confined by a thick caprock sequence of marine

and terrestrial sediments. Freshwater springs occur in some parts of the plain, including the marshy area northwest of the project site.

D. Climate

The climate of the northern area of Oahu is characteristically mild with persistent northeast tradewinds. Humidity of the area is generally within the 60 to 80 percent range. The annual temperature range is relatively small with the difference between the coldest and warmest months averaging only 6.5°F.

Rainfall along the North Shore of Oahu averages about 30 to 40 inches annually. The rain gauge station closest to the project site (State Key No. 887.00) records approximately 33 inches mean annual rainfall.

E. Soils

Soil types on the island of Oahu are delineated on maps prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Within and near Kamehameha Highway, the project site consists of Kawaihapai clay loam, 2 to 6 percent slopes (KIB). In a representative profile, the surface layer is dark-brown clay loam about 22 inches thick. The next layer is dark-brown stratified sandy loam 32 inches thick. The substratum is stony and gravelly. Runoff is slow and the erosion hazard is slight. The available water capacity is about 1.8 inches per foot in the surface layer and about 1.6 inches per foot in the subsoil. Shrink-swell potential is moderate, and its corrosivity to uncoated steel or concrete is low.

The western half of the project site consists of Haleiwa silty clay, 0 to 2 percent slopes (HeA). In a representative profile the surface layer is dark-brown silty clay

about 17 inches thick. The subsoil and substratum, to a depth of more than 5 feet, are dark-brown and dark yellowish-brown silty clay that has sub-angular blocky structure. Permeability is moderate, runoff is very slow, and the erosion hazard is no more than slight. The available water capacity is about 1.9 inches per foot. Shrink-swell potential is moderate, and its corrosivity to uncoated steel or concrete is low.

F. Wetlands

A wetland area known as Haleiwa Marsh is located northwest of the project site. Based on a wetland survey report done for the U.S. Army Corps of Engineers in 1977, the marsh is spring-fed and running water can sometimes be heard beneath the vegetation. In central and northeastern sections, the vegetation overlies mucky brown soil and standing water 1 to 2 feet deep. Rural homes are scattered along all sides of the marsh.

A biological and wetland survey was conducted by Botanical Consultants, Inc. for this project on April 7 1992. (See Appendix). The rear portions of the project site were surveyed to determine whether this wetland encroaches on the project site. Three soil pits were dug along the base of a small topographic change at what appeared to be the upper limit of the wetland, just west of the subject property. Within four inches of the surface the soil was thick, pasty, and saturated; definitely wetland soil. In addition, standing water was evident in a shallow trench around an abandoned taro patch. However, vegetation at the fringe of the project site is transitional. Little of the overstory, except the coconut tree which is a marginal wetland plant, can be classified as wetland vegetation. The understory contains several taxa which are commonly found in wetlands, but they do not make up 50 percent of the understory vegetation.

The Federal Manual for Identifying and Delineating Jurisdictional Wetlands, set forth in 1989, outlines three specific criteria for a wetland; hydric soils, hydric vegetation, and wetland hydrology. Only two, hydric soils and wetland hydrology are fully met in this instance. The vegetation component is only partially met. The high degree of disturbance in the area, i.e. the dumping of vegetative waste, cultivation of various landscape plants, and even the erection of the small outbuilding have probably contributed to the transitory condition of the vegetation.

G. Flora

As part of the Biological and Wetland Survey Report, a botanical survey was made of the project site and wetland fringe. There are some large mango trees between the houses and the wetland fringe and a variety of introduced trees, shrubs, and forbs (weeds and grasses) in the wetland fringe. No endemic or indigenous plants were found. There were three Polynesian introductions; ti, taro, and the coconut. Plants found on the site are listed in the Biological and Wetland Survey Report in the Appendix.

H. Fauna

Based on the Biological and Wetland Survey Report, because the entire project site has been extensively modified from its original state, it has almost no value as native bird habitat. However, it does support a variety of non-native species. The wetland fringe supports a variety of introduced trees which have reached a height of 8 to 12 meters. Because the tree canopy is so varied there are many types of nest sites and the scattered grasses provided food for seed eating birds. No threatened or endangered species were found. Birds found on the site are listed in the Biological and Wetland Survey Report in the Appendix.

Three species of endangered native waterbirds have previously been sighted in the Haleiwa Wetland. The endangered Hawaiian Coot, Hawaiian gallinule, and Hawaiian Stilt have been reported from the wetland in two dated studies (Shallenberger, 1977; DLNR, 1983)

During the biological survey, no other significant wildlife was visible. However, due to the rural setting and proximity to the wetland, areas surrounding the site could be expected to provide habitat for rats, mice, mongoose, and feral cats and dogs.

I. Flood Hazard Area

According to the Federal Flood Insurance Rate Map (FIRM) for the City and County of Honolulu, Panel 20 of 135 dated September 4 1987, the project site is in Zone X, an area determined to be outside the 500-year flood plain. The tsunami inundation Zone AE (EL 6) depicted on this map stops just short of the site's western boundary.

It should be noted that the extremely localized flooding which occurs on the project site is believed to be related to an increase in paved areas within Haleiwa town, and not on natural conditions.

J. Historical and Archaeological Sites

The historic Waialua Court House which is located north of the project site on the neighboring lot (TMK 6-6-09:23) has been placed on the State of Hawaii Register of Historic Places (Site No. 80-04-1334). This site is not on the National Register of Historic Places. Nearby structures which are on the inventory for the State Historic Register include the Surf & Sail/Kua Aina Sandwich building and

Menehune Arts building located directly across Kamehameha Highway from the project site.

The project site has been developed and occupied by residences for many years. No archaeological studies have been conducted in the vicinity of the project site.

K. Noise

The most significant and intrusive noise in the vicinity of the project site is from vehicular traffic on Kamehameha Highway. As the western boundary of the project site is approached, noise diminishes greatly until sound is more characteristic of a rural setting.

L. Air Quality

Air quality near the project site is influenced by the prevailing northeasterly tradewinds which generally blow with 90 percent frequency in the summer season and for 50 percent of the time in winter, and are stronger in the afternoon than at night. During tradewind conditions, air quality near the project site is minimally affected by automobile emissions to the east along Kamehameha Highway. Problems of poor air quality are more likely to occur when tradewinds diminish or give way to southerly winds.

There are no air quality measurements taken in the vicinity of Haleiwa. The nearest air quality measurements were conducted in 1991 as part of the EIS for the Lihī Lani Recreational Community at Pupukea, about 7 miles northeast of the project site. For this study, carbon monoxide was selected for modeling because it is the most stable and abundant motor vehicle generated pollutant, and has the greatest

likelihood of violating Ambient Air Quality Standards (AAQS). The estimated peak-hour concentration of carbon monoxide at the intersection of Pupukea Road and Kamehameha Highway in 1991 was 4.1 mg/m^3 . These estimated concentrations are well within State and national AAQS of 10 mg/m^3 and 40 mg/m^3 , respectively. This measurement is believed to be typical of most intersection locations along Kamehameha Highway.

M. Scenic and Visual Resources

Haleiwa has a natural/agricultural landscape which is enhanced by buildings with a rural character. This visual quality of Haleiwa town is preserved through design controls of the Haleiwa Special District, outlined in the City and County of Honolulu Land Use Ordinance. The Haleiwa Special District objectives consist of use restrictions, building height limitations, yard, landscaping, parking, and architectural design requirements, choice of exterior colors, and sign and exterior furniture design controls; all aimed at preserving and enhancing the visual character of the area.

The visual quality of Haleiwa is most apparent along stretches of Haleiwa Road and Kamehameha Highway where significant sites, buildings of historic significance and coastal views can be seen. Significant roadway views include those from Haleiwa Road into Haleiwa Alii Park, Haleiwa Boat Harbor, and Haleiwa Beach Park; and those along Kamehameha Highway where views are afforded of Anahulu Stream and Lokoea Pond.

The east portion of the project site is visible from Kamehameha Highway as an unobtrusive single-family residences surrounded by landscaped vegetation. The three houses to the rear of the site are not visible from the highway. The project

site is not within any significant coastal view planes which were identified in the City and County of Honolulu Coastal View Study.

IV. SOCIO-ECONOMIC ENVIRONMENT

A. Economy

The economy of the North Shore district is based primarily upon agriculture and tourism. Large employers in the area include Waialua Agricultural Company and the Turtle Bay Resort.

The community of Haleiwa began as a business area for the Waialua Plantation and has now become the commercial center of the North Shore. Local employment is primarily in commerce, small shops, restaurants, banking, real estate, and insurance. Many small commercial establishments are located along Kamehameha Highway, in close proximity to the project site.

B. Population

In 1990, the resident population of Haleiwa was 2,442 persons. The entire North Shore neighborhood had a population of 14,008 as of July 1, 1989.

C. Public Services

1. Transportation System

Kamehameha Highway, a two-lane State Highway, is the major thoroughfare between communities along the entire North Shore. A Haleiwa by-pass highway is currently under construction by the State which is expected to funnel a large share of traffic past Haleiwa town, thereby decreasing traffic congestion in the town center. The portion of the highway nearest to the

project site is 600 feet to the east. Drainage infrastructure for the highway will include swales and drain inlets which will direct runoff into concrete gutters. Runoff will be piped to Opaepa Stream and Anahulu River. The Haleiwa by-pass highway is scheduled for completion in May 1993.

The City and County of Honolulu Department of Transportation Services operates a municipal bus system which serves the entire Island of Oahu, including the Haleiwa area.

2. Water System

The City and County of Honolulu Board of Water Supply is responsible for the operation, control and maintenance of the municipal water system on the North Shore. Within Haleiwa, Kamehameha Highway acts as a major arterial for water transmission main. Water laterals from this transmission main supply water to the residences on the project site.

3. Sewage Treatment and Disposal

The Waiialua-Kahuku District, extending from Kaena Point to Waimea Bay, is serviced primarily by individual household cesspools and small private treatment plants located within high density areas. Residences on the project site are serviced by individual household cesspools.

4. Electrical and Telephone System

Electrical and telephone services island-wide are provided by the Hawaiian Electric Company and GTE HawaiianTel, respectively. Utility poles run lines along Kamehameha Highway, next to the project site.

5. Drainage

There is no major drainage system in or around Haleiwa. Runoff is directed into the neighboring Anahulu River approximately 2,200 feet north of the project site, into Paukauila Stream approximately 2,500 feet to the south, or directly into the ocean where possible.

6. Police and Fire Protection

A police substation in Kahuku serves the communities along the North Shore. The station is manned by about 40 officers. Fire protection is provided by the Waialua/Haleiwa Fire Station located on Haleiwa Road, about 3,600 feet southwest of the project site.

7. Educational Facilities

Haleiwa Elementary School, located along Haleiwa Road, is the school nearest the project site. Intermediate and High School students in Haleiwa attend Waialua Intermediate and High School.

