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RECEIVED

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GW 10/98-2014

November 19, 1998

Mr. Gary Gill, Director
Office of Environmental Quality Control
Central Pacific Plaza
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

Acceptance Notice for the Waipio Peninsula Soccer Park -
Final Environmental Impact Statement

We are notifying you of our acceptance of the Final Environmental Impact Statement (EIS) for the Waipio Soccer Park as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

Pursuant to Section 11-200-23(e), Chapter 200, Title 11 ("Environmental Impact Statement Rules") of the Administrative Rules, this Acceptance Notice should be published in the December 8, 1998 Environmental Notice.

We have attached our Acceptance Report for the Final EIS for the Waipio Soccer Park. Should you have any questions, please contact Gordon Wood of our staff at 527-6073.

Yours very truly,

PATRICK T. ONISHI
Chief Planning Officer

PTO:lh

Attachment

1998 - Oahu - FEIS -
Waipio Soccer

Final
Environmental Impact Statement
for

WAIPIO PENINSULA SOCCER PARK
CONCEPTUAL MASTER PLAN

Prepared for
The Department of Design and Construction
City and County of Honolulu

October 1998

Final
Environmental Impact Statement

for

WAIPIO PENINSULA SOCCER PARK
CONCEPTUAL MASTER PLAN

Prepared For:
City and County of Honolulu
Department of Design and Construction

Prepared By:
Belt Collins Hawaii
and
Stringer Tusher Architects, AIA Inc.

OCTOBER 1998

SUBMITTED BY AND PREPARED
UNDER THE DIRECTION OF:

Susan A. Sakai

Susan Sakai, Director of Planning
Belt Collins Hawaii, Ltd.

October 13, 1998

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ABBREVIATIONS/ACRONYMS

AAQS	Ambient Air Quality Standards
ADA	Americans With Disabilities Act
ADPV	Average delay per vehicle, in seconds
ALISH	Agricultural Lands of Importance to the State of Hawaii
AYSO	American Youth Soccer Organization
BWS	Board of Water Supply
CDUA	Conservation District Use Application
CDUP	Conservation District use Permit
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
CWRM	State Commission on Water Resource Management
cy	cubic yards
CZM	Coastal Zone Management

DDESB	Department of Defense Explosives Safety Board
DEIS	Draft Environmental Impact Statement
DLNR	State Department of Land and Natural Resources
DOE	Department of Education
DP	Development Plan
DPW	Department of Public Works
DSB	Detention/sedimentation basin
DU	Ducks Unlimited
EA	Environmental Assessment
ESQD	Explosive Safety Quantity Distance
FCC	Federal Communications Commission
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
gpm	gallons per minute
GSP	Gross State Product
HAR	Hawaii Administrative Rules
HCM	Hawaii Capacity Manual
HECO	Hawaiian Electric Company
HRS	Hawaii Revised Statutes
HYSA	Hawaii Youth Soccer Association
ICBO	International Conference of Building Officials
in/hr	inches per hour
LOS	level-of-service
mgd	million gallons per day
MSL	mean sea level
MSW	Municipal Solid Waste
NA	Not Analyzed
NAAQS	National Ambient Air Quality Standards
NASBP	Naval Air Station Barbers Point
NAVMAG	Naval Magazine
NC	Not Calculated
NEPA	National Environmental Policy Act of 1969
NISMF	Naval Inactive Ships Maintenance Facility
NO_2	nitrogen dioxide
NRHP	National Register of Historic Places
O_3	ozone
OR&L	Oahu Railway and Land Company
OSHA	Occupational Safety and Health Administration
Pb	lead
PHGWMA	Pearl Harbor Ground Water Management Area
PHNHL	Pearl Harbor National Historic Landmark
PHNWR	Pearl Harbor National Wildlife Refuge
PL	Public Law
PM-10 and PM-2.5	particulate matter

PPE	Personal protective equipment
PRG	preliminary remediation goal
PSD	Prevention of Significant Deterioration
SCORP	State Comprehensive Outdoor Recreation Plan
SHPD	State Historic Preservation Division
SO_2	sulfur dioxide
SRFP	State Recreation Functional Plan
TMK	Tax Map Key
TPD	tons per day
TR55	Natural Resource Conservation Service Technical Release 55
TRB	Transportation Research Board
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/C	volume-to-capacity ratio
WWTP	Waste Water Treatment Plant

CHAPTER 1
INTRODUCTION AND SUMMARY

1.1 BACKGROUND

1.1.1 Purpose of Document

This Final Environmental Impact Statement (FEIS) has been prepared for the City and County of Honolulu Department of Design and Construction for the proposed master plan development of the Waipio Peninsula Soccer Park. The project calls for the use of City and County of Honolulu land and funds, thereby subjecting the proposed action to review under Chapter 343, Hawaii Revised Statutes, and its administrative rules. The Department of Design and Construction has determined that the proposed action will result in potential impacts which should be addressed in an EIS. The Department of Design and Construction is the approving agency for the EIS, and the Planning Department is the accepting authority for the EIS acting on behalf of the Mayor of the City and County of Honolulu. The consultant and planner for the project is the firm of Stringer Tusher Architects. This EIS document was prepared by Belt Collins Hawaii.

1.1.2 General Project Description

The proposed project is based upon a Conceptual Master Plan for the Waipio Peninsula Soccer Park (see Appendix A). As presently envisioned, the conceptual master plan includes four principal elements: the soccer park at Waipio Peninsula, a portion of Waipio Point Access Road which links the soccer park to Farrington Highway, a portion of Waipahu Depot Street that links the soccer park to Farrington Highway, and a proposed alignment for a non-potable irrigation water transmission line between Waikele Stream and the soccer park. The three "off-site" elements (the two roadways and the irrigation line alignment) are included because they represent infrastructure improvements directly related to development of the soccer park. Together, these four elements constitute the project that is discussed and analyzed in this EIS. Therefore, the so-called "project area" includes the soccer park and three "off-site" elements. Following is a more detailed description of these project elements.

> <u>The Soccer Park</u>: The City and County of Honolulu is proposing to develop a soccer park on approximately 300 acres at Waipio Peninsula in Waipahu [Tax Map Keys (TMK) 9-3-02, 30, 31, 33, 34 & Pors. 1, 9, & 28, Central Oahu District] (Figures 2-1 and 2-2). The proposed soccer park will be situated immediately south of and adjacent to the Ke Kula Maka'i Police Academy. The majority of the soccer park site is on federal land formerly leased by Oahu Sugar Company for sugar cane cultivation and sugar mill waste water disposal. This federal property would be leased by the City and County of Honolulu from the U.S. Navy. The remainder of the soccer park site consists of land owned by the City and County of Honolulu and the State of Hawaii (see Figure 2-4). It

encompasses the Waipahu Incinerator, which ceased operations in the early 1990s, and the Municipal/Ash Landfill, as shown in Figure 2-3.

In addition to the soccer park lands, the proposed project may require improvements to two existing roadways, depending on which alternative traffic mitigation measures are selected for implementation:

Waipio Point Access Road: This roadway is a paved two-lane collector road which extends from Farrington Highway south to the soccer park along the eastern edge of Waipio Peninsula. The portion of the roadway extending from Farrington Highway to the Naval Reservation (which is identified by a chain link perimeter fence just south the road's intersection with Poailani Circle) is owned by the City and County of Honolulu and is depicted on Tax Map 9-4-08. The remaining portion of Waipio Point Access Road is located on federal land and is identified as TMK 9-3-02: portion 1. This roadway presently serves as the access road to the Ted Makalena Golf Course. Improvements to the roadway could include widening to three or possibly four lanes and improvements to its intersection with Farrington Highway.

Waipahu Depot Street: This roadway is a paved two-lane street that presently extends from Farrington Highway to the Waipahu Incinerator along the eastern edge of Kapakahi Stream. It is owned by the City and County of Honolulu and is depicted on Tax Maps 9-4-11 and 9-3-02. The portion of the street depicted on Tax Map 9-3-02 consists of roadway easement. Improvements to the street could include extending it into the soccer park, subject to landfill closure requirements, as well as improvements to its intersection with Farrington Highway.

As part of the proposed lease between the U.S. Navy and the City and County of Honolulu for the federally owned portion of the soccer park lands, non-potable irrigation water will be provided by the City to the Navy, in accordance with Public Law (P.L.) 105, Section 127. As discussed in Section 3.11.2.2 of this document, a number of alternatives for source development and transmission line alignment have been evaluated. The preferred alignment. is included as an element of the proposed project:

Non-Potable Irrigation Water Transmission Line Alignment: The alignment generally extends from source development at Waikele Stream southeast to Waipahu Depot Street, within a series of existing sewerline easements, and then east across the City's Waipahu Sewer Pump Station property and a City-owned plant nursery to the Ted Makalena Golf Course, and finally, south through the golf course to the soccer park. The alignment will include portions of three State-owned parcels (TMKs 9-4-10: 27 and 9-4-11: 03 and 104), portions of five City-owned parcels (TMKs 9-4-10: 08 and 57, 9-4-11: 46, and 9-3-02: 32 and 34), and a portion of federally owned parcel 9-3-02: 01. The irrigation system will also include reconstruction of a reservoir pond within the golf course.

At build-out, the Conceptual Master Plan (Appendix A) envisions the soccer park to include the following elements:

- Thirty-three regulation soccer fields, seven of which would be illuminated, including a tournament or stadium field with initial seating of 4,000 expandable to an ultimate capacity of approximately 10,000 with locker rooms, trainer facilities, media facilities, security, administrative offices, medical facilities, public concessions, and restrooms;

- Conversion of existing facilities at the Waipahu Incinerator into a training center with locker rooms, multi-purpose room, recreational and training facilities, conference and meeting rooms, kitchen and dining facilities, dormitories, and two indoor soccer arenas on the incinerator site as part of the training center, with bleacher seating and support facilities;

- Five to ten beach soccer fields;

- Free-standing restrooms and concession stands;

- Parking for up to 5,000 cars;

- A non-potable irrigation water source and transmission system to the soccer park and U.S. Navy agricultural lands south of the soccer park site;

- Drainage improvements adjacent to Waipio Point Access Road;

- Potable water and sanitary sewer systems; and

- Improvements to Waipio Point Access Road and Waipahu Depot Street, and the Farrington Highway intersections with these two roadways.

All soccer park facilities will be designed, constructed, and operated to be in compliance with the Americans With Disabilities Act (ADA) and all other applicable federal, state, and City and County of Honolulu laws, statutes, rules and regulations, and ordinances. The project is being designed so as not to conflict with or adversely affect the operations of the adjacent Federal Communications Commission (FCC) facility.

1.2 STATEMENT OF OBJECTIVES

The primary goals of the proposed action are to facilitate the promotion of Honolulu and the State of Hawaii as a destination sports center for regional, national, and international markets and to increase the number of soccer practice and game fields in the Central Oahu district. These goals will be accomplished, in part, by developing a full-service soccer park capable of hosting regional, national, and international tournament and exhibition play, as well as by providing a resource for local soccer and soccer related recreational activities.

1.3 SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Impacts to the environment are expected to result from construction and operation of the Waipio Peninsula Soccer Park. Potential adverse impacts will be mitigated where possible and/or offset by benefits resulting from the project. The following identifies the expected short-term and long-term environmental effects and recommended mitigation. Each of the mitigation measures summarized below is discussed in detail in Chapter 3.

Topography, Geology, and Soils

The soccer park will be located on former sugar cane lands (see Chapter 3, Section 3.2, Figure 3-1). Additionally, a portion of the proposed soccer park will be located on lands previously used for disposal of Waipahu Sugar Mill waste wash water and sediments. Waipio Peninsula is underlain by coralline reef material and basalt. The land on which the soccer park is planned is relatively flat, sloping from west to east. Elevations of the Peninsula range from about 40 feet above mean sea level (+40 feet MSL) to less than +5 feet MSL. The elevation of the site averages approximately 10 feet higher than lands to the north of the site, including the Ted Makalena Golf Course.

A complete aerial and ground topographic survey of the soccer park site has been completed as part of the preliminary engineering phase of the project. Similarly, soils drilling and testing have been performed to determine the engineering and landscape properties of the soccer park site. The information generated by these actions has been included in this FEIS (see Chapter 3, Section 3.2).

The geology of the project area will be unaffected by the proposed project and, therefore, not require any mitigation measures. The soils of the project area will be regraded, and added to as required, to create the soccer play fields. The topography of the soccer park will be reconfigured to allow development of the soccer play fields and stadium. Grading will be designed to minimize potential surface water runoff into Pearl Harbor and Kapakahi Stream. Similarly, best management practices will be employed to assure appropriate erosion and sediment control during construction activities.

Soil samples from the Phase 1 and part of the Phase 2 areas were compared to concentrations established by the U.S. Environmental Protection Agency (EPA) to be protective of human health. None of the samples had concentrations exceeding these target concentrations except metals, which are naturally high in volcanic soils. Hence, no risks are expected to construction workers or park users from residual agricultural chemicals or from incinerator ash that may have blown into the area. Soil samples were not obtained from the landfill or incinerator sites. If Phase 2 proceeds, additional environmental work may have to be conducted to develop these sites and mitigation would be implemented as required.

Biological Environment

A botanical survey of the soccer park site has been conducted as part of the EIS process and the information generated included in this FEIS (Chapter 3, Section 3.6 and Appendix C). The soccer park site is covered with remnant sugar cane, koa haole, castor bean, and various grasses and weeds. No candidate or listed endangered or threatened plants are found on the site. Similarly, there are no wetlands, as defined by the U.S. Army Corps of Engineers, found within the project boundaries. However, there are wetlands along the shorelines of both Middle and West Loch of Pearl Harbor. These areas will be unaffected by the proposed project.

The existing botanical characteristics of the soccer park area will be changed as a result of the development of the soccer fields and associated landscaping. To the extent practical, native plants will be used in the landscaping scheme, and drought and salt tolerant grasses will be selected.

A wildlife survey of the site has been conducted as part of the EIS process and the information included in this FEIS (Chapter 3, Section 3.7 and Appendix D). The known wildlife inhabiting or frequenting the soccer park site include dove, red-whiskered bulbul, common house sparrows, Pacific golden plover, common myna, nutmeg mannikin, cattle egret, and Japanese white-eye. The wildlife also includes common Indian mongoose as well as feral cats and dogs. There are no candidate or listed endangered or threatened faunal species found on the site.

The bird fauna of the soccer park site may change as a result of the proposed project. Changes would be due to alterations to habitat and existing food and cover characteristics of the site. New landscaping, in addition to use of native plants to the extent practical, would serve as wildlife habitat.

Air Quality

The air quality in the vicinity of Waipio Peninsula is in attainment of the National Ambient Air Quality Standards (NAAQS) and meets the State of Hawaii Ambient Air Quality Standards.[1] No significant sources of air pollutants occur on or near the soccer park site. Construction dust and emissions from equipment associated with project construction activities may temporarily increase air emissions during the construction period. These factors have been considered, along with potential effects from operational sources, such as automobiles entering and leaving the project area.