8. Parks and Recreational Facilities

Parks nearest the project site include Haleiwa Beach Park, Haleiwa Alii Beach Park, Haleiwa Regional Park, and the Kaiaka State Recreation Area.

V. RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

The proposed Kamehameha Highway Drainage Improvements will be developed in consonance with the following land use controls.

A. State Land Use District

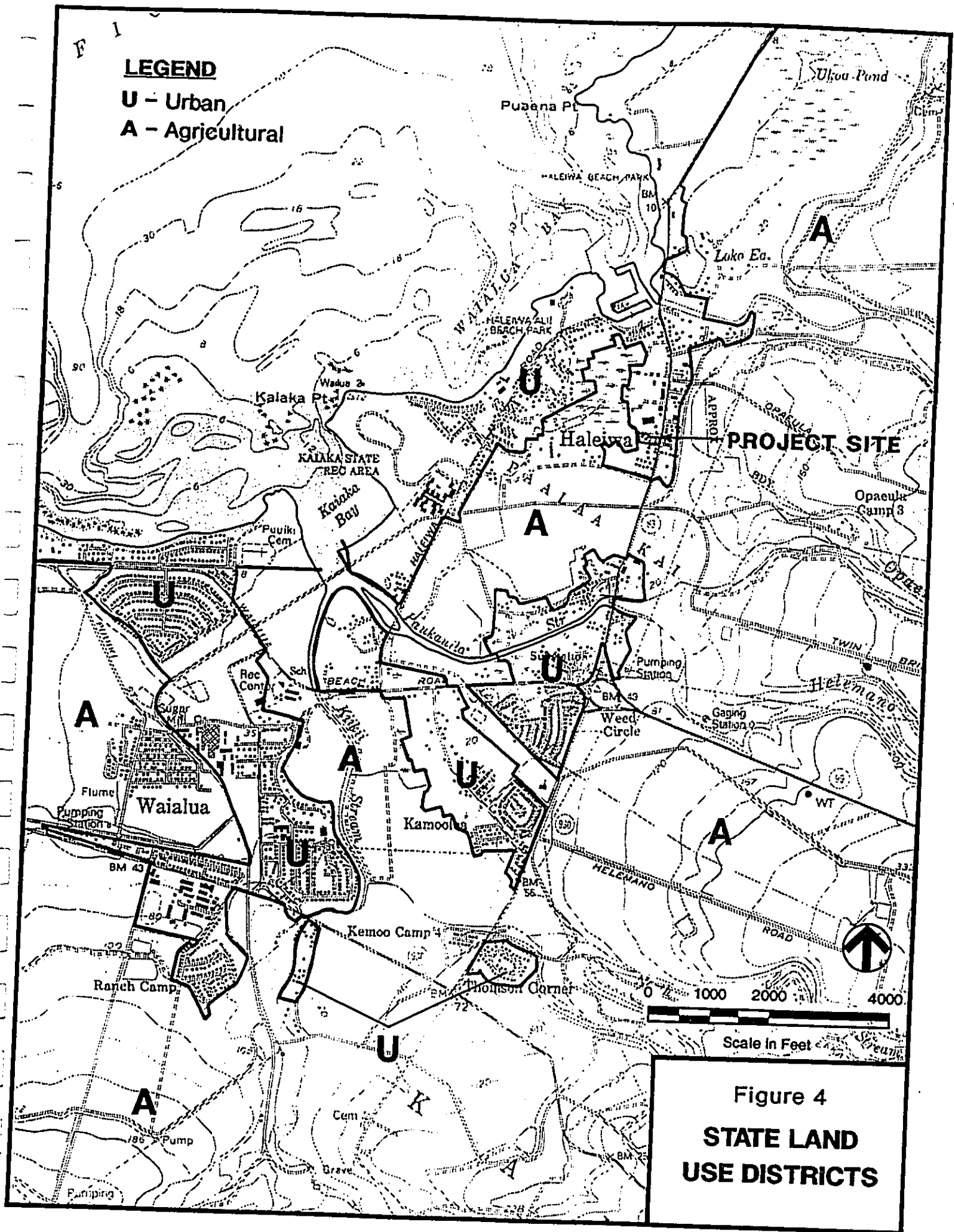
The State Land Use Commission has classified all lands in the State into four land use districts: Urban, Agricultural, Conservation and Rural. The proposed project site is in the Urban District (see Figure 4). The wetland to the west is in the Agricultural District. Construction of the proposed improvements is permitted under the Urban designation.

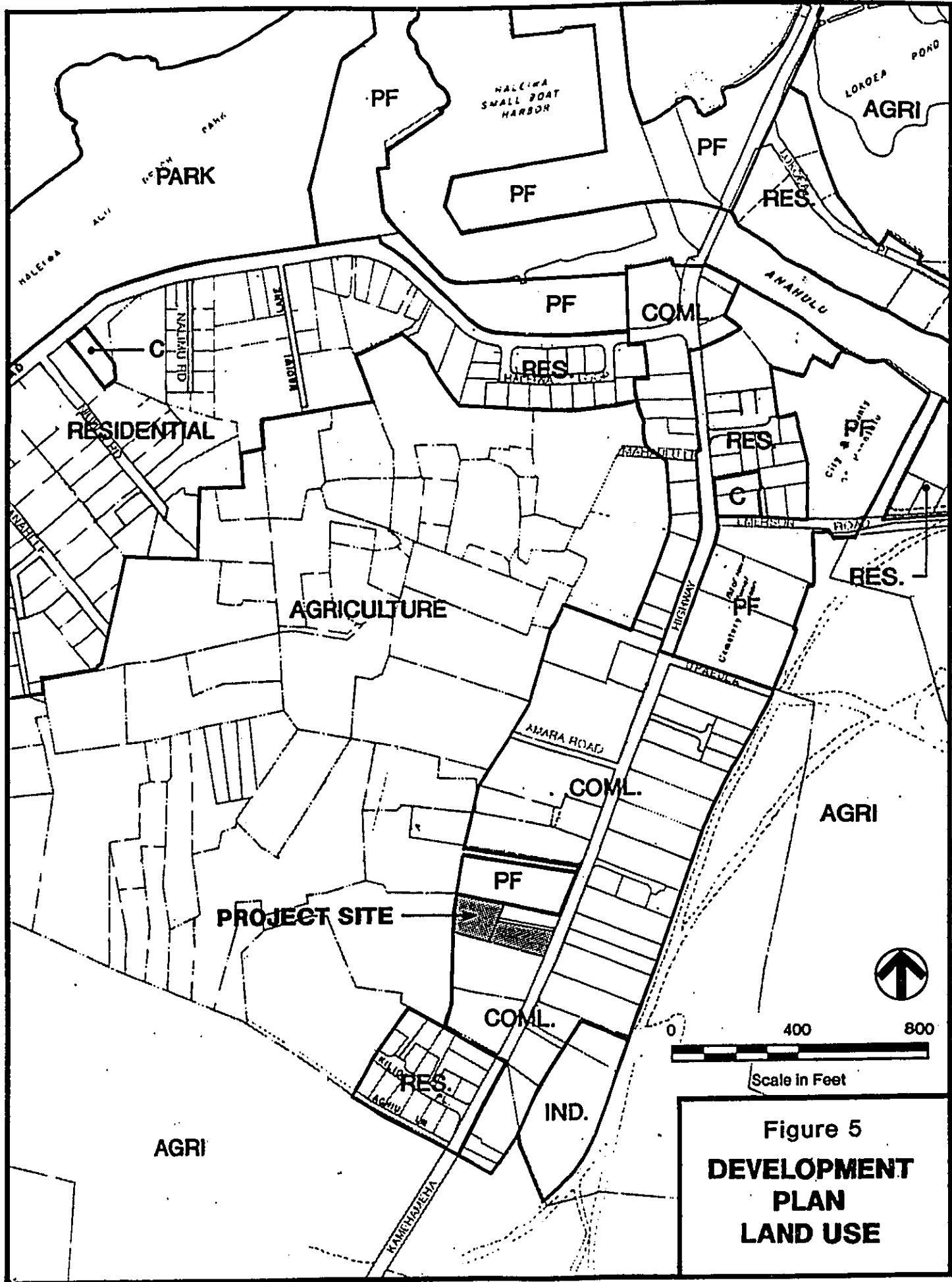
B. Development Plan Land Use

The project site is designated "Commercial" on the North Shore Development Plan Land Use Map. (See Figure 5). Neighboring areas to the south and east are also designated Commercial. The Waialua Court House to the north is designated as "Public Facility". The marsh area to the west is designated "Agriculture".

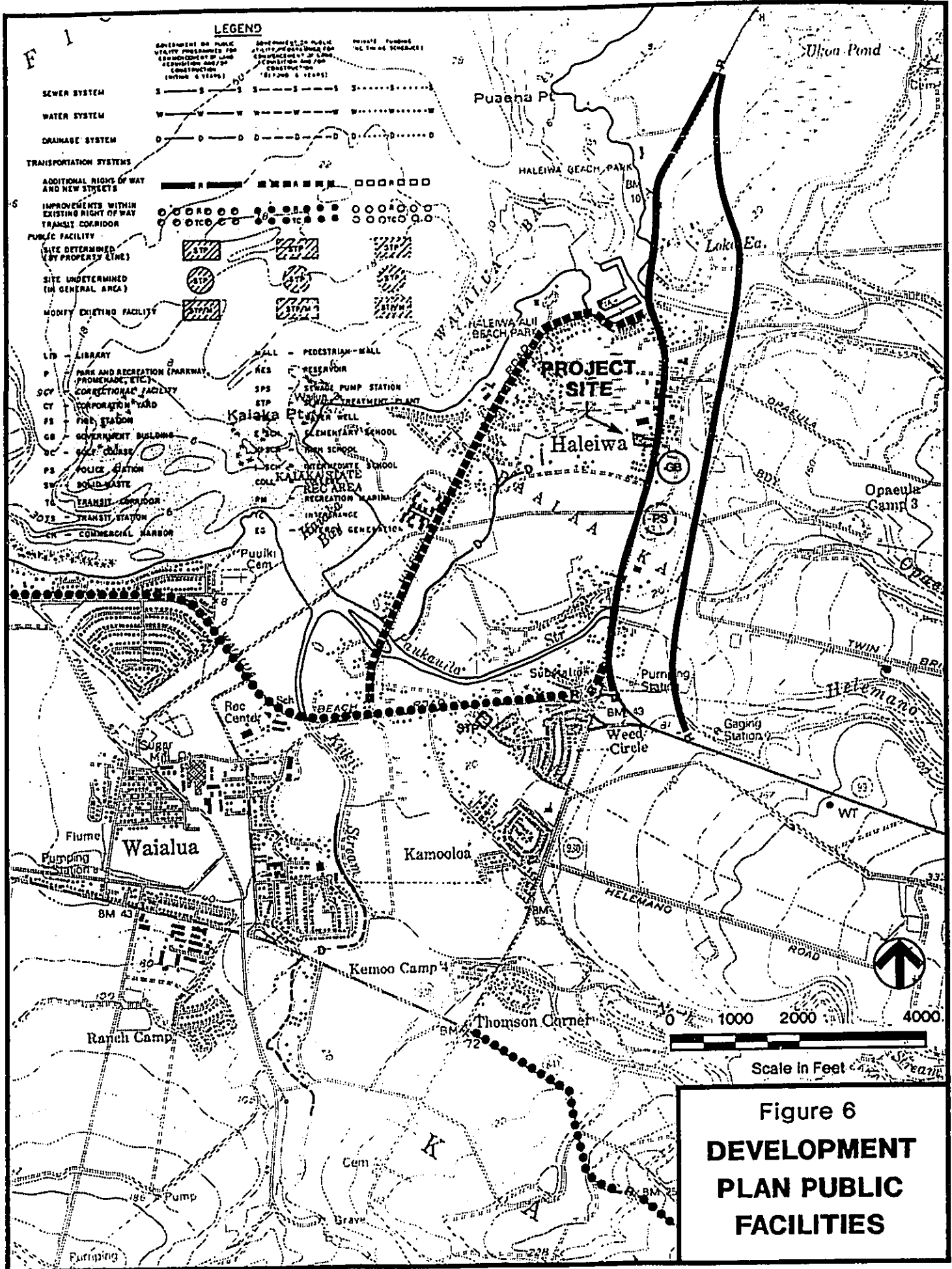
C. Development Plan Public Facilities

The North Shore Development Plan Public Facilities Map shows Kamehameha Highway as undergoing an additional right-of-way within 6 years (see Figure 6). This highway widening is intended to improve safety and to add sidewalk improvements through Haleiwa. The proposed project will not interfere with or make it difficult to implement this highway widening in the future.





**Figure 5
DEVELOPMENT
PLAN
LAND USE**



Other nearby public facilities designated as occurring within 6 years include the Haleiwa by-pass road which is under construction, and a government building across the street from the project site. Just south of this proposed government building is an area designated for a police station to be implemented beyond 6 years.

D. Zoning

The project site is within an area zoned R-5 Residential (see Figure 7). The proposed drainage improvements project will not conflict with the development standards of the R-5 Residential zoning designation.

E. Special Management Area

The Hawaii CZM Law (Chapter 205A, HRS) charges the Counties with designating and administering special management areas along the State's coasts. Any "development" within the SMA boundary requires an SMA Use permit administered by the City and County of Honolulu Department of Land Utilization. Approval of an SMA Use permit is by the Honolulu City Council.

The west half of the project site, TMK 6-6-09:25, is within the Special Management Area and will require an SMA permit (see Figure 8). The project will qualify for the SMA minor permit since the drainage improvements within the SMA boundary will amount to less than \$125,000 and will have no significant impacts.

F. Haleiwa Special District

The purpose of a Special District is to provide a means by which certain areas in the community in need of restoration, preservation, redevelopment or rejuvenation may

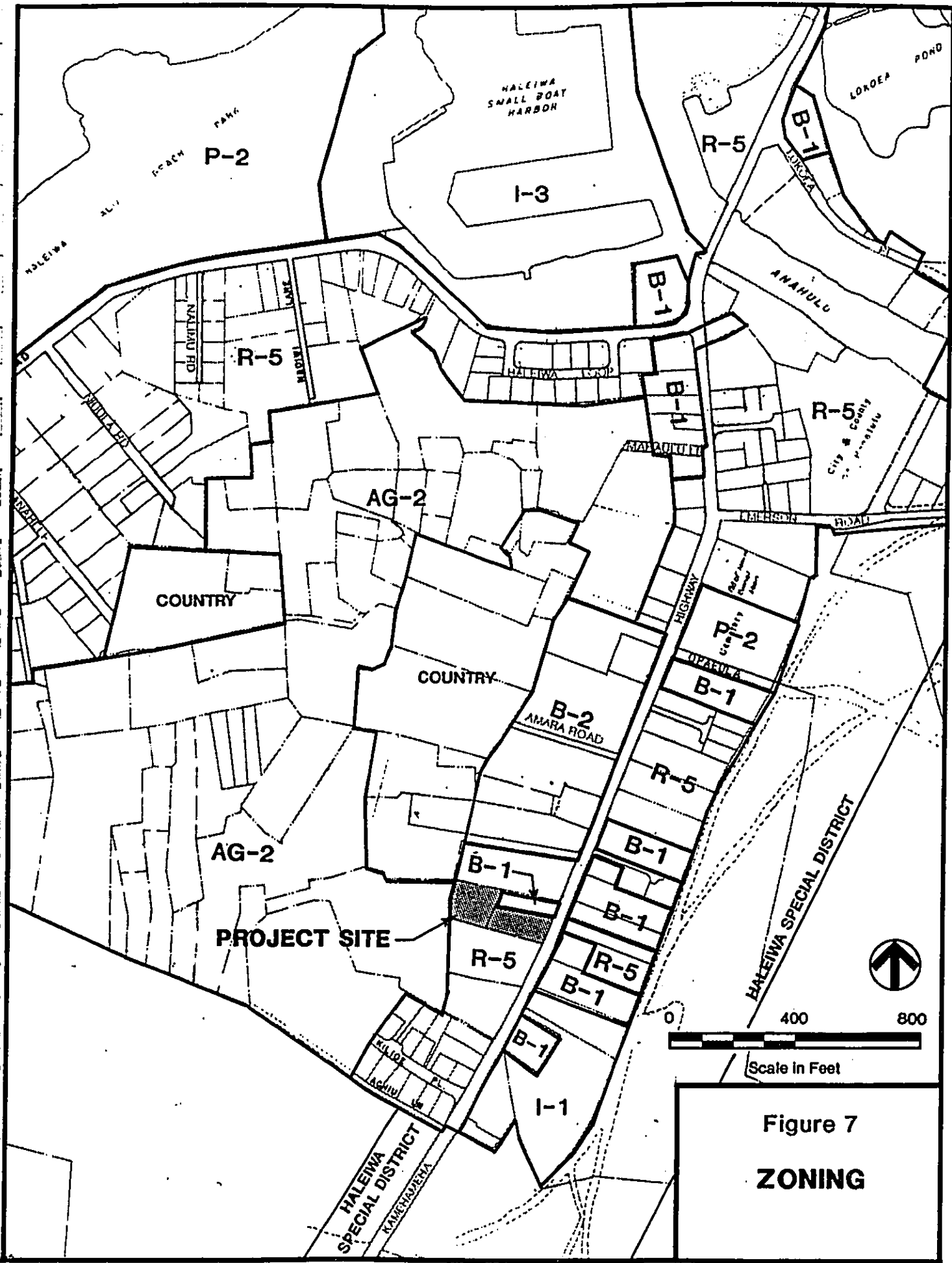


Figure 7
ZONING

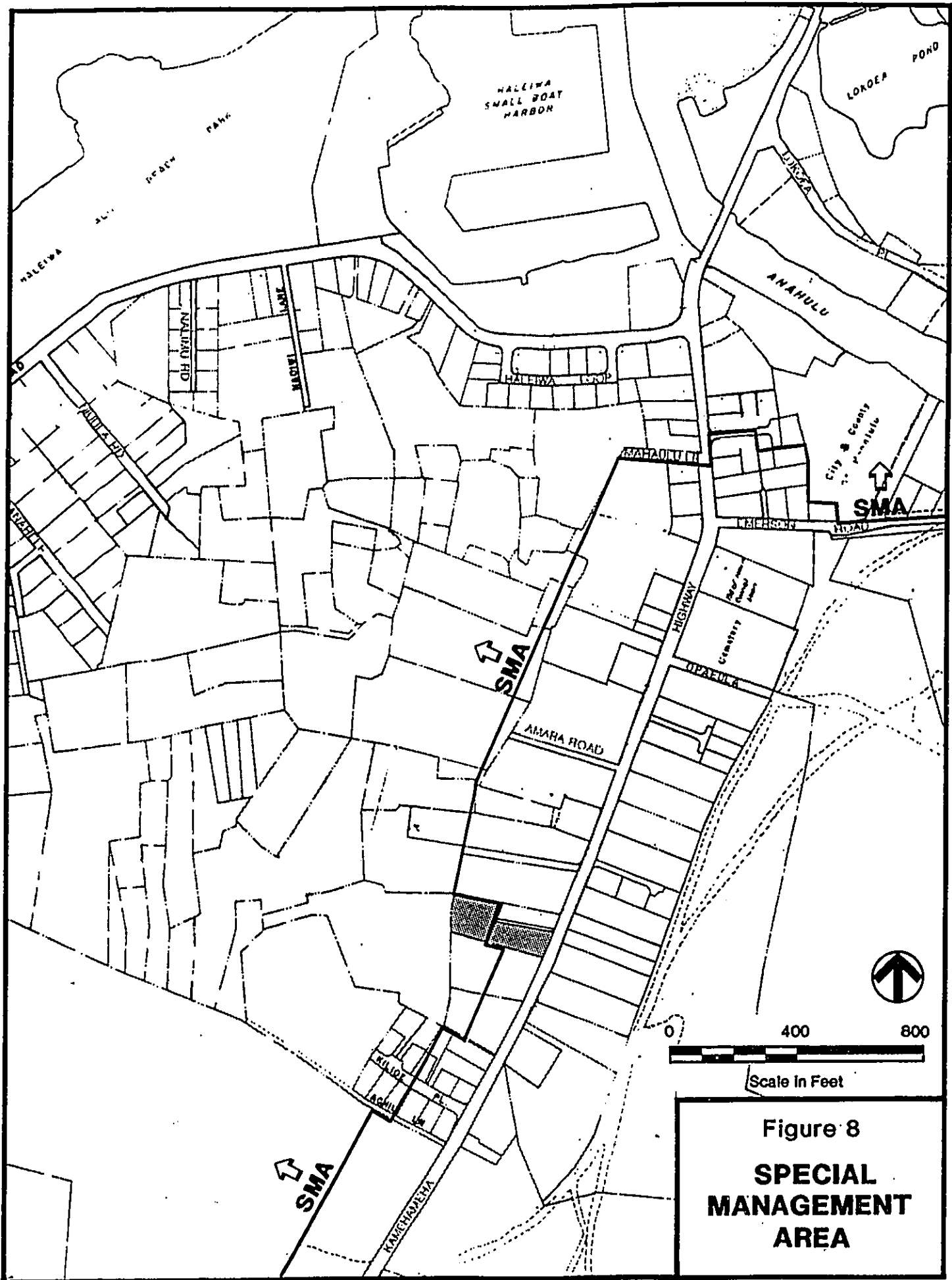


Figure 8
SPECIAL
MANAGEMENT
AREA

be designated as Special Districts to guide development to protect and/or enhance the physical and visual aspects of an area for the benefit of the community as a whole.

The portion of the project site on the Kuba property falls within the Haleiwa Special District. However, as a below grade infrastructure improvement, the project is exempt from any required Special District permit. Areas near the property such as the existing sidewalk will not be affected, or if they are, they will be returned to their existing condition.