Because of the predominant trade wind pattern and the proposed traffic mitigation measures, no project specific mitigation measures are warranted. During construction, all equipment will be required to meet applicable federal and state air pollution control

1 Extrapolated from air quality data collected at various locations within the state.

rules. Construction-generated dust will be controlled through frequent watering of the construction site and other mitigation measures as required.

Noise Quality

The soccer park site is generally quiet due to the lack of significant noise generators in the area. Some noise is generated by activities at the Naval Inactive Ships Maintenance Facility (NISMF) located on the east side of Waipio Peninsula in the vicinity of the soccer park site. Noise from airplanes landing and taking off at Honolulu International Airport is experienced at the site, but at low levels. The proposed action will result in increased noise levels in the project area from cheering and other sports-related activities, as well as noise generated at build-out from special events. These activities would be ongoing, although intermittent, that is, only during practices, games, and special events.

A determination of the noise impacts is dependent upon the identification of noise-sensitive receptors, that is to say, specific locations where the levels of noise would be deemed to be unacceptable, such as schools, residences or hospitals. The nearest noise-sensitive receptors to the soccer park are the private residences situated along Awamoku Street mauka of the Ted Makalena Golf Course. Mitigation of potential adverse noise effects may be warranted due to the low level of existing noise versus that expected to be generated. Based on anecdotal information, concerts and other activities at Aloha Stadium and the Waikiki Shell exceed allowable noise levels as defined by the State Department of Health. This may also be the case with the proposed soccer park project. During construction, all equipment will be required to meet applicable noise codes.

Historical and Archaeological Resources

An archaeological inventory survey of the site, as well as an investigation into the history and possible cultural significance of the soccer park site has been conducted and included as part of this FEIS (see Chapter 3, Section 8.0 and Appendix E). The State Historic Preservation Division concurs that the proposed soccer park and offsite improvements would have no effect on precontact fishponds, deeply buried precontact sites, historic sugar cane irrigation systems, or a wall section of probable historic age, and no adverse effect on the OR&L railroad spur.

Land Use and Ownership

The ultimate build-out master planned soccer park will be located on land currently under control of the City and County of Honolulu, as well as land owned by the State of Hawaii and U.S. Navy. Use of City property is consistent with existing land use designations and controls. The City and County of Honolulu is in the process of negotiating a lease with the U.S. Navy for the use of the Navy lands, and development of the soccer park would be compatible with the proposed lease terms and conditions. Similarly, the City would need to negotiate a lease with the State for use of the State lands prior to the initiation of final build-out construction elements that would be located on State lands.

Socioeconomic Impacts

The results of a socioeconomic impact assessment study conducted specifically for the proposed soccer park (Chapter 3, Section 3.9 and Appendix F) indicate that the project will result in positive social impacts through the provision of needed soccer practice and game fields in Central Oahu. Similarly, the economic impacts are anticipated to be positive for both the City and State through the provision of direct and indirect construction jobs, income generated by the soccer park, and increased ability by the City and State to market Hawaii as a venue for regional, national, and international soccer tournaments. It is projected that total program management and maintenance expenditures would cost the City and County of Honolulu about $2.9 million per year at the completion of Phase 1 and $7.7 million per year at the completion of build-out. Potential revenues from use of the facilities are estimated to be up to $1.0 million per year at the completion of Phase 1 and up to $4.4 million per year at the completion of build-out.

Man-Made Hazards

A portion of the soccer park is proposed to be located on Navy-owned lands within the Explosive Safety Quantity Distance (ESQD) arcs which emanate from the ammunition handling wharves at the West Loch Branch, Naval Magazine (NAVMAG) Lualualei. The ESQD arcs represent hazard zones that are established by the Department of Defense for various quantities and types of explosives used by the military. Minimum distances are prescribed for separating explosives from inhabited structures (Inhabited building distance), from public roads (public transportation route), and from other explosives. The risks associated with the ESQD arcs that encumber a portion of the soccer park (see Figure 2-7) exist only when a loaded cargo ammunition ship is at a wharf, or ammunition or explosives are staged on the wharves at West Loch Branch, NAVMAG Lualualei.

The Department of Defense Explosives Safety Board (DDESB) is a Joint Service Activity of the Department of Defense with responsibility to establish safety standards that are designed to prevent hazardous conditions associated with ammunition and explosives manufacturing, tests, handling, storage, transportation, and disposal.[2] The DDESB reviews and approves, from an explosives safety standpoint, all operations involving ammunition and explosives, or structures in the vicinity of, or affected by explosives safety criteria.

2 NAVFACINST 11010.44E. Change 1, Sec. 10-14.

The DDESB has reviewed and approved the plan to site the soccer park within the outer portion of the ESQD arcs. DDESB has evaluated that this proposed site provides adequate safety for this intended recreational use. Personnel in the open are unlikely to be killed or seriously injured directly by a blast, although some injuries could result from fragments and debris depending on the amount and fragment characteristics of the ammunition involved.[3] The prohibition against stuctures in this area will eliminate the secondary hazard from the collapse of structures onto personnel.[4]

Traffic Impacts

The results of a traffic study completed for the proposed project (see Chapter 3, Section 3.11 and Appendix G) indicate that the proposed development would result in increased traffic along Waipahu Depot Street, Waipahu Point Access Road, and Farrington Highway, a State-owned roadway. Plans by the City and County of Honolulu to widen portions of Farrington Highway, in coordination with the State Department of Transportation, as well as plans to improve both Waipahu Depot Street and Waipio Point Access Road as part of the Waipio Peninsula Soccer Park project, will assist in alleviating the majority of the potential adverse traffic impacts. The majority of the activities at the site will occur during non-peak traffic hours, which will also tend to minimize traffic impacts.

Infrastructure

Electrical power, sewer, irrigation water, solid waste collection, and potable water service will be required to serve the proposed project. At present most of these services are available either adjacent to the soccer park site or will require development to the site. For example, a non-potable irrigation water source and transmission system will be developed as part of the proposed action. The non-potable water source will be the revival of a former Oahu Sugar Company Waikele Stream diversion system and may include development of a non-potable well adjacent to the diversion to augment supply. Development of this water source will be in compliance with applicable federal, state, and City and County of Honolulu laws, statutes, ordinances, rules, and regulations. Stream flow equal to or greater than historical flow rates will be maintained to minimize effects on stream biota downstream from the diversion as well as maintain existing levels of nutrients flowing into Pearl Harbor. No additional mitigation measures are warranted.

The development of electrical power, potable water, solid waste collection and sewer service to the site will be in compliance with applicable rules and regulations and are being planned in consultation with the respective utilities and agencies.

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3 NAVSEA OP 5 Volume 1, Sixth Revision, Sec. 7-8.6.

4 Electronic mail, R. Adams of 23 Jul 98.

1.4 SUMMARY OF ALTERNATIVES

Alternative development schemes were evaluated to determine the concept plan for the proposed action. Different layouts of the soccer fields and stadium as well as different ingress/egress routes were identified. Alternative locations for the soccer park were evaluated as has the No Action alternative. In the preparation of this FEIS, the concept plan for the soccer park has been further assessed in relation to alternatives and the project goals and objectives.

1.5 SUMMARY OF UNRESOLVED ISSUES

Because planning for the proposed project is presently at the level of conceptual master planning, a number of design, permitting, or operational issues related to its implementation remain to be resolved, particularly those associated with Phase 2. These include:

- Extent and timing of surface street improvements
- Availability and use of public funding for Phase 2
- Landfill closure and permitting issues (Phase 2)
- Special event management requirements to minimize noise impacts
- Issues relating to reuse of the Waipahu Incinerator Building such as the presence of potential hazardous materials (Phase 2)
- Lease of State lands in Phase 2

Several of the issues identified in the DEIS have been resolved as planning and design have progressed

1.6 SUMMARY OF COMPATIBILITY WITH LAND USE POLICIES AND PLANS

Development of the Waipio Peninsula Soccer Park is consistent with the State of Hawaii and City and County of Honolulu land use policies and plans. These policies and plans and their relationship with the proposed action are reviewed in Chapter Four of this FEIS.

1.7 NECESSARY APPROVALS AND PERMITS

The major land use and environmental approvals and permits required for the proposed action are listed below:

Direct Project Specific Permits and Approvals:

Federal:
- Lease for use of federal lands
- Environmental Assessment and Finding of No Significant Impact (FONSI) for use of federal lands

State:
- Chapter 343 (HRS) Environmental Impact Statement
- National Pollution Discharge Elimination System (NPDES) Stormwater Discharge Permit for construction exceeding five acres
- Water Use Permit
- Coastal Zone Management Consistency Certification

City and County of Honolulu:
- Clearing, Grubbing and Grading Permits
- Building Permits
- Sewer Connection Permit
- Development Plan Public Facilities Map amendment to add proposed non-potable water system

Possible Indirect Project Permits and Approvals:

Federal:
- U.S. Army Corps of Engineers Nationwide Permit #33 for Waikele Stream diversion
- Possible Section 404 (Clean Water Act) Permit for Waikele Stream diversion

State:
- Landfill closure plan and implementation approval
- Conservation District Use Application (CDUA) for use of landfill lands for other uses

1.8 RELATED DOCUMENTS

An Environmental Assessment (EA), prepared under the National Environmental Policy Act of 1969 (NEPA) for the lease of federal lands, is being prepared by the Commander, Naval Base, Pearl Harbor. Notice of intent to prepare this EIS and the NEPA EA was published in the *OEQC Environmental Notice* (November 23, 1997). The deadline for comments on the EA and EIS was extended from December 23, 1997 to March 23, 1998. Comments received are included in Chapter Six of this FEIS.

CHAPTER 2
PROPOSED PROJECT AND ALTERNATIVES CONSIDERED

2.1 PROJECT OBJECTIVES

The primary long-term goal of the City and County of Honolulu Department of Design and Construction Waipio Peninsula Soccer Park project is to facilitate the promotion of Honolulu and the State of Hawaii as a destination sports center for regional, national, and international markets. The immediate goal of the project is to increase the number of soccer practice and game fields in the Central Oahu district. These goals will, in part, be accomplished by developing a full-service soccer complex capable of hosting regional, national, and international tournament and exhibition play, and in part by serving as a resource for local soccer and soccer related recreational activities.

2.2 PROJECT NEED

At present, only six City and County of Honolulu parks and recreation facilities are available to Central Oahu children and adults for soccer practices and games. There are almost 19,000 children representing over 1,200 teams participating in American Youth Soccer Organization (AYSO) and Hawaii Youth Soccer Association (HYSA) programs on Oahu. In Central Oahu, AYSO youth enrollment is approximately 7,000, and an additional 1,500 or more participate in HYSA and adult leagues. Each of these organizations and teams must share practice and game playing fields. No soccer fields on Oahu, or in the State of Hawaii, are capable of meeting national or international tournament standards, which generally call for a minimum of 24 fields located in one place.[1] Consequently, Hawaii youth and adult teams must now travel to the mainland U.S. for regional and national tournaments.

Demand is strong in the region surrounding the proposed soccer park site. Pearl City, to the east, and Mililani, to the north, are active soccer centers in Hawaii and home to many of Hawaii's leading high school and college players. Soccer organizers in Ewa, to the west, and the new Waipahu subdivisions have stressed the need for more playing fields to meet demand from their communities. The City and County of Honolulu Soccer Task Force reports that enrollment in Waipahu, Waipio, and Waikele is limited due to a shortage of fields. As of 1990, Central Oahu and Ewa were home to 20.8 percent of the island population. This share is expected to climb to 29.1 percent by 2020 (according to City and County of Honolulu plans). This suggests that local demand will climb by at least 40 percent over the next few years.

The lack of practice and playing fields, as well as the time and costs involved with traveling from communities to existing fields, and to the mainland U.S. for regional and national tournaments, severely limit the growth and development of high quality local players and coaches.

[1] United States Youth Soccer Association, Region 4, Far West Regional Tournament Administration Manual. November 1, 1996.

2.2.1 Existing Recreation Facilities in the Waipio Area

Existing public parks in the Central Oahu district include:

Waipahu Cultural Garden Park
Kealohi Neighborhood Park
Mililani District Park
Mililani Neighborhood Park
Pearl Ridge Community Park
Waiau District Park
Rainbow Park
Hans L'Orange Park
Waipahu Recreation Center

Of the above, Kealohi Neighborhood Park, Mililani District Park, Mililani Neighborhood Park, Pearl Ridge Community Park, Waiau District Park, and Waipahu Recreation Center have one soccer field each. These fields are used by both youth and adult teams for practice sessions and games. Additionally, some of the soccer fields, such as the one at Pearl Ridge Community Park, also serve as baseball or football fields. Other playing fields are located at schools, but these are generally not available for league activities since school programs have priority. Recreation facilities on military bases are generally reserved for use by military personnel and dependents.

2.2.2 Future Demand

In recent years, the number of soccer players on Oahu has grown 5 to 7 percent annually,[2] while the number of soccer practice and game fields has not increased. Based on a 5 percent annual average increase, it can be expected that by the year 2001, when Phase 1 of the proposed project is scheduled to be completed, there will be approximately 22,000 youth and adult soccer players on Oahu. Major state and City and County of Honolulu recreation projects under consideration that would add to the recreational opportunities for island residents include:

- Central Oahu Regional Park. The project would be part of the City and County's proposal to develop a regional park and sports complex that, when completed, will include a variety of recreational facilities: baseball and soccer fields; basketball and volleyball courts; an in-line skating court; a skateboarding bowl; an aquatic center; and a community center. The plans also call for passive recreational uses.[3] More recent reports suggest that development of this park project will place less emphasis on

[2] City and County of Honolulu Soccer Subcommittee, Task Force, April 1998. This percentage growth reflects the annual increase in enrollment experienced by AYSO and HYSA in recent years.

[3] PlanPacific, Inc. 1998.

attracting professional level baseball activity. In this manner, the complex would not be in direct competition with a similar facility proposed by the state for East Kapolei.

- Barbers Point Sports Training Center. The City and County of Honolulu has plans for an Olympic-standard sports competition and training facility at Barbers Point. After the closure of Naval Air Station Barbers Point (NASBP) in mid-1999, the land for this facility would be transferred to the City and County of Honolulu. At this time, though, no development timetable has been determined.

- East Kapolei Sport Complex. This sports complex is part of the state's East Kapolei project.[4] This proposal has been presented to the community as a facility designed to encourage professional baseball teams to come to Hawaii for spring training.[5] The complex would also be available for exhibition games and, when not in use by professionals, to the surrounding community. Ground breaking for the first phase of this facility will take place during 1999; completion is currently scheduled for 2000.

2.3 DESCRIPTION OF THE PROPOSED PROJECT

2.3.1 Principal Elements of the Conceptual Master Plan

The proposed project is based upon a Conceptual Master Plan for the Waipio Peninsula Soccer Park (see Appendix A). As presently envisioned, the conceptual master plan includes four principal elements: the soccer park at Waipio Peninsula, a portion of Waipio Point Access Road which links the soccer park to Farrington Highway, a portion of Waipahu Depot Street that links the soccer park to Farrington Highway, and a proposed alignment for a non-potable irrigation water transmission line between Waikele Stream and the soccer park. The three "off-site" elements (the two roadways and the irrigation line alignment) are included because they represent infrastructure improvements directly related to development of the soccer park. Together, these four elements constitute the project that is discussed and analyzed in this EIS. Therefore, the so-called "project area" includes the soccer park and three "off-site" elements. Following is a more detailed description of these elements (a detailed discussion of the physical components of the soccer park is presented later in this chapter).