VI. POTENTIAL IMPACTS AND MITIGATIVE MEASURES**A. Water Quality**

The project site is located approximately 2,200 feet from the ocean at its closest point, about 2,500 feet north of Paukauila Stream, and approximately 2,200 feet south of Anahulu River. There are no surface water bodies or perennial streams located on the site. There are reportedly freshwater springs within the marsh to the northwest with surface water bodies located several hundred feet from the project site. Because of the distance from surface water bodies, any eroded soil or airborne dust generated during construction is not anticipated to have an adverse impact on surface water quality. Vegetation biomass and wetland conditions on the marsh fringe also function to filter out suspended sediment. Compliance with City and County of Honolulu grading, erosion and sediment control ordinances will further minimize the potential for adverse effects on water bodies in the area.

The City and County of Honolulu has undertaken an islandwide public education program which informs people of the consequences of indiscriminate disposal. As may be available, informational flyers will be discriminated to area residents to educate them that the disposal of household and hazardous chemicals may cause significant environmental damage and that the ditch should not be used for waste disposal.

Short-term impacts on water quality will occur during construction activities. Best Management Practices such as sediment barriers and perimeter runoff controls will be employed. A Best Management Practices Plan will be included with the construction plans specifying the management measures to be employed during construction.

B. Wetlands

The western boundary of the project site exhibits two of the three criteria which would establish the fringe as a wetland. As the survey indicated, the fringe of the project site property has undergone some changes due to human activity. Regardless of the condition of the marsh, however, the project will have no adverse effects on existing wetland conditions. The proposed drainage improvements will merely direct runoff around existing structures and into the same area as flows presently enter. The quantity of runoff entering the marsh may increase slightly due to the decreased opportunity for runoff to percolate on the project site, but this slight increase will not be significant.

C. Flora and Fauna

A small amount of landscaping vegetation will need to be removed in order to install the roadfront concrete ditch and the approximately 300-foot long, 2-foot wide culvert. This vegetation consists of landscape species planted and tended by residents. The fauna on the project site consists of non-native wildlife species commonly found in the area. Project construction will have a negligible effect on the flora and fauna of the area.

D. Archaeological/Historical Resources

There are no archaeological or historical resources in evidence within the project site. It is very unlikely that any such artifacts will be encountered during construction. However, in the event that previously unknown or unexpected subsurface cultural features or deposits are encountered, construction will be halted

and immediate archaeological consultation shall be sought from the State Department of Land and Natural Resources, Historic Preservation Division.

E. Traffic

For a brief period during construction, a cement truck and backhoe will use the existing Kamehameha Highway to access the project site. During this time, a portion of Kamehameha Highway may be needed to position heavy equipment, thereby shutting down the highway to one lane for short periods. Flagmen shall be employed during these periods to ensure traffic safety. If the closure of one lane of Kamehameha Highway is necessary, it will be done during non-peak traffic periods.

F. Air Quality

Ambient air quality is expected to temporarily decrease as a result of fugitive dust generated by construction activities, and by emissions from construction equipment. Most affected will be residences on the project site and their neighbors. Residents will be advised to keep windows closed for the duration of construction. To mitigate fugitive dust emissions from construction activities, the contractor will be responsible for complying with State of Hawaii Air Pollution Control Regulations concerning regular dust-watering and maintenance of vehicle exhaust systems.

G. Noise

Noise levels in the immediate vicinity of the project site will increase as a result of operating heavy vehicles and other power equipment during construction. It shall

be the contractor's responsibility to minimize noise by properly maintaining mufflers and other noise attenuating equipment.

H. Safety

Measures to ensure public safety will be taken throughout all phases of construction. When construction is not on-going (nights, weekends, and holidays), the site will be secured by adequate safety signs, signals, and/or other safety devices as required by State and City and County regulations.

I. Economy

Some short-term economic benefits will be associated with the presence of construction workers in Haleiwa town during the duration of construction.

J. Utilities

1. Water

Two 3/4-inch water meters from the transmission main within Kamehameha Highway will be temporarily capped and moved in order to construct the concrete ditch in front of the property. This will result in a minor inconvenience to the resident. No other users will be affected.

2. Wastewater

Sewer service to residents of the project site and vicinity will not be disrupted or affected in the long-term by construction of the project.

3. Drainage

Drainage of the project site will be improved by construction of the project.

4. Electric and Telephone Service

Electric and telephone service to the project site and vicinity will not be disrupted or affected in the long-term by construction of the project.

VII. ALTERNATIVES TO THE PROPOSED ACTION**A. No Action**

The No Action alternative is being carefully considered at this time. It is possible that the construction of the Haleiwa by-pass highway east of Haleiwa town may have a favorable mitigating effect on drainage. The design of this highway will include swales and drain inlets, and concrete gutters which will direct runoff into Opaepa Stream and Anahulu River. The effect of the Haleiwa by-pass on drainage in Haleiwa town is currently being studied.

B. Alternate Alignment

In order to keep construction of the proposed drainage improvements within the affected parcels, no alternate culvert alignment was considered for this project.

REFERENCES

- City and County of Honolulu, Department of Land Utilization. Haleiwa Historic, Cultural & Scenic District No. 6. August 1983.
- Chu, Michael S.; Jones, Robert B. Coastal View Study. Prepared for the City and County of Honolulu, Department of Land Utilization. 1987.
- Elliott, Margaret E. and Hall, Erin Marie. Wetlands and Wetland Vegetation of Hawaii. Prepared for the U.S. Army Corps of Engineers, Pacific Ocean Division. September 1977.
- Federal Emergency Management Agency. Flood Insurance Rate Map, City and County of Honolulu, Hawaii, Panel 20 of 135. September 4, 1987.
- Funk, Evangeline J., Ph.D. Biological and Wetland Survey Report for the Kamehameha Highway (TMK 6-6-09:25 and 26). Prepared for Wilson Okamoto & Associates, Inc. April 1992.
- Group 70 Limited. Draft Environmental Impact Statement, Application for North Shore Development Plan Amendment, Lihi Lani Recreational Community. Prepared for Obayashi Hawaii Corporation. January 1991.
- MacDonald, Gordon A., Abbott, Agatin T. Volcanoes in the Sea--the Geology of Hawaii. The University Press of Hawaii. 1970.
- State of Hawaii, Department of Business and Economic Development [DBED]. The State of Hawaii Data Book 1989: A Statistical Abstract. November 1991.
- United States Department of Agriculture, Soil Conservation Service, in cooperation with University of Hawaii, Agricultural Experiment Station. Soil Survey of the Island of Oahu, Maui, Kauai, Lanai, and Molokai, State of Hawaii. issued December 1973.
- Wilson Okamoto & Associates, Inc. Waialua-Kahuku Regional Water System Improvements Final Environmental Impact Statement. Prepared for the City and County of Honolulu Board of Water Supply. September 1988.

APPENDIX A
CONSULTATION AND
AGENCY COMMENTS

CONSULTATION AND AGENCY COMMENTS

A. Pre-Assessment Consultation

Federal

U.S. Army Corps of Engineers

State

Department of Transportation, Highways Division
State Historic Preservation Division

City and County

Department of Public Works
Department of Land Utilization

B. Agencies and Organizations to be Consulted

Federal

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

State

Department of Agriculture
Department of Land and Natural Resources
State Historic Preservation Division
Department of Health
Department of Transportation, Highways Division
Office of Environmental Quality Control
Office of State Planning
University of Hawaii Environmental Center

City and County of Honolulu

Board of Water Supply
Department of General Planning
Department of Public Works

Department of Land Utilization
Department of Transportation Services

Other

Councilmember Rene Mansho
North Shore Neighborhood Board No. 27



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



April 30, 1993

REPLY TO
ATTENTION OF

Planning Division

Mr. Scott Kunioka
Project Manager
Wilson Okamoto and Associates
1150 South King Street
Honolulu, Hawaii 96814

RECEIVED
13 MAY 1993

WILSON OKAMOTO & ASSOC., INC.


Dear Mr. Kunioka:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the Kamehameha Highway Drainage Improvements, Haleiwa, Oahu. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. The project is located in or near a wetland. Under Section 404 of the Clean Water Act, a DA permit would be required for any filling, grading or stockpiling of material in waters of the U.S., including wetlands. Although the wetland survey report indicates that a wetland delineation was performed, there were no data sheets or wetland delineation map attached to the report. This information is necessary to determine permit requirements. For further information regarding permit requirements, please contact the Operations Division at 438-9258 and refer to file number P093-049.

b. The flooding information presented on page III-5 of the Environmental Assessment is correct.

Sincerely,


Kisuk Cheung, P.E.
Director of Engineering

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR



KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0014

January 9, 1996

Mr. Thomas Ushijima
Director of Engineering
Department of the Army
U.S. Army Engineer District
Fort Shafter, Hawaii 96858-5440

Attention: Planning Division

Dear Mr. Ushijima:

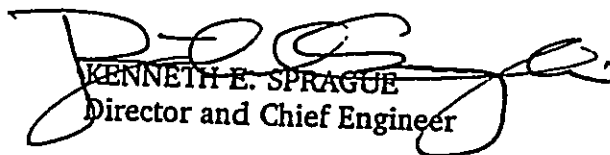
Subject: Kamehameha Highway Drainage Improvements, Draft Environmental Assessment (EA), Haleiwa, Oahu, Hawaii, Tax Map Key: 6-6-09: 25 and 26

Thank you for your review and comments of April 30, 1993, regarding the subject draft EA. In response to your concerns, we offer the following comments:

1. The proposed project is located in proximity to but is outside of the wetland boundaries. A wetland delineation map depicted by our consulting biologist (Ms. Evangeline Funk) is enclosed to show the location of the wetland boundary relative to the project construction site.
2. Due to the limited scope of this project and its location outside of the wetland fringe, we do not foresee the need for any permits under Section 404 of the Clean Water Act.