<u>The Soccer Park</u>: The City and County of Honolulu is proposing to develop a soccer park on approximately 300 acres at Waipio Peninsula in Waipahu [Tax Map Keys (TMK) 9-3-02, 30, 31, 33, 34 & Pors. 1, 9, & 28, Central Oahu District] (Figures 2-1 and 2-2). The soccer park

[4] PBR Hawaii. 1998.

[5] Bakutis, B. July 21, 1997.

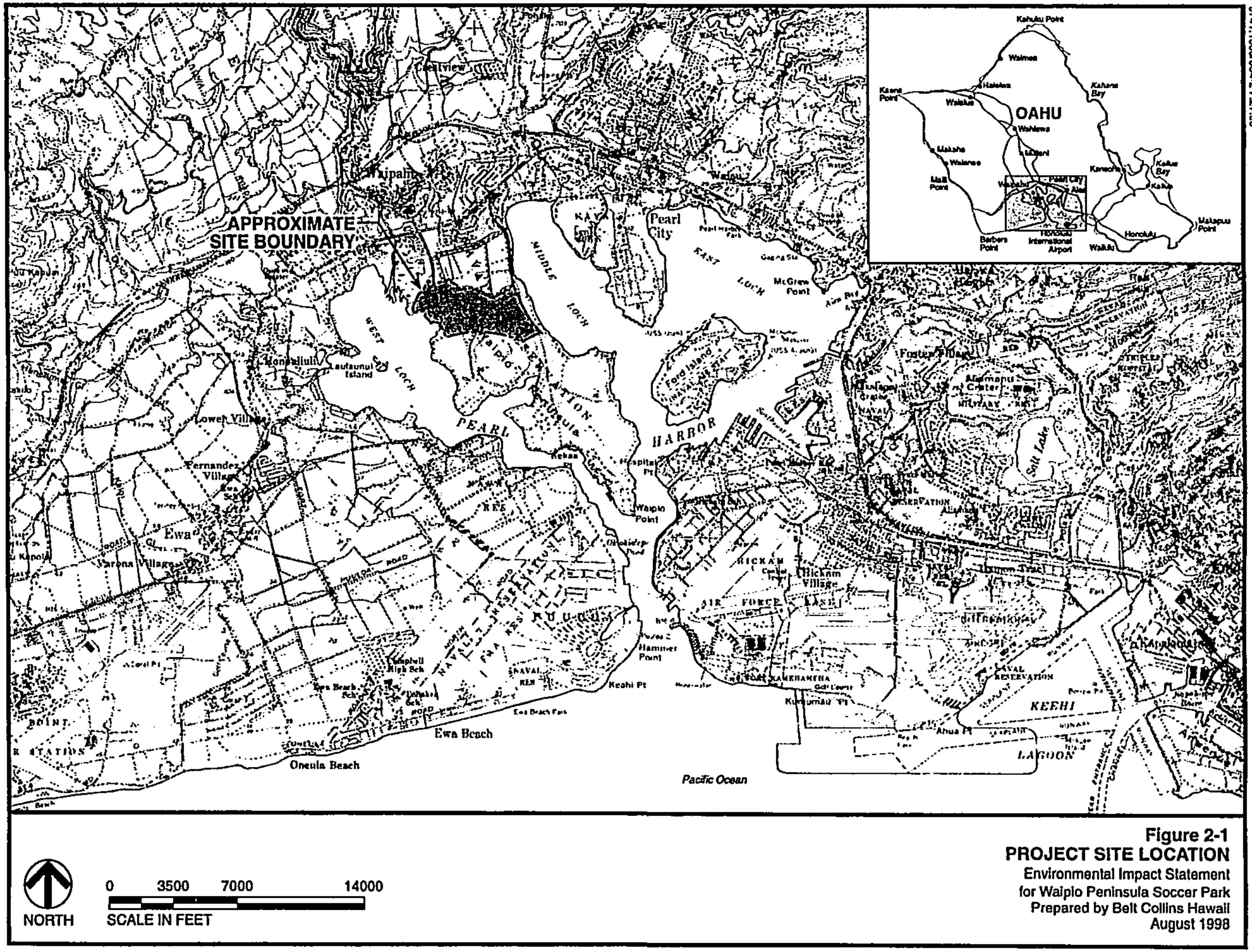

Figure 2-1
PROJECT SITE LOCATION
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

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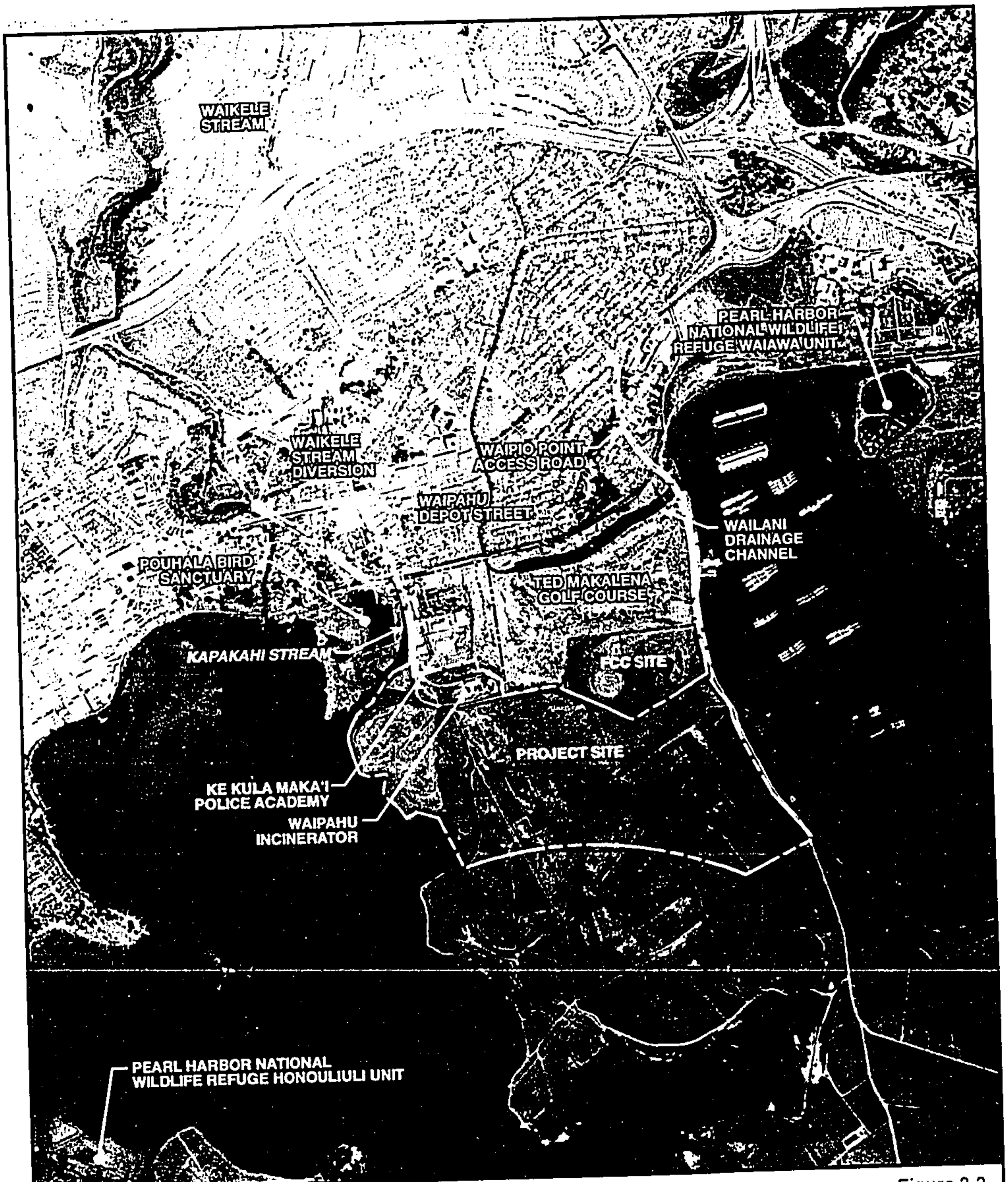

Source of aerial photo: Air Survey Hawaii, December 1995

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Figure 2-2
WAIPIO POINT PROJECT LOCATION MAP
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

site is bounded on the north by City and County of Honolulu land (Ke Kula Maka'i Police Academy and Ted Makalena Golf Course), and a federal reservation used by the Federal Communications Commission (FCC); on the west by Kapakahi Stream, a State-owned parcel leased to the City and County of Honolulu, and West Loch of Pearl Harbor; on the south by a naval reservation; and on the east by the naval reservation, the FCC federal reservation, and Waipio Point Access Road (Figures 2-3 and 2-4). The majority of the soccer park site is on federal land formerly leased by Oahu Sugar Company for sugar cane cultivation and sugar mill waste water disposal. This federal property would be leased by the City and County of Honolulu from the U.S. Navy. The remainder of the soccer park consists of land owned by the City and County of Honolulu and the State of Hawaii (see Figure 2-4). It encompasses the Waipahu Incinerator and Municipal/Ash Landfill (see Figure 2-3).

In addition to the soccer park lands, the proposed project may require improvements to two existing roadways, depending on which alternative traffic mitigation measures are selected for implementation:

Waipio Point Access Road: This roadway is a paved two-lane collector road which extends from Farrington Highway south to the soccer park along the western edge of Waipio Peninsula. The portion of the roadway extending from Farrington Highway to the Naval Reservation (which is identified by a chain link perimeter fence just south the road's intersection with Poailani Circle) is owned by the City and County of Honolulu and is depicted on Tax Map 9-4-08. The remaining portion of Waipio Point Access Road is located on federal land and is identified as TMK 9-3-02: portion 1. This roadway presently serves as the access road to the Ted Makalena Golf Course. Improvements to the roadway could include widening to three or possibly four lanes and improvements to its intersection with Farrington Highway.

Waipahu Depot Street: This roadway is a paved two-lane street that presently extends from Farrington Highway to the Waipahu Incinerator along the eastern edge of Kapakahi Stream. It is owned by the City and County of Honolulu and is depicted on Tax Maps 9-4-11 and 9-3-02. The portion of the street depicted on Tax Map 9-3-02 consists of roadway easement. Improvements to the street could include extending it into the soccer park, subject to landfill closure requirements, as well as improvements to its intersection with Farrington Highway.

As part of the proposed lease between the U.S. Navy and the City and County of Honolulu for the federally owned portion of the soccer park lands, non-potable irrigation water will be provided by the City to the Navy. As discussed in Section 3.11.2.2 of this document, a number of alternatives for source development and transmission line alignment have been evaluated. The preferred alignment is included as an element of the proposed project:

Non-Potable Irrigation Water Transmission Line Alignment: The alignment generally extends east from source development at Waikele Stream (TMK 9-4-10: portion of 27), across a portion of City-owned property (TMK 9-4-10: 57), and then south along a City-owned easement (TMK 9-4-10: 08), under Farrington Highway. Makai of the highway, the alignment continues south along an easement which corresponds to an abandoned spur of the Oahu Railway and Land

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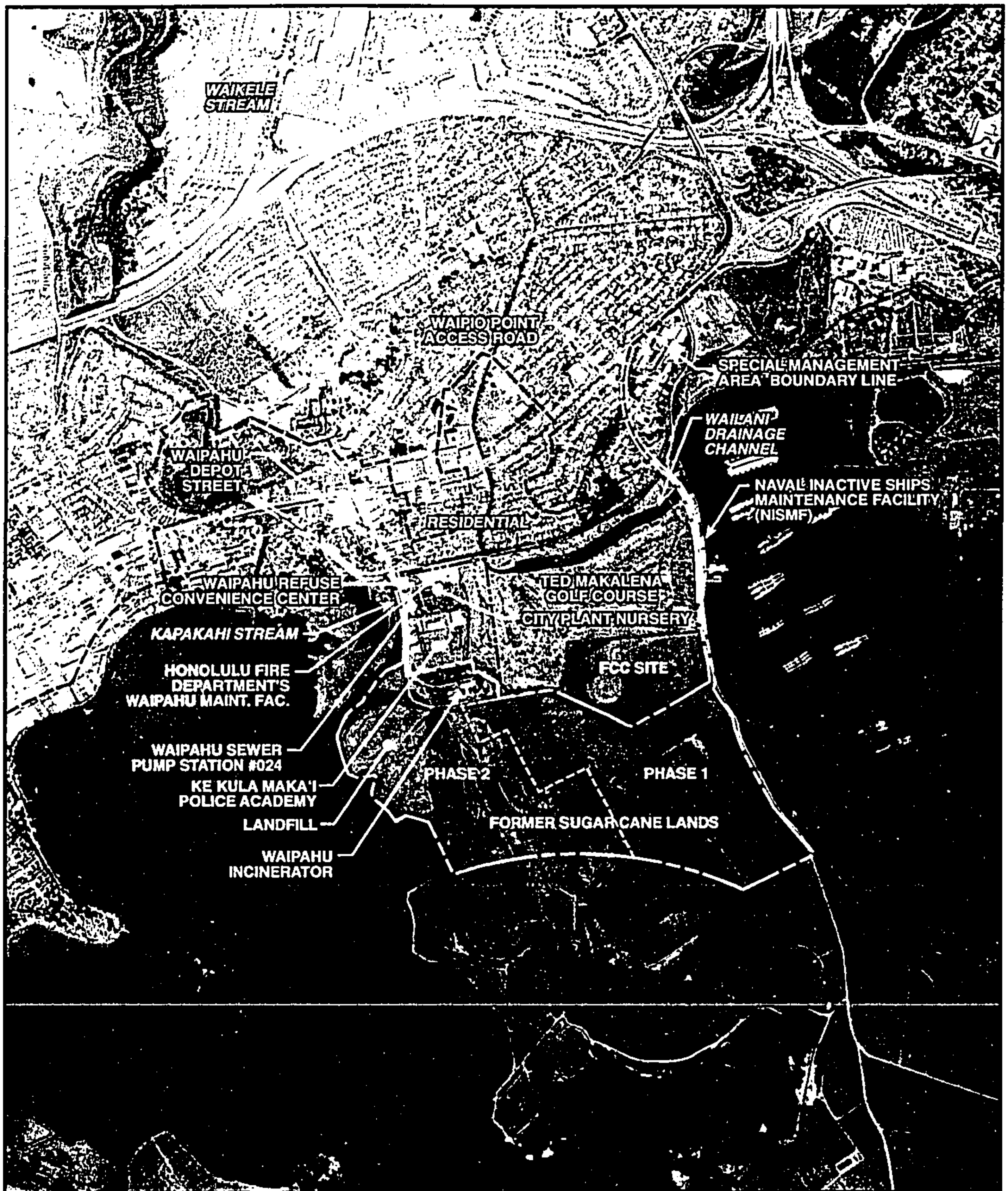

Source of aerial photo: Air Survey Hawaii, December 1995.

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Figure 2-3
EXISTING LAND USES
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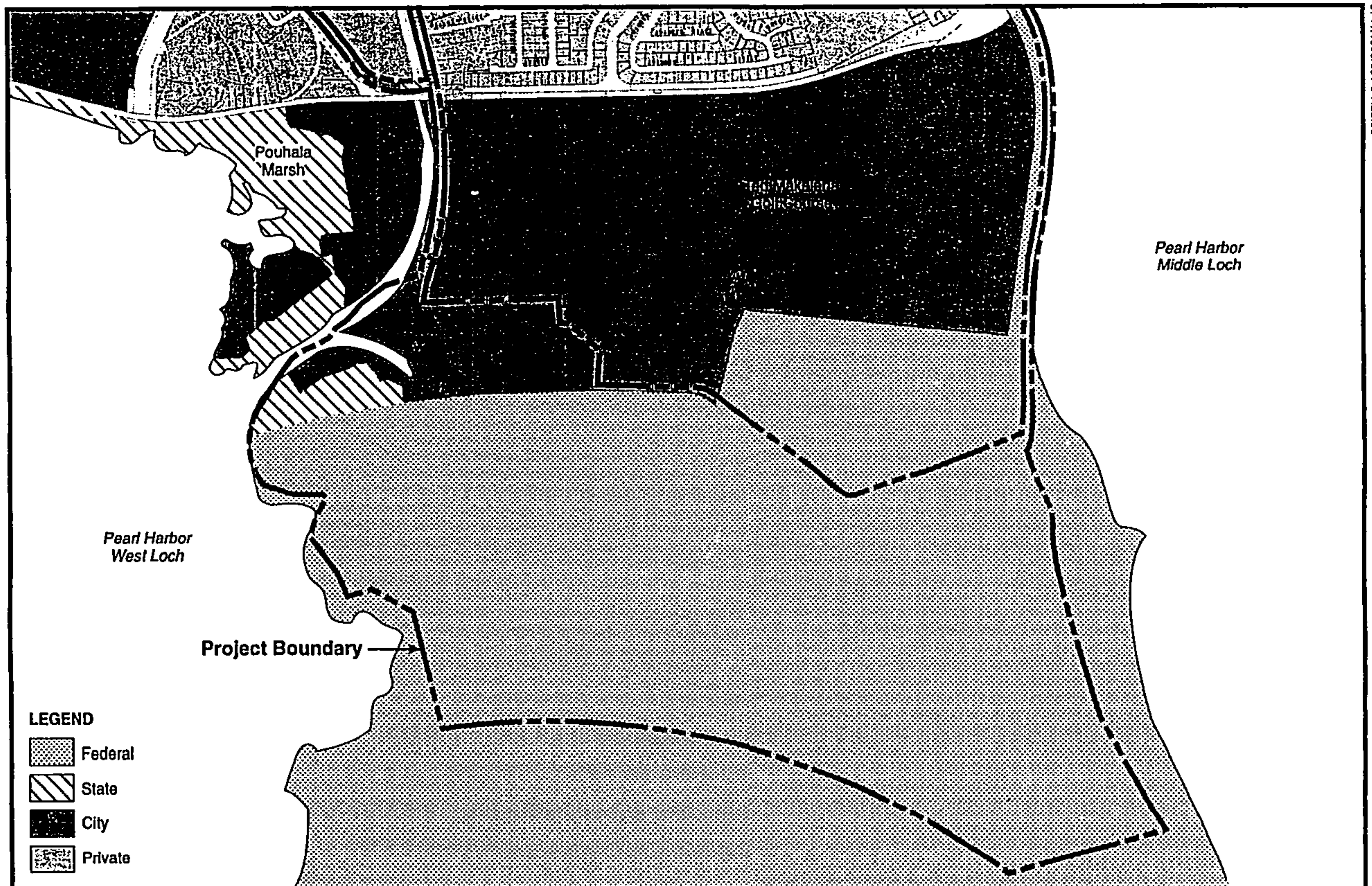
October 1998



Source: Various tax maps.

Figure 2-4
SOCCER PARK SITE LAND OWNERSHIP MAP

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for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

9741.1000/031-3 7.23.98

Company (OR&L) railroad (TMK 9-4-11: 03, owned by the State; and 9-4-11:46, owned by the City) to a point where it intersects with an easement owned by the State (TMK 9-4-11: 104). The alignment extends east along parcel 104 to the point where it intersects with Waipahu Depot Street. It turns south and extends under Waipahu Depot Street approximately 400 feet before turning east again and entering TMK parcel 9-3-02: 32 (the Waipahu Sewage Pump Station #024). The alignment will likely extend along the southern property boundary of the pump station, and then cross into TMK 9-3-02:34 (the Ted Makalena Golf Course). As depicted in Figure 3-9, the alignment extends east across a portion of the golf course and then turns south, eventually entering the soccer park lands (TMK 9-3-02: portion 01). It should be noted that for the purposes of analysis in this EIS, the transmission line alignment includes source development, which consists of non-potable water diverted from Waikele Stream via an existing intake, as well as non-potable water which may be provided by a well to be developed on TMK 9-4-10:57 adjacent to Waikele Stream (see section 3.11.2.2 for a full discussion of the transmission line). The actual transmission line will be a PVC pipeline, sized to handle up to 4.6 million gallons per day (mgd) and will be buried approximately three feet below grade. A reservoir will be reconstructed in the golf course as part of the non-potable water irrigation system.

2.3.2 Existing Land Use

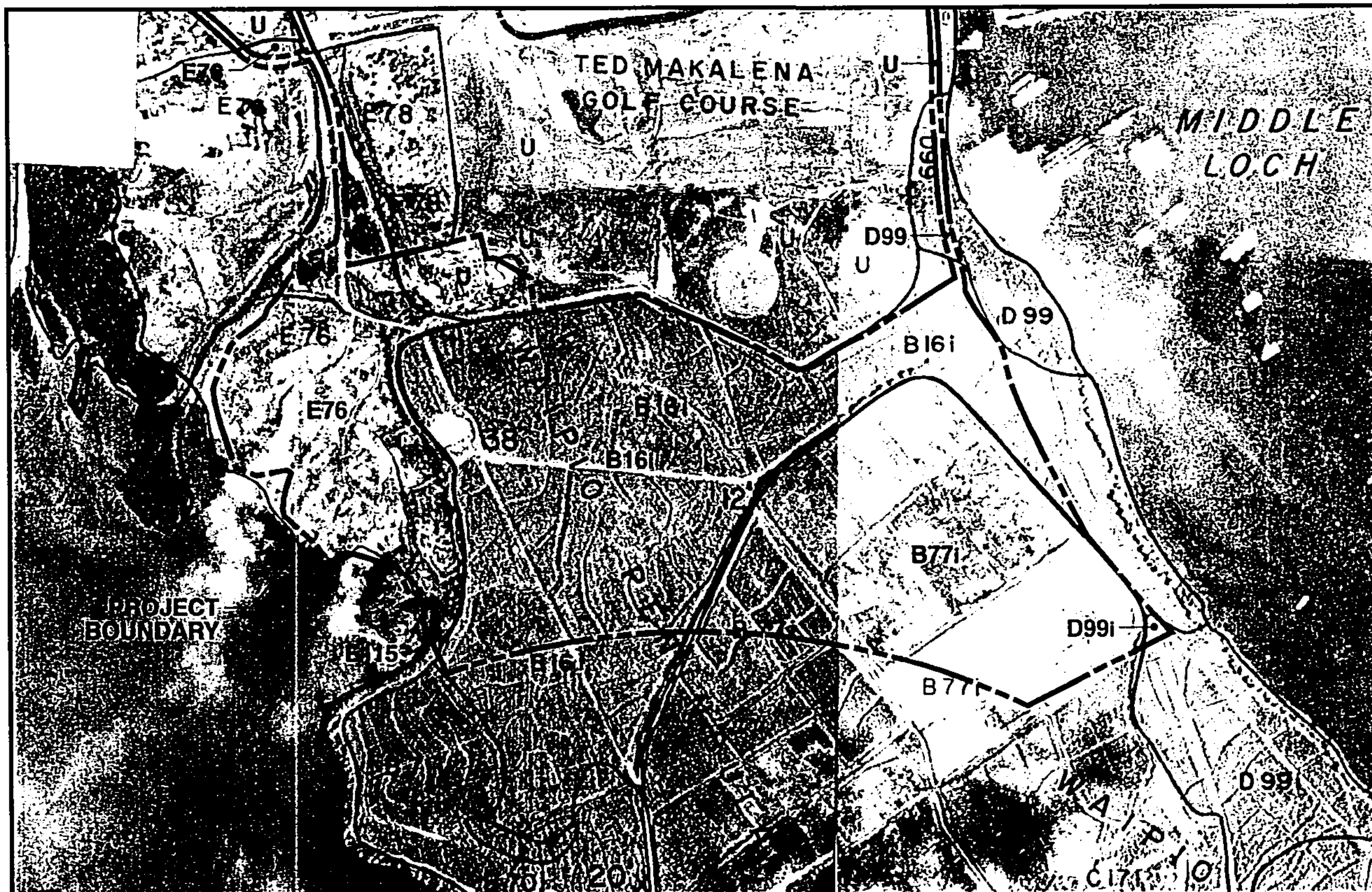
Surrounding and nearby land uses are light industrial, public facilities, military, and residential (see Figure 2-3). Existing State and City and County of Honolulu land use designations for the soccer park site are (see Figures 2-5 and 2-6):

<u>State Land Use</u>: Agriculture (A) and Conservation (C)

<u>Land Study Bureau Master Productivity Rating</u>: B, D, E, and U (Letter designations relate to productivity of soils, with A being the highest productivity and E being the lowest)

<u>City and County Central Oahu Development Plan Land Use Map</u>: Park; Public Facilities; Residential; Preservation; Military.

<u>City and County Central Oahu Development Plan Public Facilities Map</u>: Publicly funded solid waste modification, site determined, within six years; publicly funded sewer system, within six years; publicly funded park, site determined, within six years; publicly funded park, site undetermined, beyond six years; publicly funded transportation system, additional right-of-way and new streets, within six years; publicly funded transportation system, improvements within existing right-of-way, within six years.



Source: Base map and information from University of Hawaii Land Study Bureau. Detailed Land Classification—Island of Oahu, 1972.

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LAND CLASSIFICATION SYMBOL

B 62i
- Master Productivity Rating
- Land Type. Number and letter "i" if irrigated; number only if unirrigated. (See sections of text where land types are defined and rated by selected uses.)

Figure 2-5
DETAILED LAND CLASSIFICATIONS
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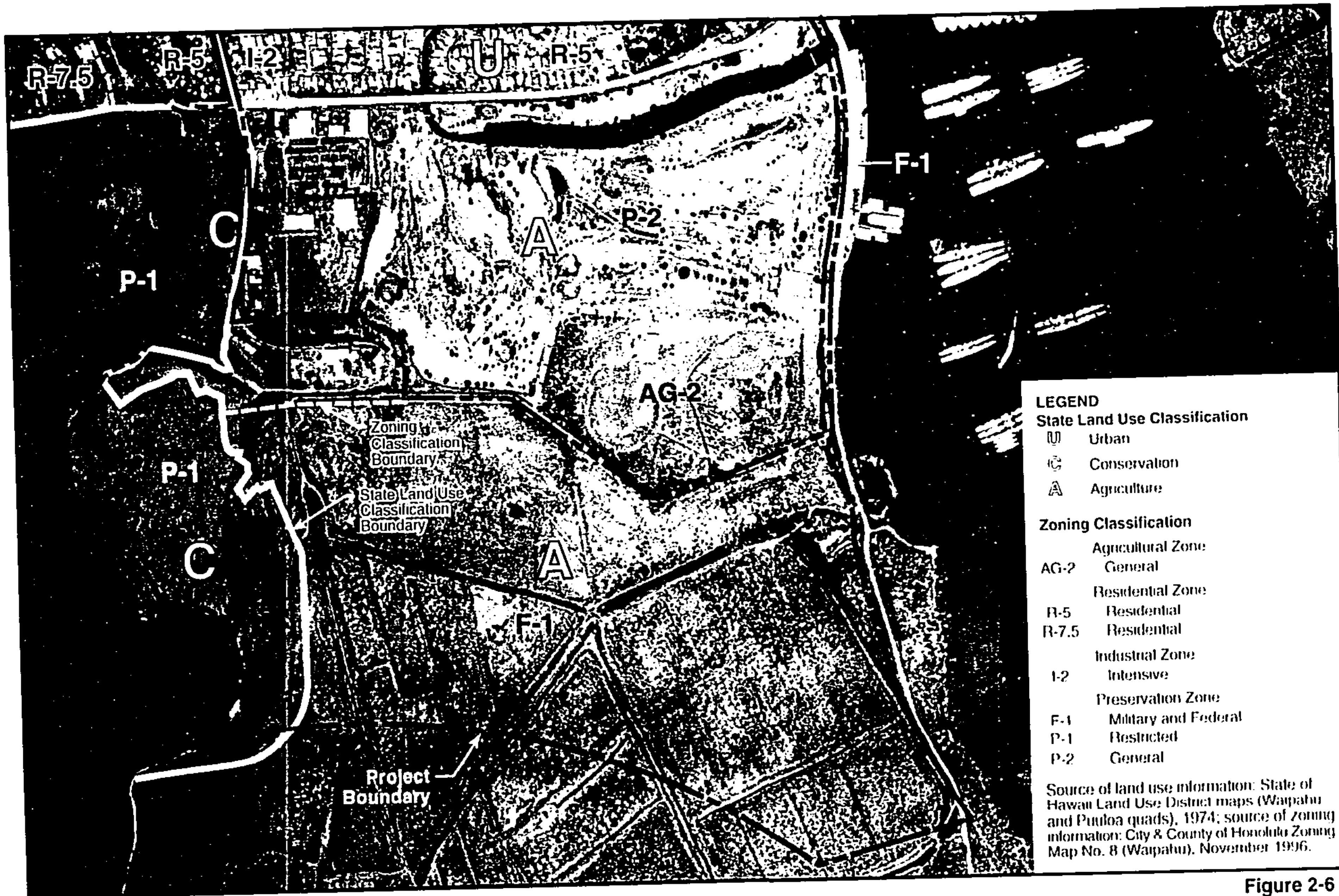

Source of aerial photo: Air Survey Hawaii, December 1997.

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Figure 2-6
STATE LAND USE CLASSIFICATIONS AND CITY AND COUNTY OF HONOLULU ZONING
Environmental Impact Statement
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Zoning: F-1 (military and federal reservation) and P-1 (restricted preservation).

As shown in Figure 2-3, a portion of the site is in the Special Management Area (SMA). (See Section 4.8.)