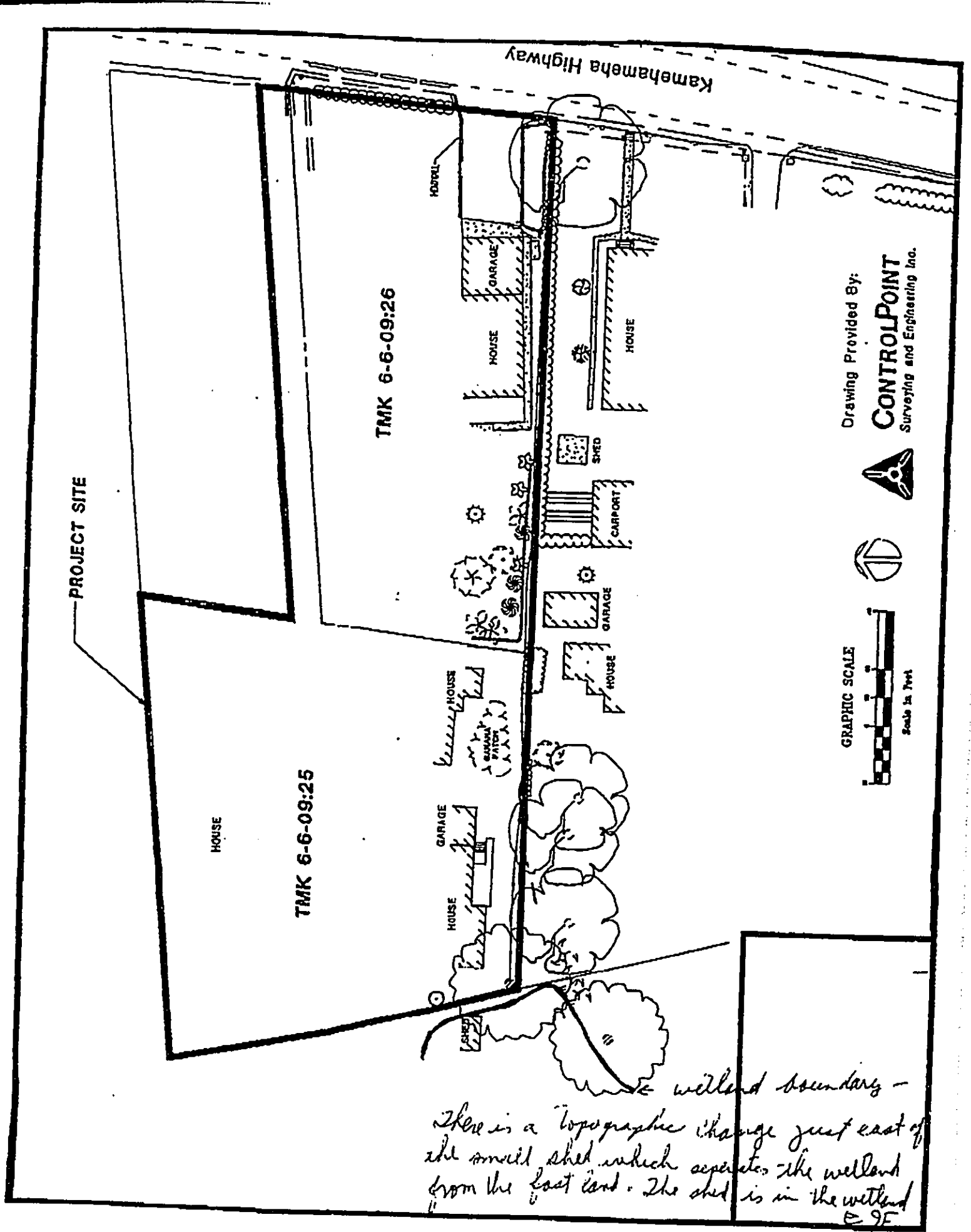
Should you have any questions, please contact Ms. Laverne Higa of the Division of Engineering at 527-6246.

Very truly yours,


KENNETH E. SPRAGUE
Director and Chief Engineer

Encl.

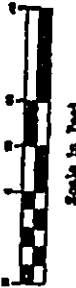
cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)



Drawing Provided By:
CONTROLPOINT
 Surveying and Engineering Inc.



GRAPHIC SCALE
 Scale in Feet



JOHN WAHEE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II
DONA L. HANA'IKE

AQUACULTURE DEVELOPMENT
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AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:OCEA:KCK

File No.: 93-544

DOC. ID.: 2731

MAY 7 1993

The Honorable C. Michael Street, Director
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attn: Ms. Laverne Higa

RECEIVED
MAY 11 1993

WILSON OKAMOTO & ASSOC., INC.

Dear Mr. Street:

Subject: Draft Environmental Assessment (DEA): Kamehameha Highway
Drainage Improvements, Haleiwa, Oahu, TMK: 6-6-09: 25, 26

We have reviewed the DEA information for the proposed project transmitted by Wilson Okamoto & Associates' letter dated April 5, 1993, and have the following comments:

Brief description:

The City and County of Honolulu Department of Public Works is proposing to construct drainage improvements along a 100-foot section of Kamehameha Highway in Wahiawa Town to reduce the flooding of two residential properties makai of the highway. The flooding is attributable to drainage off the highway during heavy rains.

In order to direct storm runoff away from these properties, the installation of a trench drain is proposed to collect sheet flows from the highway and discharge it into the Haleiwa Marsh located behind the properties.

Mr. C. Michael Street

- 2 -

File No.: 93-544

Division of Aquatic Resources

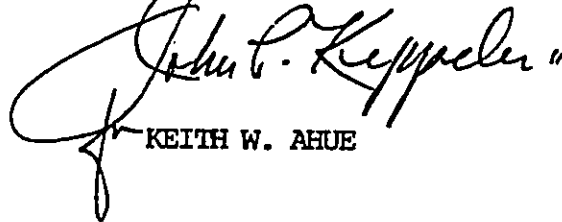
The Division of Aquatic Resources (DAR) comments that the proposed project will not alter total flows into the marsh or modify the marsh environment, and that the marsh does not provide habitat for native stream fishes or crustaceans. As such, DAR has no objections to the proposed project.

We will forward our Historic Preservation Division comments as they become available.

We have no other comments to offer at this time. Thank you for the opportunity to comment on this matter.

Please feel free to call Steve Tagawa at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Very truly yours,


KEITH W. AHUE

cc: Scott Kunioka
OEQC

JOHN WAIHEE
GOVERNOR OF HAWAII



KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAKE

AQUACULTURE DEVELOPMENT
PROGRAM

AQUATIC RESOURCES
CONSERVATION AND

ENVIRONMENTAL AFFAIRS
CONSERVATION AND

RESOURCES ENFORCEMENT
CONVEYANCES

FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
DIVISION

LAND MANAGEMENT
STATE PARKS

WATER AND LAND DEVELOPMENT

RECEIVED
APR 8 1993

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 8TH FLOOR
HONOLULU, HAWAII 96813

WILSON OKAMOTO & ASSOC., INC.

April 22, 1993

Mr. Scott Kunioka
Wilson Okamoto & Associates
1150 South King Street
Honolulu, Hawaii 96814

LOG NO: 7989
DOC NO: 9304TD67

Dear Mr. Kunioka:

**SUBJECT: Kamehameha Highway Drainage Improvements, Draft Environmental Assessment (DEA)
Pa`ala`a, Waialua, O`ahu
TMK: 6-6-9: 25**

Thank you for the opportunity to review this project. A review of our records shows that the DEA correctly summarizes the information on known historic sites in the vicinity. There are no known historic sites at the project location. The proposed project will dig a ditch and construct a culvert to divert rainwater runoff from Kamehameha Highway. This is a small-scale project that we believe will have "no effect" on historic sites.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case all work in the vicinity must stop and the Historic Preservation Division must be contacted at 587-0047.

Sincerely,

A handwritten signature in cursive script that reads "Don Hibbard".

DON HIBBARD, Administrator
State Historic Preservation Division

TD:bek

JOHN WAHEE
COMMISSIONER OF PUBLIC WORKS



RECEIVED
JUN 2 1993

KEITH W. AHUE, CHAIRPERSON
DEPARTMENT OF LAND AND NATURAL RESOURCES
DEPUTIES
JOHN P. KEPPELER, II
CONA L. HANAIKE

RECEIVED
DIV. OF ENGINEERING
JUN 17 4 29 PM '93
REF: OCEA:SKB

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

AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

File No.: 93-544a
DOC. ID.: 2910

The Honorable C. Michael Street, Director
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

JUN 15 1993

Attn: Ms. Laverne Higa

Dear Mr. Street:

Subject: Draft Environmental Assessment (DEA): Kamehameha Highway
Drainage Improvements, Haleiwa, Oahu, TMK: 6-6-09: 25, 26

The following are our Historic Preservation Division's (HPD) comments on the subject project which supplement those forwarded in our previous letter dated May 7, 1993.

Historic Preservation Division

A review of our records shows that the DEA correctly summarizes the information on known historic sites in the vicinity. There are no known historic sites at the project location. The proposed project will dig a ditch and construct a culvert to divert rainwater runoff from Kamehameha Highway. This is a small-scale project that we believe will have "no effect" on historic sites.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case all work in the vicinity must stop and HPD must be contacted.

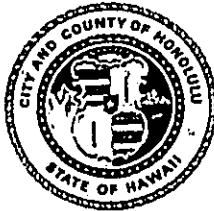
We have no other comments to offer at this time. Thank you for the opportunity to comment on this matter.

Please feel free to call Tom Dye at our Historic Preservation Division, at 587-0014, should you have any questions.

Very truly yours,
John P. Keppeler
for KEITH W. AHUE

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0015

January 10, 1996

Mr. Michael D. Wilson, Director
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Kamehameha Highway Drainage Improvements, Draft Environmental Assessment (EA), Haleiwa, Oahu, Hawaii, TMK: 6-6-09: 25 and 26

Thank you for your review and letters regarding the subject draft EA. This is to acknowledge your indications of no objections from your Division of Aquatic Resources and State Historic Preservation Division. As requested, should any historic sites or human burials be uncovered during construction activities, all work in the vicinity will stop and the Historic Preservation Division contacted.

If there are any questions, please call Laverne Higa of the Division of Engineering at 527-6246.

Very truly yours,

A handwritten signature in black ink, appearing to read "D. E. Sprague", is written over the typed name.

KENNETH E. SPRAGUE
For Director and Chief Engineer

cc: ~~Wilson~~ Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

JOHN WAIHEE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

REX D. JOHNSON
DIRECTOR
DEPUTY DIRECTORS
JOYCE T. OMINE
AL PANG
JEANNE K. SCHULTZ
CALVIN M. TSUDA
IN REPLY REFER TO:
STP 8.5179

April 28, 1993

RECEIVED
MAY 0 5 1993

Ms. Laverne Higa
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOC., INC.

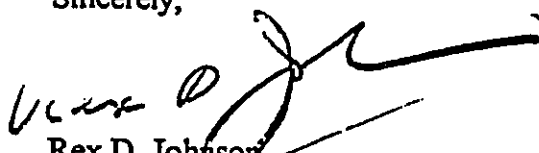
Dear Ms. Higa:

Subject: Draft Environmental Assessment
Kamehameha Highway Drainage Improvements
Haleiwa, Oahu

The proposed Kamehameha Highway drainage improvements will not impact our State transportation facilities. The project will affect a portion of the highway that is currently under the jurisdiction of the City and County of Honolulu.

We appreciate the opportunity to provide comments.

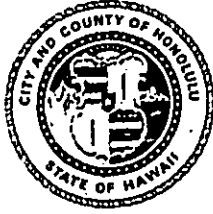
Sincerely,


Rex D. Johnson
Director of Transportation

c: Mr. Brian J. J. Choy, OEQC
Mr. Scott Kunioka, Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0016

January 10, 1996

Mr. Kazu Hayashida
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Subject: Kamehameha Highway Drainage Improvements, Draft Environmental Assessment (EA), Haleiwa, Oahu, Hawaii, TMK: 6-6-09: 25 and 26

Thank you for your review of the subject draft EA. This is to acknowledge your letter indicating no impact to State transportation facilities.