2.3.3 ESQD Constraints

A portion of the Soccer Park is proposed to be located on Navy-owned lands within the Explosive Safety Quantity Distance (ESQD) arcs which emanate from the ammunition handling wharves at the West Loch Branch, NAVMAG Lualualei. The ESQD arcs represent hazard zones that are established by the Department of Defense for various quantities and types of explosives used by the military. Minimum distances are prescribed for separating explosives from inhabited structures ("Inhabited Building Distance"), from public roads ("Public Transportation Route"), and from other explosives.[6] The risks associated with the ESQD arcs that encumber the soccer park (see Figure 2-7) exist only when a loaded cargo ammunition ship is at a wharf, or ammunition or explosives are staged on the wharves at West Loch Branch, NAVMAG Lualualei.[7]

The Department of Defense Explosives Safety Board (DDESB) is a Joint Service Activity of the Department of Defense with responsibility to establish safety standards that are designed to prevent hazardous conditions associated with ammunition and explosives manufacturing, tests, handling, storage, transportation, and disposal.[8] The DDESB reviews and approves, from an explosives safety standpoint, all operations involving ammunition and explosives, or structures in the vicinity of, or affected by explosives safety criteria.

The DDESB has reviewed and approved the plan to site the soccer park within the outer portion of the ESQD arcs. DDESB has evaluated that this proposed site provides adequate safety for this intended recreational use. Personnel in the open are unlikely to be killed or seriously injured directly by a blast, although some injuries could result from fragments and debris depending on the amount and fragment characteristics of the ammunition involved.[9] The prohibition against stuctures in this area will eliminate the secondary hazard from the collapse of structures onto personnel.[10]

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[6] NAVMAG Lualualei Master Plan.

[7] Electronic mail, R. Adams of 23 Jul 98.

[8] NAVFACINST 11010.44E. Change 1, Sec. 10-14.

[9] NAVSEA OP 5 Volume 1, Sixth Revision, Sec. 7-8.6.

[10] Electronic mail, R. Adams of 23 Jul 98.

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Source of aerial photo: Air Survey Hawaii, December 1995

NORTH

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SCALE IN FEET

Figure 2-7
ESQD ARCS
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

2.3.4 Project Phases

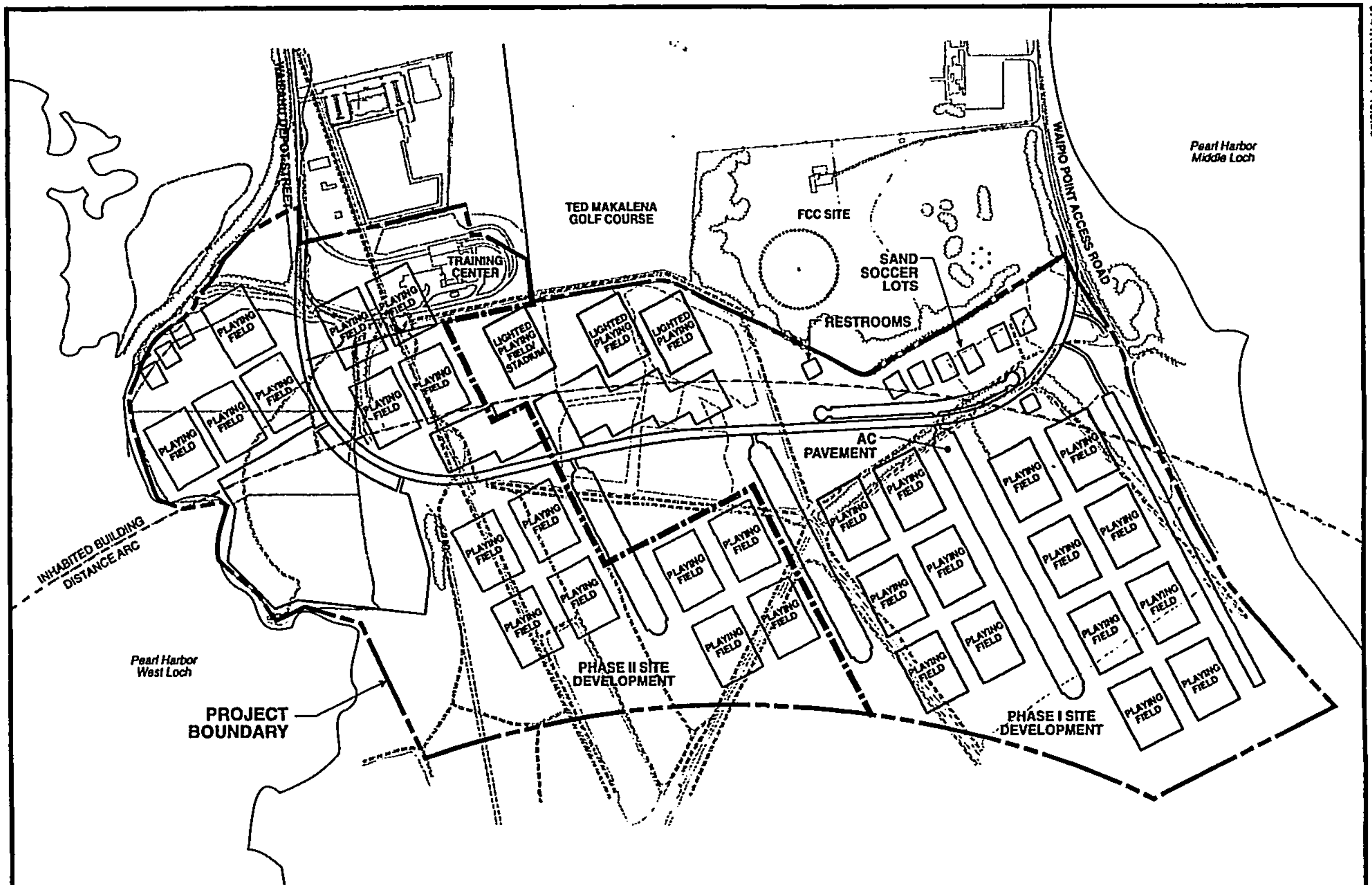
At build-out, the Conceptual Master Plan (Appendix A) envisions development of the following elements in at least two distinct phases (Figure 2-8):

Thirty-three regulation soccer fields, seven of which would be illuminated, including a tournament or stadium field with initial seating of 4,000 expandable to an ultimate capacity of approximately 10,000, with locker rooms, trainer facilities, media facilities, security, administrative offices, medical facilities, public concessions, and restrooms;

- Conversion of existing facilities at the Waipahu Incinerator into a training center with locker rooms, a multi-purpose room, recreational and training facilities, conference and meeting rooms, kitchen and dining facilities, dormitories, and two indoor soccer arenas with bleacher seating and support facilities;
- Five to ten beach or sand soccer lots;
- Free-standing restrooms and concession stands;
- Parking for up to 5,000 cars;
- A non-potable irrigation water source and transmission system to the soccer park and U.S. Navy agricultural lands south of the soccer park site;
- Drainage improvements adjacent to Waipio Point Access Road;
- Potable water and sanitary sewer systems; and
- Improvements to Waipio Point Access Road and Waipahu Depot Street, and the Farrington Highway intersections with these two roadways.

Internal park roads would be maintained by the Department of Parks and Recreation. Waipio Point Access Road and Waipahu Depot Street would continue to be under the City and County Department of Transportation Services, while Farrington Highway would continue to function as a state highway.

All soccer park facilities will be designed, constructed and operated to be in compliance with the Americans With Disabilities Act (ADA) and all other applicable federal, state and City and County of Honolulu laws, statutes, rules and regulations, and ordinances.



Note: Locations are approximate.

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Figure 2-8
CONCEPTUAL SITE DEVELOPMENT PLAN
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
October 1998

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Phase 1

Construction of the ultimate build-out master planned soccer park would be accomplished in at least two phases. Phase 1 development would include the following elements located on leased Navy land:

1. Clearing, grading and constructing up to 19 regulation-size soccer fields including three lighted fields, one of which would be a lighted tournament field (Figure 2-8);

2. Widening, paving, and providing drainage improvements adjacent to Waipio Point Access Road from Farrington Highway to an access dead-end roadway extension into the soccer park (Note: this roadway would be connected to Waipahu Depot Street in the build-out phase of the soccer park);

3. Constructing approximately 700 parking spaces;

4. Installing potable water and sanitary sewer connections;

5. Developing a non-potable water source and installing a non-potable water irrigation system and landscaping of the soccer park; and

6. Constructing free-standing restrooms, concession, and maintenance-related facilities.

Phase 1 drainage improvements adjacent to Waipio Point Access Road would consist of the following items in conformance with the Engineering Study on Drainage Improvements for Naval Inactive Ships Maintenance Facility (NISMF), Pearl Harbor, Hawaii:[11]

- Minor swale improvements north of the NISMF and north of Wailani Drainage Channel within the City and County of Honolulu portion of Waipio Point Access Road. These improvements will allow water to flow into an abandoned cane haul road and Wailani Drainage Channel.

- Improvements along the Ted Makalena Golf Course across from the NISMF, including the creation of new ditches along the golf course within the road right-of-way and construction of base course for 50 perpendicular parking spaces along the road for NISMF's use. These improvements are expected to eliminate flooding onto the NISMF.

The City Department of Design and Construction may apply for Federal Highway Administration (FHWA) funds for the Waipio Point Access Road improvements. The roadway has been declared a regional collector roadway by the State Department of Transportation.

[11] Hawaii Pacific Engineers, Inc. November 1, 1994.

Should the City elect to apply for federal funds, a separate Environmental Assessment (EA) under the National Environmental Policy Act (NEPA), per FHWA requirements, will be prepared specifically for the roadway project.

Build-out (Phase 2):

1. Clearing, grading and constructing up to 14 additional regulation-size soccer fields, four of which would be lighted (specific siting of these lighted fields has not been determined);

2. Renovating the closed incinerator buildings for use as a training center, to include indoor soccer arenas, multi-purpose rooms, locker rooms, offices, concessions/retail stands, kitchen and cafeteria, meeting rooms, and dormitory for 30 to 40 persons;

3. Expanding the lighted tournament field to a stadium with a maximum of 10,000 seats;

4. Providing parking lots for up to 5,000 cars; and

5. Completing roadway improvements linking an extension of Waipahu Depot Street through the soccer park to Waipio Point Access Road as required.

A separate but related build-out project may include closure of an ash landfill formerly used by the City and County of Honolulu Waipahu incinerator to allow for full development of the parking spaces.

Phase 1 is presently scheduled to be completed in 2000; $12 million in funds have been authorized and appropriated for the park and roadway projects and an additional $2 million for the non-potable irrigation water system. Funds have not yet been authorized or appropriated for build-out, planned for 2010. It is estimated that total costs for full build-out, exclusive of Phase 1 costs, would be more than $36 million.

2.3.5 Soccer Park Operations

Operationally, it is anticipated that most of the soccer fields would be in use almost every day. Following the completion of Phase 1, on a typical week day, from about 3:30 p.m. to 6:00 p.m., at least 11 of the 19 fields would be in use for youth soccer team practices. Average population on-site would be about 330 persons per hour. Also, on weekday evenings from about 7:00 p.m. to 9:00 p.m., the three illuminated fields would be in use for practices. Estimated population on-site during these practices would be about 75 persons per hour. On Saturdays, it is estimated that 16 of the fields would be in use from about 9:00 a.m. to 4:00 p.m. for youth games, with an average population of about 480 per hour. From 6:30 p.m. to

10:30 p.m. all three of the lighted fields would be in use for adult games with an average population of about 75 per hour.

Following the completion of build-out, it is estimated that 20 of the 33 fields would be in use from 3:30 p.m. to 6:30 p.m. on weekdays for youth soccer team practices. Average population at these times would be about 600 per hour. On a typical weekday evening, seven lighted fields would be in use for adult soccer team practices from about 7:00 p.m. until 10:00 p.m., with an average population of about 145. Additionally, there would be another 100 persons attending training sessions at the Training Center. On Saturdays, about 30 of the fields would be in use for youth soccer games from about 9:30 a.m. until 4:00 p.m. with an average population of about 900 per hour. Additionally, there would be an average of about 100 persons at the Training Center during this time and there would be about 50 persons per hour at the beach soccer fields. On a typical Saturday evening, seven lighted fields would be in use for adult games from 7:00 p.m. to 9:00 p.m., with an average population of about 275, and about 300 persons at an event at the Training Center and 50 attendees at a training camp.

It is further estimated that at peak use following completion of Phase 1, all 19 fields may be in use from 9:00 a.m. to 4:00 p.m. on a Saturday for youth games, with an average population of about 900 per hour. It is estimated this would occur about four times per year. Also, approximately 12 times per year there would be a special event during the day or evening with an estimated attendance of 3,000 persons. At the completion of build-out, it is estimated that peak use would include use of 33 fields from 9:00 a.m. to 4:00 p.m. about six times per year with an average population of about 1,650 persons per hour, plus about 50 persons at a training camp and 300 at an event at the Training Center. A special event, either an afternoon sporting event or evening concert at the stadium, would draw about 15,000 about six times per year. Also, there could be an additional 300 persons at a special event at the Training Center and 50 at a training camp.

The above operational estimates have been used throughout this EIS and the studies conducted for the EIS to estimate potential impacts to the natural, social, and economic environments of the project area and of the island and state in general. It is noted that these are estimates based on similar soccer park operations at other locations on the mainland U.S.

The City Department of Parks and Recreation will develop standard operating procedures for the soccer park dealing specifically with coordination with other agencies and nearby facilities prior to major events. Procedures will require coordination with the police academy, NAVMAG Lualualei, Waipahu High School, and others as appropriate. Standard operating procedures will also be developed to provide plans for dealing with emergencies, traffic management, security, and other issues as needed.

2.4 PROJECT ALTERNATIVES

2.4.1 Introduction

Alternatives to the proposed project that have been evaluated include different sites for the project, different development schemes and layouts of the soccer fields, and no action. A description of the alternative sites evaluated, the results of the evaluations, and the final conceptual master plan are included in Appendix B.

In addition to the basic project alternatives, different non-potable irrigation water source development and transmission line routings and alternative roadway improvements that will serve the master planned build-out project have been analyzed and are described in Chapter 3, Sections 3.10 and 3.11.2. The following paragraphs briefly describe the alternative sites and layouts evaluated.

2.4.2 Alternative Sites

Initial planning for the project, which included community and local soccer sports industry input, resulted in a determination that a site of approximately 250 to 300 acres would be required to create the needed number of fields and support facilities to host regional and national level tournaments, as well as to provide fields for local use throughout the year. International and national soccer organizations generally require a minimum of 24 soccer fields for tournament play.[12] Each field is between 300 and 360 feet long and 165 to 225 feet wide and requires side areas (for teams, coaching, and spectator areas) of approximately 50 feet on both sides of the field. Additionally, the fields require at least 100 feet of separation. Therefore, each field requires approximately 4 acres. Parking, circulation, roadways, restrooms, concession stands, training areas, landscaping, support facilities, drainage retention basins, and areas add to the total land requirements. Few sites of the required total size exist within the urban area of Honolulu.