If there are any questions, please call Laverne Higa of the Division of Engineering at 527-6246.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Kenneth E. Sprague".

KENNETH E. SPRAGUE
Director and Chief Engineer

ret 1

cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)



University of Hawaii at Manoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawaii 96822
Telephone: (808) 956-7361

May 7, 1993
EA:00025

RECEIVED
MAY 10 1993

Ms. Laverne Higa
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOC., INC.

Dear Ms. Higa:

**Draft Environmental Assessment (DEA)
Kamehameha Highway Drainage Improvements
Waialua, Oahu**

The Department of Public Works (DPW) proposes to construct drainage improvements to relieve localized flooding conditions along a 100-foot section of Kamehameha Highway in Haleiwa Town on the North Shore of Oahu. From the highway, a trench drain will extend to the west along the southern boundary of two residential properties, and then discharge storm runoff into a Haleiwa Marsh, behind the residences. The project will be funded by the City and County of Honolulu.

The Environmental Center has reviewed this document with the assistance of Sheila Conant, General Science; and B. Alex Buttaro, Environmental Center.

Traffic (page VI-2)

We note that the construction activities will require that one lane of Kamehameha Highway be shut down. Is it possible to schedule shutdowns to occur during a time when use of Kamehameha Highway is minimal, in order to mitigate adverse or unsafe traffic impacts that may result because of this project?

Potential Improper Uses of Drainage Ditch

Our reviewers expressed concern that residents living along the drainage ditch and marsh may use the ditch to dispose of do-it-yourself oil and other environmentally hazardous substances. We suggest that the City and County of Honolulu DPW implement an educational program for residents surrounding the project site. The residents should be informed that disposal of household and hazardous chemicals may cause significant environmental damage and

the ditch should not be thought of as a waste disposal option. The educational format could include a community meeting or informational flyers sent to area residents.

Fauna (page III-4)

The Biological and Wetland Survey Report may not have adequately assessed the potential of Haleiwa Marsh as a native or endangered bird habitat. Our reviewers suggest that the two ten-minute count periods were not adequate to detect wetland birds. Also, no mention was made as to the time the data was collected. Additionally, Ecologically Sensitive Wetlands on Oahu: Groundwater Protection Strategy for Hawaii, Environmental Center Technical Report No. 184, lists three endangered species present in this area, not mentioned in the EA.

Wetlands (page VI-1)

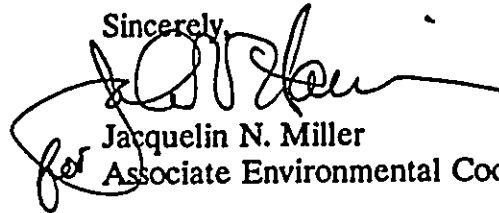
While the project area and the areas directly adjacent may only meet two of the three wetlands criteria, this project will directly impact a wetland area that meets all three criteria. The EA correctly states that the quantity of runoff entering the marsh will increase, but does not mention that both the quality of runoff and localized impacts at the Haleiwa Marsh discharge point may be significant in terms of input of suspended sediments and other potential constituents. Because both vegetation and endangered wildlife may be significantly affected at the drainage discharge point, an assessment of discharge water quality should be made to more adequately determine the range of potential pollution scenarios and to identify consequent mitigation strategies.

Monitoring

We suggest that a water quality monitoring program be implemented in order to safeguard Haleiwa Marsh against potential pollution that may occur at the discharge point. Baseline analyses should be conducted prior to construction and periodic monitoring following project completion would be highly desirable. Such a program would help to better ensure that mitigation of potential environmental impacts could be effectively implemented prior to any significant or irreversible damage.

Thank you for the opportunity to review this document and we hope our comments are helpful.

Sincerely,



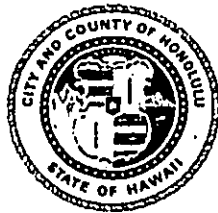
Jacquelin N. Miller
Associate Environmental Coordinator

cc: OEQC
Wilson, Okamoto and Associates ✓
Roger Fujioka
Sheila Conant
B. Alex Buttaro

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR



KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0017

January 10, 1996

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

Dear Ms. Miller:

Subject: Kamehameha Highway Drainage Improvements, Draft Environmental Assessment (EA), Haleiwa, Oahu, Hawaii, TMK: 6-6-09: 25 and 26

Thank you for your review and comments regarding the subject draft EA. In response to your concerns, we offer the following:

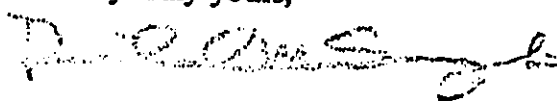
1. The final EA will state that if the closure of one lane of Kamehameha Highway is necessary, it should occur during non-peak traffic periods.
2. Apart from the legal restrictions on disposal of hazardous substances into any drainage system, the City is also formulating a County-wide public education program which will inform people of the consequences of indiscriminate disposal. The final EA will include your recommendation as a potential mitigation measure.
3. The names of the three endangered waterbirds previously sighted in the Haleiwa wetland will be annotated to the final EA. Our biologist points out that because of the density of the vegetation, the absence of open water, and the small size of the observation area, the presence of these species in the area was very unlikely, and therefore concluded that the limited observation time was sufficient.
4. The input of suspended sediments and other potential constituents on the Haleiwa Marsh should not be significant for several reasons:

Ms. Jacquelin M. Miller
Page 2
January 10, 1996

- a. The quality of runoff at the discharge point is not anticipated to change significantly. Water which previously collected along Kamehameha Highway before running across the subject parcels will be collected in the same location and routed around the subject parcels. Hence, water quality is not anticipated to contain any more or less suspended sediment or other constituents.
 - b. Under "Water Quality", the draft EA specifies that because of the distance from surface water bodies such as the Haleiwa Marsh, any potential eroded soils generated during construction activities are not anticipated to impact the marsh's surface water quality. This distance of several hundred feet was not specified in the draft EA but will be included in the final EA.
 - c. It should also have been specified that the vegetation biomass and wetland conditions on the marsh fringe filter out potential suspended sediment. This has been the observation at other wetlands in the State and will be stated in the final EA.
5. For the reasons above and also given the small scale of proposed drainage improvements, the establishment of a water quality monitoring program for the subject project is not warranted.

Should you have any questions, please contact Ms. Laverne Higa of the Division of Engineering at 527-6246.

Very truly yours,



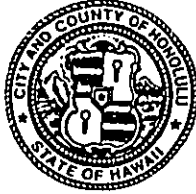
KENNETH E. SPRAGUE
Director and Chief Engineer

For

cc: ~~Wilson Okamoto & Associates, Inc.~~
(Attention: Mr. Rodney Funakoshi)

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

FRANK F. FASI
MAYOR



DONALD A. CLEGG
DIRECTOR
LORETTA K.C. CHEE
DEPUTY DIRECTOR
93-02337 (AC)

May 3, 1993

MEMORANDUM

TO: MICHAEL STREET, DIRECTOR
DEPARTMENT OF PUBLIC WORKS

ATTN: MS. LAVERNE HIGA

FROM: DONALD A. CLEGG, DIRECTOR

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU
TAX MAP KEY: 6-6-09: 25 & 26

RECEIVED
MAY 10 1993

WILSON OKAMOTO & ASSOC., INC.

Thank you for allowing the Department of Land Utilization (DLU) the opportunity to review the above-referenced Environmental Assessment. As noted in the EA document, the proposed project is subject to provisions of Chapter 25, Special Management Area (SMA) prior to construction. Based upon the proposed project cost of \$70,000 and a Negative Declaration from your department, we anticipate issuing a Minor Permit for the project.

Should you have any questions, please contact Mr. Art Challacombe of our staff at 523-4107.

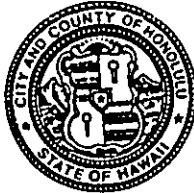
Donald Clegg
DONALD A. CLEGG
Director of Land Utilization

DAC:ak

cc: Office of Environmental Quality Control
Wilson Okamoto and Associates

G:eakam.adc

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0019

January 10, 1996

MEMORANDUM

TO: MR. PATRICK T. ONISHI, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: *D. E. Sprague*
For: KENNETH E. SPRAGUE, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU, HAWAII,
TAX MAP KEY: 6-6-09: 25 AND 26

Thank you for your review and comment regarding the subject draft EA. This is to acknowledge your comments relating to the need for a Special Management Area permit from your department.

If there are any questions, please contact Laverne Higa of the Division of Engineering at extension 6246.

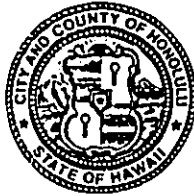
cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

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APR 29 1993



ROBIN FOSTER
CHIEF PLANNING OFFICER
ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER

WILSON OKAMOTO & ASSOC., INC.

MM 4/93-935

April 26, 1993

MEMORANDUM

TO: C. MICHAEL STREET, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

ATTENTION: LAVERNE HIGA

FROM: ROBIN FOSTER, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR THE
KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS
HALEIWA, OAHU, HAWAII

We have reviewed the Draft Environmental Assessment and have no comments or objections to the subject project.

Should you have any questions, please contact Mel Murakami of our staff at 527-6020.

A handwritten signature in cursive script, appearing to read "Robin Foster".

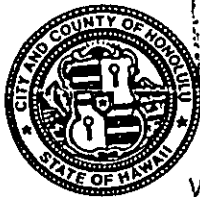
ROBIN FOSTER
Chief Planning Officer

RF:ft

cc: Office of Environmental Quality Control
Attn: Brian J.J. Choy
Wilson Okamoto & Associates, Inc.
Attn: Scott Kunioka

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



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JAN 12 1996

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

WILSON OKAMOTO & ASSOC.

96-12-0018

JEREMY HARRIS
MAYOR

January 10, 1996

MEMORANDUM

TO: MS. CHERYL SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT
D. E. Sprague

FROM: ^{for} KENNETH E. SPRAGUE, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU, HAWAII,
TAX MAP KEY: 6-6-09: 25 AND 26

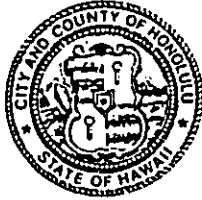
Thank you for your review of the subject draft EA. This is to acknowledge your indication of no comments or objections to the subject project.

If there are any questions, please contact Laverne Higa of the Division of Engineering at extension 6246.

cc: *Wilson Okamoto & Associates, Inc.*
(Attention: Mr. Rodney Funakoshi)

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



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APR 20 1993

C MICHAEL STREET
DIRECTOR AND CHIEF ENGINEER

FELIX B. LIMTIACO
DEPUTY DIRECTOR

WILSON OKAMOTO & ASSOC., INC.

FRANK F. FASI
MAYOR

April 15, 1993

ENV 93-92

MEMORANDUM

TO: LAVERNE HIGA, PROJECT ENGINEER
DIVISION OF ENGINEERING

FROM: ALEX HO, ENVIRONMENTAL ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS
TMK: 6-6-09: 25 AND 26

I have reviewed the subject DEA and have the following comments:

1. Since the proposed project is located adjacent to Haleiwa Marsh, the DEA should address the potential impact on storm water discharge associated with construction activities on water quality of the receiving waters.
2. The DEA should also state what structural and non-structural best management practices (BMP) will be provided to control and reduce the discharge of pollutants resulting from the construction and/or dewatering operations.
3. If dewatering activity is anticipated, dewatering permits will be required by the State Department of Health and the Department of Public Works, City and County of Honolulu.
4. Since the project site is surrounded by some commercial establishments, a site assessment to determine the potential hazardous wastes may be necessary.

If you have any questions, please call me at extension 4150.

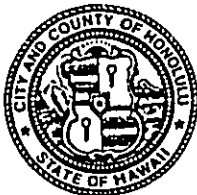
A handwritten signature in black ink, appearing to read "Alex Ho".

ALEX HO
Environmental Engineer

cc: OEQC
Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
DIVISION OF ENGINEERING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR



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MAY 12 1996

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER
MARVIN T. FUKAGAWA
CHIEF

WILSON OKAMOTO & ASSOCIATES

IN REPLY REFER TO:
95-12-0022

January 10, 1996

MEMORANDUM

TO: MR. ALEX HO, ENVIRONMENTAL ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: MARVIN T. FUKAGAWA, CHIEF
DIVISION OF ENGINEERING

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU, HAWAII,
TAX MAP KEY: 6-6-09: 25 AND 26

Thank you for your review and comments regarding the subject draft EA. In response to your concerns, we offer the following comments:

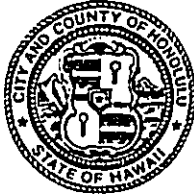
1. The draft EA specifies that because of the distance from surface water bodies such as the Haleiwa Marsh, any potential eroded soils generated during construction activities are not anticipated to impact the marsh's surface water quality. We further note that the vegetation biomass and wetland conditions on the marsh fringe function to filter out potential suspended sediment. This has been the experience at other wetlands in the State and will be reported in the final EA.
2. Best Management Practices such as sediment barriers and perimeter runoff controls will be discussed in the final EA. A Best Management Practices plan will be included with the construction plans specifying the management measures to be employed during construction.
3. It has been determined that the entire project is located outside of the wetland boundaries. No dewatering activity is anticipated on the project site.
4. The localized and minor scope of this project does not warrant a site assessment of potential hazardous wastes from surrounding commercial establishments.

Should you have any questions, please contact Laverne Higa at extension 6246.

cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
MAYOR

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MAY 07 1993

JOSEPH M. MAGALDI, JR.
DIRECTOR

AMAR SAPPAL
DEPUTY DIRECTOR

TE-1348
PL93.1.138

WILSON OKAMOTO & ASSOC., INC.

May 4, 1993

MEMORANDUM

TO: C. MICHAEL STREET, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

ATTENTION: LAVERNE HIGA

FROM: JOSEPH M. MAGALDI, JR., DIRECTOR

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS
DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
TMK: 6-6-09: 25 AND 26

This is in response to the subject DEA submitted to us for review on April 5, 1993 by Wilson Okamoto & Associates, Inc.

We have no objections to the proposed drainage improvements at this time. However, there is a 10-foot road widening setback affecting the subject parcels along Kamehameha Highway.

Construction plans for all work within the City's right-of-way should be submitted to our department for review. A traffic control plan showing temporary detours for pedestrians and vehicles should be included in these plans.

Should you have any questions, please contact Lance Watanabe of my staff at local 4199.

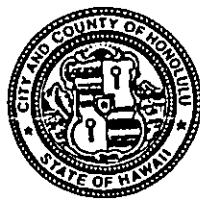


JOSEPH M. MAGALDI, JR.

cc: Office of Environmental Quality Control
Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0020

January 10, 1996

MEMORANDUM

TO: MR. CHARLES O. SWANSON, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

[Handwritten Signature]

FROM: ^{For} KENNETH E. SPRAGUE, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU, HAWAII,
TAX MAP KEY: 6-6-09: 25 AND 26

Thank you for your review and comments regarding the subject draft EA. In response to your concern about the 10-foot road widening setback affecting the subject parcels, please be assured that construction plans for all work within this area will be submitted, along with a traffic control plan, to your department for review.

Should you have any questions, please contact Laverne Higa of the Division of Engineering at extension 6246.

cc: Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



COPY

April 28, 1993

RECEIVED
APR 30 1993

WILSON OKAMOTO & ASSOC., INC.

TO: C. MICHAEL STREET, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

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

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA) DATED MARCH 1993,
REGARDING THE PROPOSED DRAINAGE IMPROVEMENTS PROJECT,
TMK: 6-6-09: 25 AND 26, KAMEHAMEHA HIGHWAY, HALEIWA

Thank you for the opportunity to review and comment on the DEA for the proposed drainage improvements project.

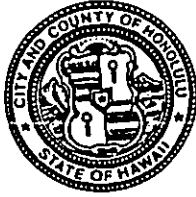
We have no objections to the proposed trench drain improvement project. The relocation of the two existing water meters should be coordinated with our Customer Service Division.

If you have any questions, please contact Roy Doi at 527-5235.

cc: Office of Environmental Quality Control
✓Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

IN REPLY REFER TO:

96-12-0021

January 10, 1996

MEMORANDUM

TO: MR. RAYMOND SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: *[Signature]*
For KENNETH E. SPRAGUE, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KAMEHAMEHA HIGHWAY DRAINAGE IMPROVEMENTS, DRAFT
ENVIRONMENTAL ASSESSMENT (EA), HALEIWA, OAHU, HAWAII,
TAX MAP KEY: 6-6-09: 25 AND 26

Thank you for your review of the subject draft EA. This is to acknowledge your indication of no objections to the subject project. As requested, the relocation of the two existing water meters will be coordinated with your Customer Service Division.

If there are any questions, please contact Laverne Higa of the Division of Engineering at extension 6246.

cc: *[Signature]* Wilson Okamoto & Associates, Inc.
(Attention: Mr. Rodney Funakoshi)

10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

APPENDIX B
BIOLOGICAL AND
WETLAND SURVEY REPORT

BIOLOGICAL AND WETLAND SURVEY REPORT FOR THE KAMEHAMEHA HIGHWAY
DRAINAGE IMPROVEMENTS (TMK 6-6-09-25 AND 26)
HALEIWA, OAHU, HAWAII

for
Wilson Okamoto and Associates, Inc.
1150 South King Street
Honolulu, Hawaii 96814

by
Evangeline J. Funk Ph.D.
Botanical Consultants
P.O. Box 90765
Honolulu, Hawaii 96835

April 1992

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INTRODUCTION

A biological survey and wetland delineation of the proposed Kamehameha Highway Drainage Improvements (TMK 6-09-25 and 26) was carried out on April 7, 1992. This small study area is located between Kamehameha Highway and the Haleiwa Marsh (Elliot & Hall 1977) and includes two residential sites and a portion of the wetland fringe. Observations were made on the bird and plant populations of the site and the mauka limit of the wetland was delineated and flagged.

METHODS

Wetland delineation techniques set forth in Technical Report Y-87-1, Corps of Engineers Wetlands Delineation Manual (Department of the Army 1987) were used to determine the wetland boundaries.

The walk through method was used to collect data on the existing vegetation of the site, to ascertain if endangered species are found in the area, and to describe the present vegetation.

Data on bird species were collected during two ten minute observation periods spent in the wetland fringe away from the houses.

The biologist was part of a four man team which collected a variety of data on the study site.

RESULTS

WETLANDS

The study site slopes in a northwesterly direction from Kamehameha Highway toward the Haleiwa wetland. Beginning at Kamehameha Highway, there are three dwellings and a small outbuilding along the gradient from the road to the fringe of the wetland. There is a noticeable topographic change between the house lots and the wetland fringe. The outbuilding is mostly within the wetland fringe.

Three soil pits were dug along the base of a small topographic change at what appeared to be the upper limit of the wetland (Figure 1.). The results from the three pits were similar. Within four inches of the surface the soil was thick, pasty and saturated. The closest color match, using a Munsel Soil color chart was 5y 2.5/1 with some gleying, definitely wetland soil.

In addition to the wet, pasty condition of the soil, there was a small abandoned taro patch around which someone had dug a shallow trench. Although the trench was less than six inches deep, there was standing water along its length.

This is a very disturbed area and the vegetation component is transitional. For example, there are mature coconut (*Cocos nucifera* L.), Java plum (*Zyzygium cumini* (L.) Skeels), African tulip (*Spathodia campanulata* P. Beauv.) and 'opiuma trees (*Pithecellobium dulce* (Roxb.) Benth) growing within the wetland fringe. Only one of these, the coconut tree, is considered to be a very marginal wetland plant.

By contrast, the understory or ground layer contains several taxa which are commonly found in wetlands. The taro (*Colocasia esculenta* (L.) Schott) is an obligate wetland plant (obl) which occurs in wetlands 99% of the time. California grass (*Brachiaria mutica* (Forssk.) Staff) which makes up about 25% of the understory is a facultative wetland plant (facw) and is found in wetlands between 67% and 99% of the time. Honohono and Hilo grass (*Commelina diffusa* N.L. Brum. and *Paspalum conjugatum* Berg.) are often found in wetlands (67% to 99% of the time), but all of these, collectively, do not make up fifty percent of the understory vegetation.