The following alternative sites were evaluated by the City and County of Honolulu Soccer Task Force and master planning consultants, using the land area requirements noted above:

- Waipio Peninsula next to Waipahu Town (the soccer park site);
- Barbers Point/Kapolei;
- Open agricultural sites in the Ewa or Kapolei areas;
- A Waiola site next to Waipio along Kamehameha Highway; and
- The Kaiwi area in Hawaii Kai.

[12] United States Youth Soccer Association, Region 4, Far West Regional Tournament Administration Manual. November 1, 1996.

Table 2-1 indicates the relative site evaluation rankings developed as a result of the evaluations.

Detailed engineering analyses of each site were not conducted, but the normative evaluation indicates the Waipio Peninsula site is the highest ranked site due to its central location, relatively good access, lack of significant adverse environmental effects, land use designations, and cost of acquisition. The Waipio Peninsula site also has a shorter time period for acquisition and construction, thereby providing the community with the desired facilities at the earliest possible date.

Table 2-1
Site Evaluation Ranking

CRITERIA	SITE				
	Waipio Peninsula	Barbers Point	Ewa/Kapolei	Waiola	Kaiwi
Area and Configuration	5	3	5	5	3
Land Use and Zoning	5	4	2	5	1
Location	5	3	4	5	3
Access	4	3	4	5	5
Geology	5	3	5	5	3
Topography	4	3	5	5	3
Environmental Effects	5	4	4	5	1
Community Acceptance	5	4	4	2	1
Acquisition Costs	5	5	3	2	2
Development Costs	4	3	4	4	2
TOTAL	47	35	40	43	24

Source: Appendix B

2.4.3 Alternative Development Schemes

The alternative development schemes identified different layouts of the soccer fields and stadium as well as different ingress/egress routes. Over a dozen different development schemes, that is, alternative layouts of the soccer fields, were examined. The primary factors in determining the optimum layout of the fields were consideration of the prevailing wind direction and the overlying ESQD arcs. To the extent practical, the fields were oriented perpendicular to the prevailing northeasterly tradewinds. Similarly, because of ESQD arc restrictions, all lighted fields as well as concession stands and restrooms were located outside the inhabited building distance ESQD arc.

In addition to the above, the different layouts included different mixes and quantities of support services, such as restrooms, concession stands, and parking next to or close to the play fields. A minimum of 600 parking spaces were provided for the playing fields in Phase 1 and 5,000 for the various stadium configurations with a maximum 18,000-seat stadium at build-out.

The benefits of Phase 1 development as planned will be the addition of 18 soccer fields for practice and games for the approximately 22,000 soccer players expected in 2001, and the capability to move tournaments presently held at Kapiolani Park to the new soccer park. Additionally, the project will bring irrigation water to the agricultural lands south of the soccer park site and to Ted Makalena golf Course. Completion of the non-potable water irrigation system will eliminate the use of 0.5 mgd of potable water for irrigation of the golf course. Similarly, Phase 1 amenities will allow the City and County of Honolulu to market Honolulu and the state as a potential site for national and international soccer matches and tournaments. The success of this marketing effort could then lead to the completion of the sports complex, either with public, or possibly, private monies. The economic benefits of these actions are cumulatively estimated to be approximately $5.5 million per year after build-out through the year 2020 (best case estimate), as discussed in Chapter 3, Section 3.9.

Generally, all of the various layouts analyzed would have the same or similar effects on the natural and economic environmental characteristics of the area and Oahu. Each of the alternative layouts would require clearing and grading, each would result in re-landscaping the soccer park site, and each would result in the loss of existing wildlife habitat. Similarly, each alternative layout would require approximately the same quantity of irrigation water and other utility services, such as potable water, sewer, and electrical power.

During the planning and design process, other options have been considered, including variations to the irrigation transmission line. The selected alignment meets the project objectives (for example, the line must serve the golf course) and is most cost effective.

2.4.4 No Action Alternative

The No Action alternative would be the status quo. That is, present and future soccer teams, players, coaches, and parents would continue to experience the lack of adequate facilities for practices and games, long travel times between home communities and limited available facilities, and costly travel to the mainland U.S. for regional, national, and international events. Further, the No Action alternative would result in the continued use of potable water for irrigation of the Ted Makalena Golf Course, although, if available, non-potable water could be used. The no-action alternative would not allow the City and County of Honolulu to accomplish its goals of facilitating the promotion of Honolulu and the State of Hawaii as a destination sports center and increasing the number of soccer fields in Central Oahu.

2.5 POTENTIAL SIGNIFICANT ADVERSE EFFECTS OF PROPOSED PROJECT

Potential significant adverse effects of the proposed project (see Chapter 3) include increased traffic levels in the surrounding area and potential surface water runoff into Pearl Harbor.

Although development of the project will result in the loss of existing vegetation and the temporary displacement of fauna, these impacts are not anticipated to be significant because no endangered, protected, or threatened species habitats have been identified in the project area. Further, the loss in bird habitat would be offset by maintained grassed areas that provide new habitat. The migratory Pacific Golden Plover is one species attracted to such habitat (see Chapter 3, Section 3.7).

The proposed soccer park would contribute to increased traffic along Farrington Highway and Waipio Point Access Road (see Chapter 3, Section 3.11). Increased vehicular traffic, along with use of the soccer facilities, would increase noise levels along the roadways and in the vicinity of the soccer fields. These elevated noise levels would be most noticed by nearby residents; the closest residences are about one-half mile away from the site. Whether noise generated by the soccer park and its related traffic would constitute a significant adverse impact cannot be determined until noise measurements are recorded during actual events. This is due to the fact that there are presently no comparable developments to use as a basis for noise impact modeling. However, the noise situation will be monitored and appropriate management measures adopted, as needed, by the City and league/tournament organizers.

The site will be graded and bermed to prevent direct runoff of surface water into Pearl Harbor (see Chapter 3, Section 3.5).

2.6 PUBLIC RESOURCE COMMITMENTS FOR PROPOSED PROJECT

Public resources will be dedicated to construction, operation, and maintenance of the soccer park and its related facilities. The development of Phase 1 of the proposed project would require the expenditure of approximately $14 million over a one- to two-year period. Build-out of the project is presently estimated to cost over $36 million (1998 dollars). Funds have not been authorized or appropriated for build-out, and the City and County of Honolulu is in the process of trying to attract private sector monies to complete the project.

Facility maintenance and operation, security, and management requirements for the build-out project would increase the type and number of management and maintenance personnel employed by the City and County of Honolulu if a private party is not found to handle these functions. It is estimated that program management and maintenance expenditures would total about $2.9 million per year at the completion of Phase 1 and $7.7 million at the completion of build-out. Potential revenues from use of the facilities are estimated to be up to $1.0 million at the completion of Phase 1 and, cumulatively through 2020, $5.5 million per year after the completion of build-out. The City does not currently charge for use of its parks for soccer activities, nor does it earn significant revenues from soccer activities for the City and County of Honolulu.

CHAPTER 3
EXISTING CONDITIONS, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

3.1 INTRODUCTION AND ENVIRONMENTAL SETTING

The existing physical, biological, and archaeological/cultural resources, socioeconomic environmental characteristics, and infrastructure systems serving the proposed City and County of Honolulu soccer park site are described in this section. The information contained in this section has been derived from the environmental baseline studies conducted specifically for this EIS and/or readily available general information regarding the area and site.

Waipio Peninsula is situated in Central Oahu and extends out into Pearl Harbor approximately three and one half to four miles. The majority of the Peninsula is under control of the Navy. Up to about 1990, Oahu Sugar Company leased approximately 1,000 acres for sugar cane cultivation. The northern end of the Peninsula is primarily residential neighborhoods with various commercial and retail establishments located along Farrington Highway. The City and County of Honolulu Ted Makalena Golf Course is located south of the residential/commercial areas, and the City and County of Honolulu Ke Kula Maka'i Police Academy, and City and County of Honolulu Waipahu Incinerator are located on the northwestern edge of the Peninsula.

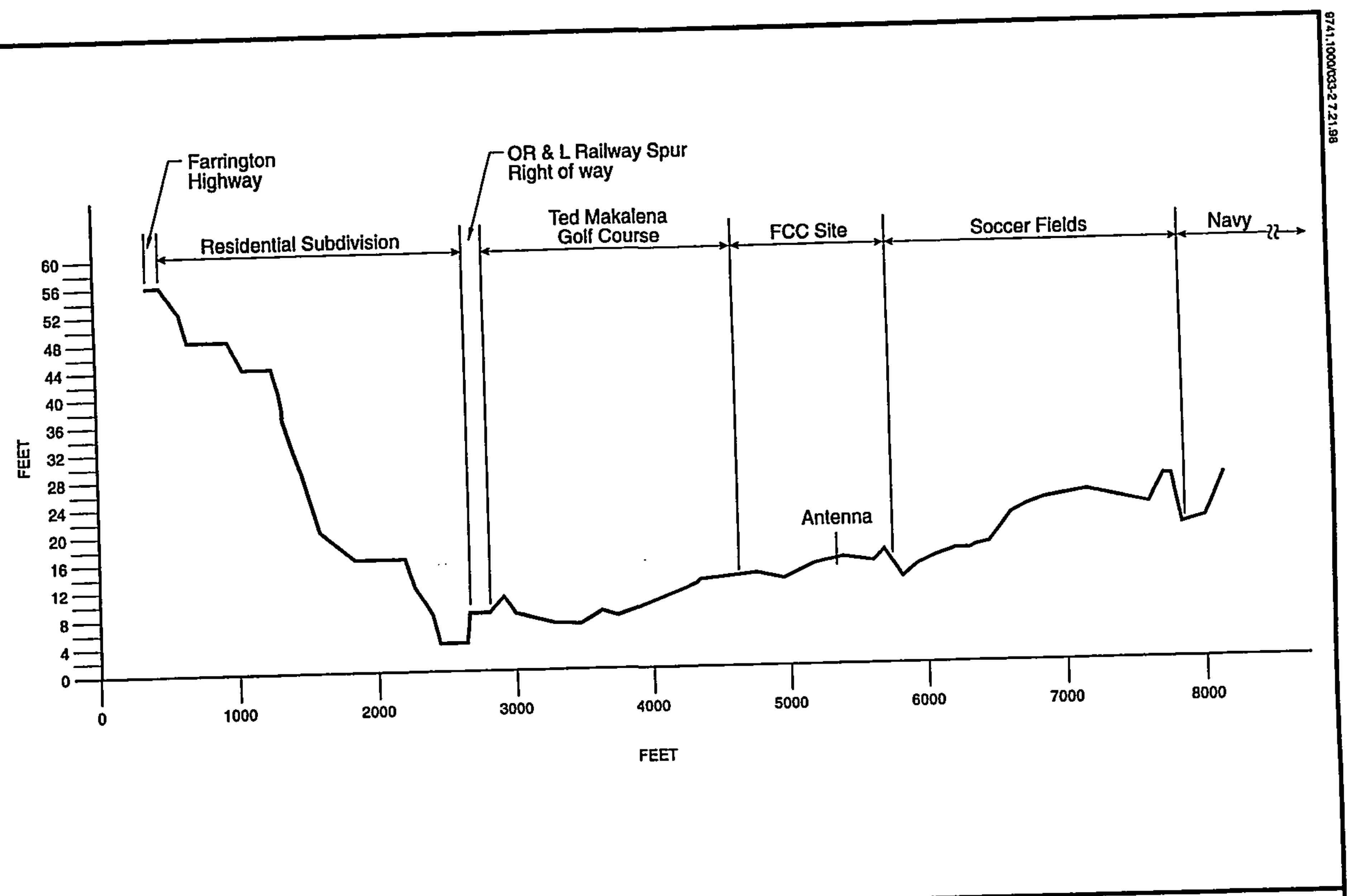
With the cessation of sugar cane cultivation, the land has become overgrown with various grasses and weeds, koa haole, castor bean, and a variety of other introduced plants. The wildlife of the area is now sparse, although the bird life was fairly abundant when the land was in cane cultivation. The proposed soccer park lands are relatively flat and are currently fallow.

3.2 TOPOGRAPHY, GEOLOGY, AND SOILS

3.2.1 Existing Conditions

3.2.1.1 Topography

Topographically, the land on which the proposed soccer park is planned is relatively flat, sloping from west to east. The elevation of the Waipio Peninsula project site ranges from about 40 feet above mean sea level (MSL) at the landfill to less than +5 feet MSL (Figure 3-1). The elevation of the site averages approximately 10 feet higher than lands to the north, including the Ted Makalena Golf Course. Manmade irrigation dikes and berms rise approximately 10 to 15 feet above surrounding topography throughout most of the site. A low-level (less than 6 feet high) berm runs along the northern boundary.



Vertical Scale 1"=20'
Horizontal Scale 1"=1000'

Figure 3-1
TYPICAL ELEVATION FROM FARRINGTON HIGHWAY THROUGH SOCCER PARK
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

3.2.1.2 Geology and Geologic Hazards

The geological conditions are typical of those found along the southern flank of the coastal margin of the Koolau shield volcano, including most of the Ewa Plain. In general, there are few rock exposures on the site, which had a much lower elevation and was partially submerged prior to filling. The subsurface conditions are dominated by fossilized coral/algal reef deposits, and the base of the stratigraphic section is the Koolau Basalt. The rock structure underlying the coastal flats consists chiefly of coral of the Ewa Coral Reef Formation.[1] Ewa coral flat consists of extensive reef masses with upper surfaces that generally rise from 10 to 15 feet at the coast. The Ewa coral flat is found over large areas in the seaward part of the Pearl Harbor and surrounding areas.

The island of Oahu is not subject to volcanic eruptions or significant earthquakes. It is in Seismic Zone 2A, which is characterized by earthquakes that may cause minor damage to structures.[2]

3.2.1.3 Soils

The soils of the soccer park site, including the future Waipio Depot Street access, are classified as fill land (Fd); Keaau Clay, 0-2 percent slopes (KmA); Keaau clay, saline, 0-2 percent slopes (KmbA); and *Honouliuli clay, 0-2 percent slopes* (HxA) by the U.S. Department of Agriculture.[3] Soil borings taken specifically for the proposed soccer park confirm the Department of Agriculture findings. The fill land (Fd) was created by bagasse and slurry from the Waipio Sugar Mill, as well as construction and demolition debris. At least one location in the south central portion of the project area is known to contain buried automobiles and white goods, i.e., discarded refrigerators, washers, and the like. The landfill is filled primarily with burned remains of municipal solid waste intermixed with cover materials, with an upper layer of ash from the nearby incinerator.

The incinerator ash fill material, located on the western portion of the site, has an estimated saturated permeability value of 1.42 inches/hour. The remaining portions of the site are anticipated to have significantly lower saturated permeability values ranging between about 0.028 inches/hour for fill material in the southeastern portion of the site to 0.113 inches/hour for the remaining areas with undisturbed natural *in situ* soil.

The Keaau Clay, 0-2 percent slopes soil type occurs on lowlands on the coastal plains. Permeability of this soil type is slow as is runoff, and the erosion hazard is no more than slight. Workability is difficult because the soil is very sticky and plastic. The Keaau clay, saline, 0 to 2 percent slopes soil type generally occurs in Hawaii on lowlands on the coastal plains. This soil type is strongly affected by salts and occurs in depressions next to the ocean or in pockets within limestone areas. The Honouliuli soils developed in alluvium derived from basic igneous material. Permeability is moderately slow as is runoff, and the erosion hazard is no

1 Stearns, H.T. and K.N. Vaksvik. 1935.
2 International Conference of Building Officials (ICBO). 1994.
3 U.S. Department of Agriculture Soil Conservation Service. August 1972.

more than slight. These soils are used for sugarcane, truck crops, orchards, and pasture. The soils on the east side of Waipio Peninsula Access Road are classified as Pearl Harbor Clay (Ph). This soil is on low coastal plains adjacent to the ocean. It is level or nearly level.

3.2.2 Potential Impacts

3.2.2.1 Environmental Issues and Significance Criteria

The primary environmental issues with regard to the topography, geology, and soils are related to changes in topography to accommodate playing fields, the effects on drainage patterns, and the potential exposure of construction workers or site users to agriculture or landfill chemicals resulting from grading for the soccer park. Impacts of the proposed soccer park on the topography, geology, and soils of the action area could be significant if:

- Topography is altered beyond that required to level the area for playing fields;
- Erosion, subsidence or other geologic processes are triggered or accelerated;
- Soil material at the site is irreversibly disturbed, compromising its use for normal purposes; or
- Grading and excavation activities cause the release ~~of~~ or exposure of soils containing residual agricultural chemicals or landfill materials containing hazardous substances at concentrations determined to be hazardous to human health.

3.2.2.2 Potential Impacts

At build-out, the proposed soccer park will require grading approximately 600,000 cubic yards (cy) of cut material and an equal amount of fill material to develop the playing fields. The majority of the site is relatively flat, and the grading will be primarily to level the berms constructed by Oahu Sugar Company for irrigation canals and settling ponds for sugar mill washwater. Grading will also create drainage basins and settling ponds to control surface water runoff. The grading will not cause or accelerate subsidence or erosion because of the relatively flat character of the site and because appropriate erosion and sedimentation controls will be taken during construction and operation of the complex (see Section 3.5 below).

Soil samples obtained from former cane lands within the soccer park site (Figure 3-2) were analyzed for agricultural chemicals, petroleum-related compounds, and for metals and dioxins that may have been contained in any incinerator ash blown onto the fields.

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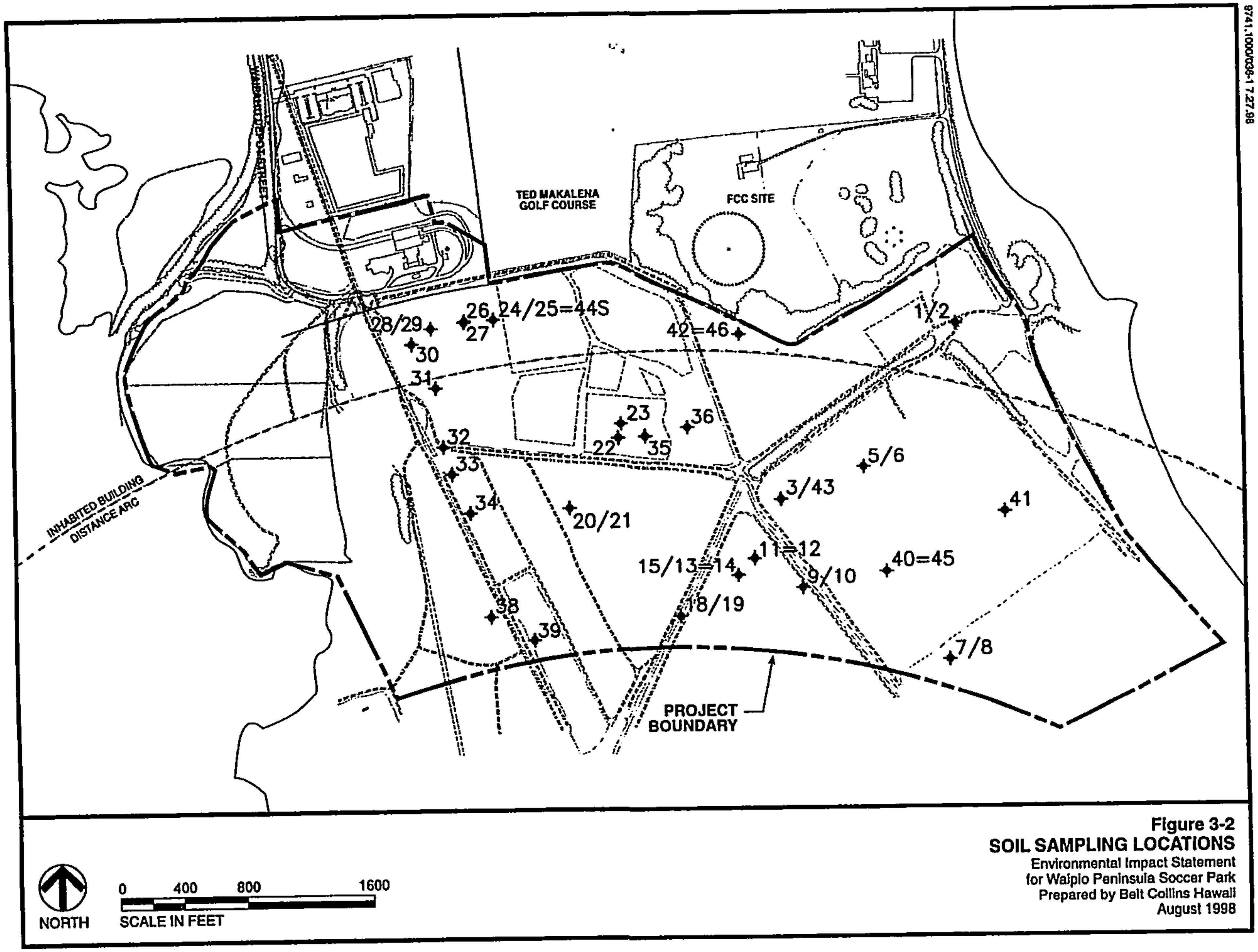

Figure 3-2
SOIL SAMPLING LOCATIONS
Environmental Impact Statement
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Prepared by Belt Collins Hawaii
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Laboratory results were compared to target concentrations established by U.S. EPA to be protective of human health.[4] None of the samples had concentrations exceeding these target concentrations except metals, which are naturally high in volcanic soils. In other words, no human health risk to construction workers or park users from residual chemicals in soils on former cane lands is expected.

The south-central section of the project area may contain junk automobiles or white goods which could be encountered during grading and would require removal. Residual petroleum products or hazardous materials could conceivably be contained in the junk and could be released to the project area during removal activities.

Soil samples were not obtained from the landfill or incinerator lands. Grading the landfill for the proposed soccer park could only occur after formal landfill closure and capping and therefore would be unlikely to disturb underlying waste materials. Minor grading and possible excavation for utility lines may occur on the incinerator property. It is not known whether soils in the vicinity of the incinerator contain dioxins (a common byproduct of municipal solid waste incineration) or metals at concentrations hazardous to human health. Therefore, these soils will have to be tested prior to any excavation work.

3.2.3 Proposed Mitigation Measures

Measures to minimize potential adverse impacts to the topographic or geologic characteristics of the project site are not required due to the lack of significant impacts resulting from the proposed project. During grading activities, appropriate erosion and sedimentation control measures will be taken in compliance with City and County of Honolulu Department of Public Works guidelines[5] (See Section 3.5 below). As indicated above, the soils of the project site will be minimally affected by the proposed project through the grading and revegetation of the site.

No impacts are expected from residual agricultural chemicals or landfill materials in soil on former cane lands, and no mitigation is proposed. No impacts are expected from regrading of the landfill after planned future closure and capping, as long as the cap is not disturbed, and no mitigation is required. Future detailed planning and engineering will be conducted with the understanding that the cap would not be disturbed.

Potential releases from junk automobiles or other materials removed from the project area will be mitigated by preparing appropriate specifications and procedures for segregation and disposal of such materials, e.g., batteries and tires to be recycled, and construction and demolition materials to be disposed of at the appropriate landfill. Appropriate specifications and procedures will also be developed for spill response, in the event of a release of petroleum or hazardous substances during waste removal operations.

[4] The results were compared to 1998 Region IX preliminary remediation goals (PRGs) for residential soil, which are more conservative and protective of human health than PRGs established for industrial soils. PRGs can be found on the internet at http://www.epa.gov/region 09/ under Solid and Hazardous Waste Programs.

[5] City and County of Honolulu, DPW. 1975.

Excavators and other construction workers in the incinerator area will work in a level of personal protective equipment (PPE) appropriate for the known or reasonably-assumed unknown risk of exposure to dioxins, in accordance with federal and state health and safety regulations. If soils at locations to be excavated are sampled prior to excavation and found not to contain dioxins in concentrations hazardous to human health at an industrial site, construction workers' PPE will consist of routine work clothes supplemented by paper dust masks, as needed for comfort. If no sampling is performed, workers may need to wear more protective PPE, such as half-face air-purifying respirators with filter cartridges appropriate for organic contaminants and dust. PPE and construction health and safety plans will comply with applicable federal Occupational Safety and Health Administration (OSHA) Construction and General Industry standards and equivalent state occupational safety and health (HIOSH) standards.

Although *in situ* soil conditions may contribute to engineering design constraints, standard engineering and Best Management Practices will adequately address areas of concern.

3.3 CLIMATE

3.3.1 Existing Conditions

The general climatological characteristics of the soccer park area and site are relative equable temperatures ranging from an annual average maximum of about 89° F in August to an annual average low of about 65° in January. The average temperature is 73.8° F. Average annual rainfall is approximately 25 to 30 inches , the majority of which falls in the months of February and December and the monthly average ranges from 1 to 3 inches. Winds are dominated by northeasterly trades (75 percent of the time) that average about 10 knots (approximately 15 miles per hour).

3.3.2 Potential Impacts

The proposed soccer park will not affect the climate of the site and/or region.

3.3.3 Proposed Mitigation Measures

Because the proposed soccer park will not affect the climate of the site or region, mitigation measures are not required.

3.4 AIR QUALITY

3.4.1 Existing Conditions

The State of Hawaii is in attainment of National Ambient Air Quality Standards (NAAQS). These standards have been established by the U.S. Environmental Protection Agency (US EPA) to protect human health and welfare and provide a measure used to determine the level of pollution control needed for air basins. NAAQS have been established for the following criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM-10 and PM-2.5), ozone (O_3), and lead (Pb). NAAQS criteria are used to designate all air regions within the U.S., by pollutant, into one of the following categories: attainment, non-attainment, and unclassifiable. Based on ambient air monitoring data, regions that do not meet the NAAQS are classified as non-attainment; regions that meet or exceed the standards are classified as attainment.

In addition, the State complies with its own set of ambient air quality standards (AAQS), which are more stringent than NAAQS. Exceedances of the state standards have been known to occur and are primarily associated with elevated CO concentrations resulting from vehicular tail-pipe emissions with traffic delays. Such exceedances are not normally directly measured by the existing network of monitoring stations because they occur within about 50 feet from the roadways and outside of the range of these monitoring stations.

Because the entire State of Hawaii is in compliance with state and national AAQS and the proposed site is somewhat removed from the influences or urban areas and the air emissions associated with these areas, there are no existing air quality concerns.

3.4.2 Potential Impacts

Air quality in the State of Hawaii is managed by rules and permitting procedures administered and enforced by the State Department of Health. Hawaii Administrative Rules (HAR) 11-60.1 (Air Pollution Control) specify general prohibitions, provisions for open burning, operating permit requirements for non-covered and covered sources, Prevention of Significant Deterioration (PSD) requirements, standards of performance for stationary sources, requirements for hazardous air pollutant sources, and fugitive dust requirements, among others. These rules provide the constraints on air emissions that may occur during the construction and operational phases of the proposed soccer park and alternatives.

3.4.2.1 Environmental Issues and Significance Criteria

The primary air quality issues that could affect the proposed soccer park site are associated with temporary construction activities, such as dust generation and control, and facility operational activities, such as auto and bus CO emissions within and outside the project site. Criteria to determine the significance of impacts are based on federal and state air quality standards and regulations. Impacts would be considered significant if emissions generated as a result of the proposed soccer park cause ambient pollutant levels to exceed national or state AAQS.

3.4.2.2 Potential Impacts

The proposed use of the site for construction of the soccer park will require small stationary sources such as portable fossil-fuel powered generators, for which operations permits from the

State Department of Health, as required by HAR 11-60.1, would have to be obtained by the owner of the equipment. A variety of mobile sources such as delivery trucks, asphalt paving trucks, earth-moving equipment such as tractors and loaders, and construction worker vehicles will be required to support the construction operations. It is estimated that the following numbers of construction equipment would be operating at the soccer park site during construction of Phase 1:

Earth scrapers	2-3
Earth graders	2
Bulldozers	1-2
Front-end loaders	1-2
Dump trucks	2
Back-hoes	1-2

It is further estimated that at the peak of Phase 1 construction, approximately 50 to 75 workers would be on site. The numbers of construction vehicles and equipment and workers do not represent significant increases in traffic or potential emissions relative to existing traffic levels (see Section 3.10). The numbers of construction equipment and vehicles or workers for build-out activities is unknown because the extent of work that would be performed at any given time is unclear at this time. However, it is unlikely that the numbers of vehicles or equipment would generate emissions significantly greater than levels prevalent at that time.

Fugitive dust generated from earth-moving activities will be controlled, as required by HAR 11-60.1, using mitigative measures such as water spray. Because the number of emission sources will be relatively small (relative to the region), and emissions will be localized and short-term (total duration of Phase 1 construction is estimated to be 16 months), no significant impacts on air quality are expected. Based on the soil sampling conducted for the soccer park, the soils do not contain blown ash from the incinerator. Therefore, there would be no associated air quality impact from grading activities.

Once the soccer park is operational, no stationary sources of emissions would be present. Only mobile sources such as vehicular emission are anticipated. Phase 1 development would attract a maximum of 1,260 vehicles for a Saturday special event. At build-out, it is estimated that a maximum of over 5,000 vehicles could be entering and leaving the soccer park. These vehicles could create a significant impact on traffic and cause considerable delays at specific intersections leading into the site, but off of the property. Section 3.10 of this document provides the details of the delays and the specific intersections of concern projected for Phase 1. Intersections estimated to experience a level of service (LOS) of D or worse may experience a significant increase in tail-pipe emissions and create localized increases of CO concentrations. However, with the traffic mitigation measures identified in Section 3.10, no significant delays in traffic would occur and no significant impacts on air quality are expected.

3.4.3 Proposed Mitigation Measures

As required by HAR 11-60.1, stationary source emissions would be controlled through the state air quality permitting process, and fugitive dust emissions will be controlled through the use of water spraying. No additional mitigation measures are required.