By definition, three criteria, hydric soils, hydric vegetation, and wetland hydrology are required to designate an area a wetland. Only two, hydric soils and wetland hydrology are fully met in this instance. The vegetation component is

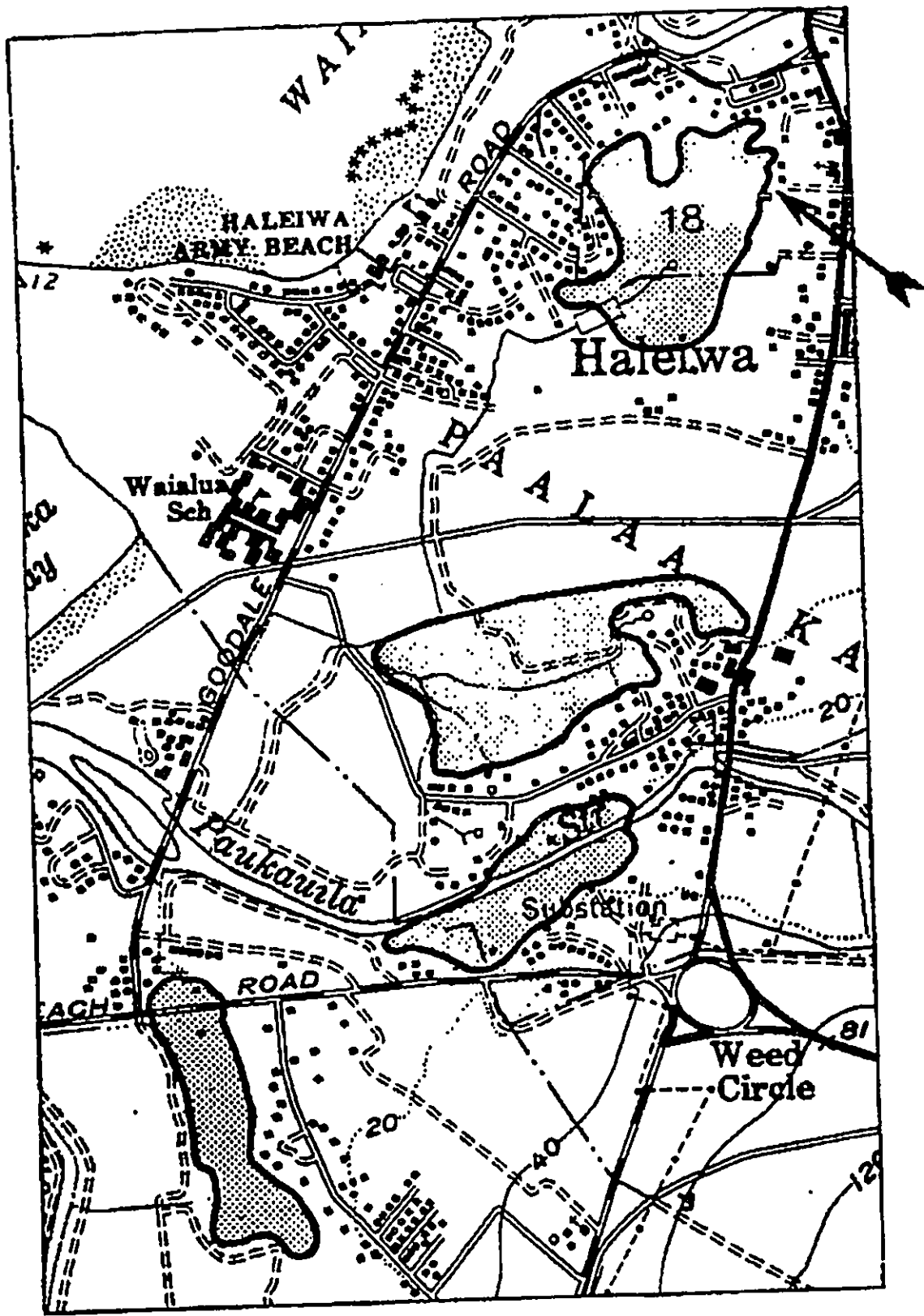


Figure 1. Arrow Indicates the Wetland Fringe.

only partially met. The high degree of disturbance in the area, i.e. the dumping of vegetative waste, cultivation of various landscape plants and even the erection of the small outbuilding have probably contributed to the transitory condition of the vegetation.

The house sites themselves do not appear to be in the wetland, but more in the drainage path from Kamehameha Highway to the wetland.

ORNITHOLOGICAL SURVEY REPORT

THE AVIAN HABITAT

Only one bird habitat, The Wetland Fringe, is found on this study site. Because the entire site has been extensively modified from its original state, it has almost no value as native bird habitat. However, it does support a variety of non-native species.

The Wetland Fringe supports a variety of introduced trees which have reached a height of from 8 to 12 m. Because the tree canopy is so varied there are many types of nest sites and the scattered grasses provide food for the seed eating birds.

The most unusual birds in the area were a pair of feral, green, thick-billed parrots.

No threatened or endangered species were found. The annotated checklist follows the nomenclature of Pratt, Bruner and Berrett (1987).

ANNOTATED SPECIES LIST

Family Zosteropidae: White-eyes

Zosterops japonicus

White-eyes are one of the most widespread introduced bird species in Hawaii. This is an ideal site for these tiny birds. It is wet and there is an abundance of weed seeds. Several pairs of birds were nesting on the site.

Family Passeridae: Old World Sparrows

Passer domesticus (House sparrow)

House sparrows are sometimes called feathered mice. These streaky brown and gray birds are a familiar commensal species and were seen among the houses and along the road. No nests were seen.

Family Fringillidae: Cardueline Finches

Carpodacus mexicanus (House finch)

The house finch is a small, sparrowlike bird with a streaked appearance. The head, throat and breast of male birds may vary from dull yellow to bright red. The females and the bodies of males are similar with gray to black streaks of color.

Introduced into Hawaii during the last century, the house finch has adapted and is now widespread throughout the islands. Pairs of birds were seen in the 'opiuma trees and near the houses.

Family Columbidae: Pigeons and Doves

Streptopelia chinensis (Spotted Dove)

The spotted dove is a large bird which is grayish brown with rosy blushed breast feathers. At the sides and back of the neck is a patch of black with white spots. The low, repetitive cooing of the spotted dove is common on this site. Several pairs and individuals were seen and appear to be an important part of the bird community of the area.

Geopelia striata (Zebra Dove)

This ground dwelling, seed eating dove is smaller and even more abundant than the spotted dove. Zebra doves were found in similar densities as the spotted dove in open, weedy places along the road and in the vacant lot next door.

Family Pycnonotidae: Bulbuls

Pycnonotus jocosus (Red-Whiskered bulbul)

This bulbul has clearly defined markings. It is brown above and white below with a sharply pointed, black, top knot. It has a bright cheek patch which is red above and white below, with a black outline. Its tail is white tipped and it has a red spot under its tail. This fairly large bird is common on this site.

Family Sturnidae: Starlings and Mynas

Acridotheres tristis (Common myna)

The myna is a plump brown bird with a dark head and tail. It has a yellow bill, legs and eyes. It has white markings on its wings and tail which flash when it flies. Its walk is distinctive. Mynas are usually seen in large groups. Many mynas were seen in the trees and in the vacant lot next door.

Bibliography

- Berger, A . J. 1981 Hawaiian Birdlife. (2nd. Ed.) Univ. Press. Honolulu.
Hawaii Audubon Society. 1988. Hawaii's Birds. Hawaii Audubon Society.
Munro, G. C. 1955. Birds of Hawaii. (3rd.Ed.) Bridgeway Press, Rutland, Vt.
Pratt, H. D., P. L. Bruner & D. G. Berrett. 1987. The Birds of Hawaii and the Tropical Pacific. Princeton Univ. Press.

BOTANICAL SURVEY REPORT

VEGETATION TYPE

The study site is very small and most of it is taken up by houses with the usual landscape vegetation around them. There are some large mango trees (*Mangifera indica* L.) between the houses and the wetland, and a variety of introduced trees, shrubs, and forbs (weeds and grasses) in the wetland fringe. No endemic or indigenous plants were found. There were three polynesian introductions; ti (*Cordyline fruticosa* (L.) Achev.), taro, and the coconut. All of the plants on the site are listed in the accompanying species list.

ENDANGERED SPECIES

No Category 1, proposed or listed threatened or endangered species of plants were found on this site (USFWS 1991, DLNR 1986).

SPECIES LIST

The plant families in the following species list have been alphabetically arranged within two groups, Monocotyledons, and Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and nomenclature follow that of St. John (1973) and Wagner, Herbst and Sohmer (1990). For each taxon the following information is provided:

1. An asterisk before the plant name indicates a plant introduced to The Hawaiian Islands since Cook or by the aborigines.
2. The scientific name.
3. The Hawaiian name and or the most widely used common name.
4. Abundance ratings are for this site only and they have the following meanings:
Uncommon = a plant that was found less than five times.
Occasional = a plant that was found between five to ten times.

Common = a plant considered an important part of the vegetation
 Locally abundant = plants found in large numbers over a limited
 area, for example the plants found in grassy patches.

This species list is the result of an extensive survey of this site at the end of the rainy season (April 1992) and it reflects the vegetative composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different growing season.

CHECKLIST OF ALL PLANTS FOUND ON THE KAMEHAMEHA HIGHWAY DRAINAGE
 IMPROVEMENT SITE, HALEIWA, HAWAII

Scientific Name	Common Name	Abundance
MONOCOTYLEDONES		
AGAVACEAE - Agave Family		
* <i>Cordyline fruitcosa</i> (L.) Achev.	Ti	Occasional
ARACEAE - Aroid Family		
* <i>Calocasia esculenta</i> (L.) Schoot	Taro	Locally abundant
* <i>Epipremnum pinnatum</i> (L.) Engl.	Golden pothos	Common
* <i>Caladium splendens</i> (Hort.) Engl.		Occasional
* <i>Dieffenbachia maculata</i> Bunting	Dumb cane	Occasional
ARECACEAE - Palm Family		
* <i>Archontophoenix alexandrae</i> Wendl & Drude	Date palm	Occasional
* <i>Cocos nucifera</i> L.	Coconut	Common
CANNACEAE - Canna Family		
* <i>Canna indica</i> L.	Indian shot	Occasional
COMMELINACEAE - Spiderwort Family		
* <i>Commelina diffusa</i> N. L. Burm.	Honohono grass	Locally abundant

Scientific Name	Common Name	Abundance
POACEAE - Grass Family		
* <i>Brachiaria mutica</i> (Forssk.) Stapf.	California grass	Locally abundant
* <i>Eleusine indica</i> Gaetrn	Beach wiregrass	Occasional
* <i>Paspalum conjugatum</i> Bergius	Hilo grass	Locally abundant
DICOTYLEDONES		
ACANTHACEAE - Acanthus Family		
* <i>Asystasia gangetica</i> (L.) T. Anders	Chinese violet	Common
ANACARDIACEAE - Mango Family		
* <i>Mangifera indica</i> L.	Mango	Occasional
* <i>Schinus terebinthifolius</i> Raddi	Christmas berry	Occasional
ASTERACEAE - Sunflower Family		
* <i>Pluchea symphytifolia</i> (L.) Cass.	Pluchea	Occasional
BIGNONEACEAE - Bignonia Family		
* <i>Spathodea campanulata</i> P. Beauv.	African tulip	Occasional
CUCURBITACEAE - Cucumber Family		
* <i>Coccinia grandis</i> (L.) Voight	Scarlet gourd	Occasional
* <i>Momordica charantia</i> Crantz	Balsam apple	Common
PHYTOLOCCACEAE - Pokeweed Family		
* <i>Rivina humilis</i> L.	Coral berry	Common
LEGUMINOSAE - Bean Family		
* <i>Canavalia cathartica</i> Thouars	Maunaloa vine	Uncommon
* <i>Leucaena leucocephala</i> deWit	Koa-haole	Common
* <i>Pithecellobium dulce</i> (Roxb.) Benth	'Opiuma	Occasional
* <i>Prosopis pallida</i> HBK	Kiawe, algaroba	Occasional
MYRTACEAE - Myrtle Family		
* <i>Syzygium cumini</i> (L.) Skeels	Java plum	Common
SOLANACEAE - Tomato Family		
* <i>Solanum americanum</i> Mill.	Popolo berry	Occasional

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