3.5 HYDROLOGY, DRAINAGE, AND FLOODPLAINS

3.5.1 Existing Conditions

The nearest large stream to site is Waikele Stream, the major stream draining central Oahu. It flows year-round into the headwaters of West Loch at Pearl Harbor. The Waikele Stream watershed extends to the upper elevations of both the Koolau and Waianae mountain ranges. Its drainage area is about 45.7 square miles. Additional information regarding Waikele Stream is presented in Section 3.12.2 and Appendix H.

Kapakahi Stream, immediately to the west of the soccer park site, is a tributary of Waikele Stream, and was once the primary outlet to West Loch for Waikele Stream. After severe flooding in the early 1950s, a direct channel was cut to West Loch to avoid flooding Waipahu Town. Kapakahi Stream flow is from spring water, urban runoff, and storm water drainage from the area north of the soccer park site.

Groundwater elevations at the soccer park have not been surveyed. Preliminary observations of groundwater levels in geotechnical boreholes indicate that the water table is generally between sea level and about 4 feet above mean sea level (+4 MSL), with some local mounding or perched areas. The head in one borehole (B-7, near Waipio Point Access Road) remained at approximately +16 MSL for several days, indicating local perching.

Most of the rainfall remains on the site and infiltrates into the ground due to the earth berms. Limited areas along the shoreline, including the landfill on the western side of the soccer park site, contribute to runoff into Middle Loch and West Loch.

Runoff flows from the north, including the residential and industrial areas, and the Ted Makalena Golf Course, do not contribute to runoff flows on the soccer park site due to the existing topography, which includes a berm along the northern boundary. The area to the south does not contribute to runoff flows on the soccer park site, as this area generally slopes to the south.

According to the Flood Insurance Rate Map (FIRM),[6] the soccer park site is located in flood zone D (see Figure 3-3). Zone D are areas in which flood hazards are undetermined. Given the relatively low annual average rainfall (25 inches per year) and lack of runoff from off the site, the soccer park site is not subject to flooding due to storm water runoff. Flooding generally occurs along Waipahu Depot Street down to the entry of the Waipahu Incinerator

[6] Federal Emergency Management Agency. September 1995.

area and over to Kapakahi Stream (Figure 3-3). The soccer park site is outside the tsunami inundation zone.

3.5.2 Potential Impacts

3.5.2.1 Environmental Issues and Significance Criteria

The primary environmental issues related to hydrology, drainage, and floodplains are temporary release and control of sediments during construction and the effect of runoff waters on receiving waters. Potential effects of the proposed soccer park on the hydrology, drainage, and floodplain characteristics of the site would be considered significant if:

- Quantities of sediments exceeding limits specified in the Erosion and Sediment Control Guidelines for Hawaii cannot be contained onsite during construction and are released into surrounding receiving waters; or,
- Stormwater runoff during operations of the soccer park causes degradation of the receiving waters or surrounding areas, exceeding Department of Health water quality standards for turbidity in Pearl Harbor.

3.5.2.2 Potential Impacts

Because rainfall is low (average of 25 inches per year), significant amounts of surface water runoff are not expected. Drainage patterns would be designed to direct flow into detention/sediment retention basins adjacent to the playing fields to reduce off-site drainage and to trap and collect sediments prior to runoff into Pearl Harbor.

As described below, the site was divided into seven drainage areas so that runoff could be estimated (see Figure 3-3). Storm water runoff quantities for the proposed condition were estimated using the Natural Resource Conservation Service Technical Release 55 (TR55)[7] and the rational method.[8]

Runoff quantities associated with a 25-year storm were used in the analysis in conformance with basin sizing guidelines presented in the *Erosion and Sediment Control Guide for Hawaii*[9] and TR55.

In addition, erosion rates were estimated using the Universal Soil Loss Equation as specified in the City and County of Honolulu Department of Public Works (DPW) *Soil Erosion Standards & Guidelines.*[10] The erosion rates were estimated for the construction period since this represents the period of time when the site is the most susceptible to erosion and subsequent water quality impacts due to runoff.

[7] U.S. Dept. of Ag. 1981.
[8] City and County of Honolulu, DPW. 1988.
[9] U.S. Dept. of Ag. 1981.
[10] City and County of Honolulu, DPW. 1975.

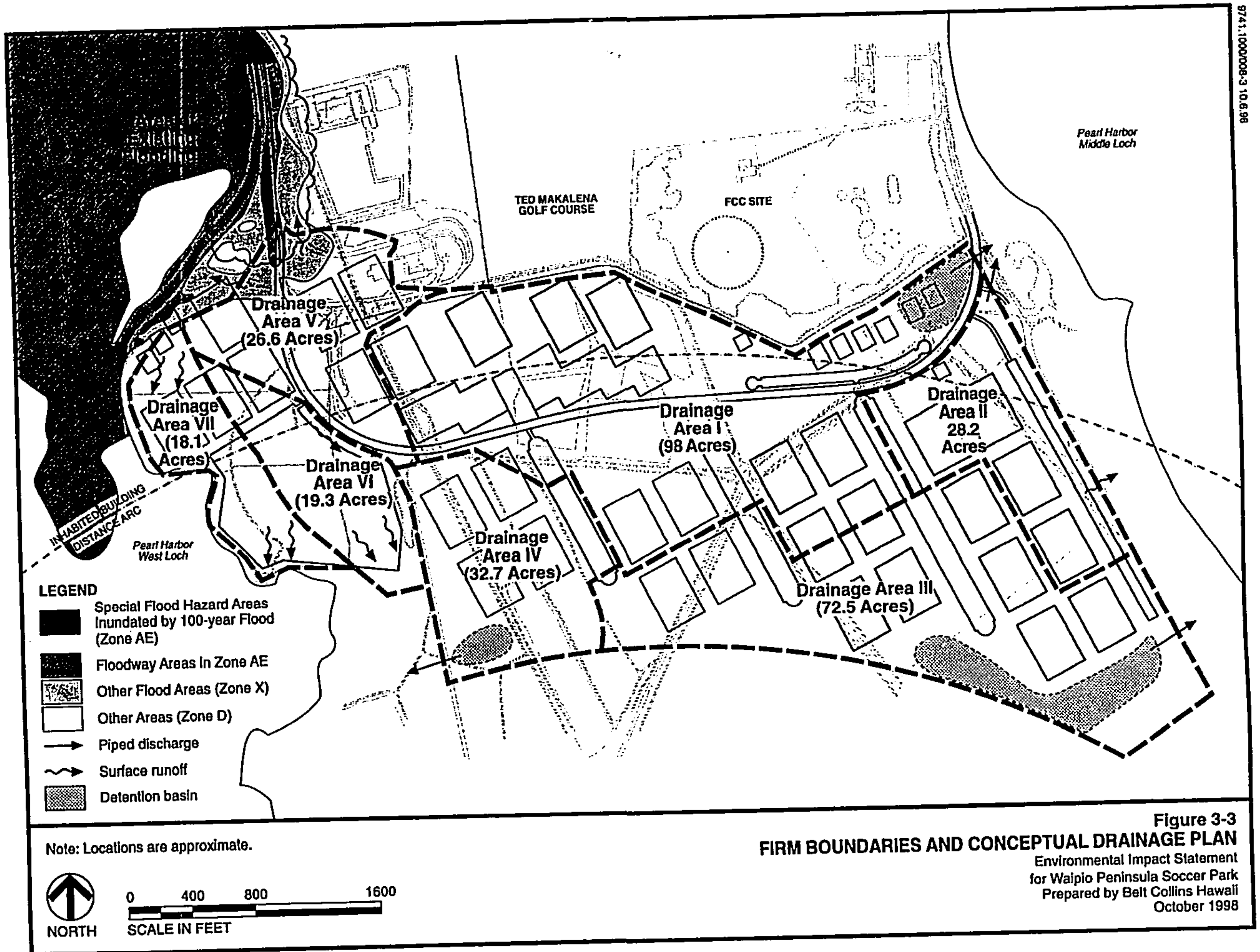

Figure 3-3
FIRM BOUNDARIES AND CONCEPTUAL DRAINAGE PLAN
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
October 1998

For the purpose of estimating erosion rates during construction, it was assumed that erosion control measures would be implemented including the use of silt fences, temporary silting basins, phased construction, and seeding of areas once grading is completed.

Assuming that the entire site is constructed simultaneously, the estimated soil loss rate from the entire site during construction would be approximately 400 tons per year. This translates to approximately 0.11 acre-feet of soil or approximately 0.004 inches across the entire site and an erosion severity rating of approximately 1,550 at full build-out. The total severity rating for the Phase 1 portion of the site is estimated at 1,180. The maximum acceptable severity rating for the island of Oahu is 50,000. The value of 50,000 represents the maximum amount of environmental damage considered tolerable based on the Soil Erosion Standards and Guidelines.[11] Therefore, the severity ratings for Phase 1 and the entire soccer park at full build-out are well within the established limit. Once construction, paving, and grassing are completed, the erosion rate would be less than the 400 tons per year estimated from the analysis. Therefore, impacts due to excessive silt in the runoff would not be significant.

The soccer park site would be graded to maintain existing drainage patterns to the extent possible and to direct stormwater runoff to detention/retention basins (DSBs) constructed onsite. No runoff would discharge onto adjacent properties. Diversionary berms and swales will be constructed to prevent surface flow onto these properties. The drainage pattern for the site is not expected to result in significant adverse effects on potential receiving waters (Pearl Harbor). Based on conceptual drainage plans for the soccer park site (Figure 3-2), for the 25-year storm, Drainage Area I, which includes approximately 98 acres of the northern portion of the site, would have a peak runoff rate of approximately 136 cubic feet per second (cfs) into a 20-acre DSB prior to discharge at a rate of about 27 cfs into Middle Loch of Pearl Harbor.

Drainage Area II, approximately 28 acres, would have a peak runoff rate of approximately 61.2 cfs and would drain directly into Pearl Harbor Middle Loch. Drainage area III, approximately 72 acres of the southern portion of the site, would have a peak flow of about 166 cfs, and would drain into a 29-acre DSB before draining into Middle Loch at a rate of about 90 cfs.

Drainage Area IV, approximately 33 acres, would have a peak runoff rate of approximately 44 cfs draining into a 6-acre DSB, before draining, at a rate of approximately 7 cfs, into a former drainage canal that leads to West Loch. Drainage Area V, approximately 27 acres, would have a peak runoff rate of approximately 40 cfs that would sheet flow in a north-east direction discharging into Kapakahi Stream.

Drainage Area VI, approximately 19 acres, would sheet flow off the site in a southerly direction toward West Loch at peak rate of approximately 53 cfs. Drainage area VII covers approximately 18 acres. It would sheet flow in a southerly direction towards West Loch at a peak rate of approximately 47 cfs. The approximate drainage areas, DSB volumes, peak runoff rates into the DSBs, and peak discharge rates from the DSBs are summarized in Table 3-1.

[11] *Op. cit.*

Table 3-1
Drainage Summary

Drainage Basin	Detention/ Retention Basin	Area (acres)	Detention Basin Volume (acre-feet)	25-year Peak Runoff Rate (cfs)	25-year Peak Discharge Rate (cfs)	% Decrease in Peak Rate
Drainage Area I	DSB-I-1	98	20	136	27.2	80
Drainage Area II	-	28.2	-	61.2	61.2	0
Drainage Area III	DSB-III-1	72.5	29	166.0	16.6	90
Drainage Area IV	DSB-IV-1	32.7	6	43.6	6.9	84
Drainage Area V	-	26.6	-	39.8	39.8	0
Drainage Area VI	-	19.3	-	52.6	52.6	0
Drainage Area VII	-	18.1	-	47.3	47.3	0
Total		305.3		546.5	251.6	54

Source: Belt Collins Hawaii. 1998.

Average rainfall is only 25 inches per year, the site is comprised primarily of grass, and landscape areas and the graded slopes are typically one percent. These factors result in relatively low drainage runoff rates which are further reduced by more than 50 percent by the detention/sediment retention basins. Therefore, no significant adverse effects on the Pearl Harbor waters are expected.

The proposed soccer park is not expected to affect or be affected by floodplains within the area.

3.5.3 Proposed Mitigation Measures

Drainage Areas I, III, and IV, which account for approximately 72 percent of the 305-acre site, will have permanent DSBs and associated outlets. The DSBs will have low-flow outlet pipes which will allow sedimentation within the basins. In addition, DSBs will have overflow outlets sized such that the peak discharge rate is sufficient to discharge at least 5 inches of runoff from the drainage area in 24 hours.[12] This results in an average design storm peak flow reduction of approximately 54 percent for the entire site when compared to the developed condition with no DSBs.

[12] U.S. Dept. Of Ag. 1981.

DSB volumes and peak discharge rates were calculated using methods outlined in TR55 and the *Erosion and Sediment Control Guide for Hawaii.*[13] Design storms were also selected using the erosion and sediment control guidelines for Hawaii.[14]

Runoff from Drainage Areas II, V, VI, and VII will continue to drain towards the ocean. Silt fences will be installed along the makai boundary of Drainage Areas II, V, VI, and VII during construction to filter silt from the runoff. In addition, temporary sedimentation basins will be constructed in these areas prior to mass grading to allow fines in the runoff to settle or be filtered prior to discharge. Once the area is grassed, the temporary sedimentation basins will be removed. However, silt fences will remain along all makai boundaries of disturbed areas until the temporary sedimentation basin areas have been removed and final grades and grassing have been completed.

Diversion berms and swales will be incorporated into the drainage plan to preclude runoff generated on-site from flowing into the areas adjacent to the southern boundary of the site. The southern berms and swales will direct runoff into DSB-III-1 and DSB-IV-1 located on the southeast and southwest portions of the site, respectively.

As discussed earlier, erosion control measures will be implemented during construction. Measures will include constructing silt basins with low-flow outlet structures to allow for sedimentation, phasing construction to minimize the amount of land exposed with no ground cover, and seeding of areas as soon as practical once grading is completed.

The permanent DSBs will have overflow pipes sized to handle runoff associated with a 25-year storm event. The site's permeability rates are estimated at between 0.028 inches per hour (in/hr) for areas classified as fill land (Drainage Area III) to 1.42 in/hr for areas classified as incinerator ash fill (Drainage Area IV). DSBs in areas with lower permeability will have lower overflow elevations, while DSBs in areas with higher permeability will have slightly higher overflow elevations. Due to the area's low permeability rates, DSB overflow elevations were minimized to reduce the amount of time for the DSBs to empty from the point just below the overflow elevation to the DSB floor elevation. Once water levels within the DSBs fall below the overflow elevation, flow out of the DSBs will occur via the low flow pipe or through ground percolation.

Drainage from the proposed development is not anticipated to present significant impacts once mitigative measures are implemented. It is noted that flooding does occur on nearby sites, such as the Ted Makalena Golf Course, which are at lower elevations than the soccer park site.

The proposed soccer park will not affect the geology of the soccer park site or region. Therefore, no mitigation measures are required.

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[13] *op. cit.*
[14] *op. cit.*

3.6 TERRESTRIAL FLORA

3.6.1 Existing Conditions

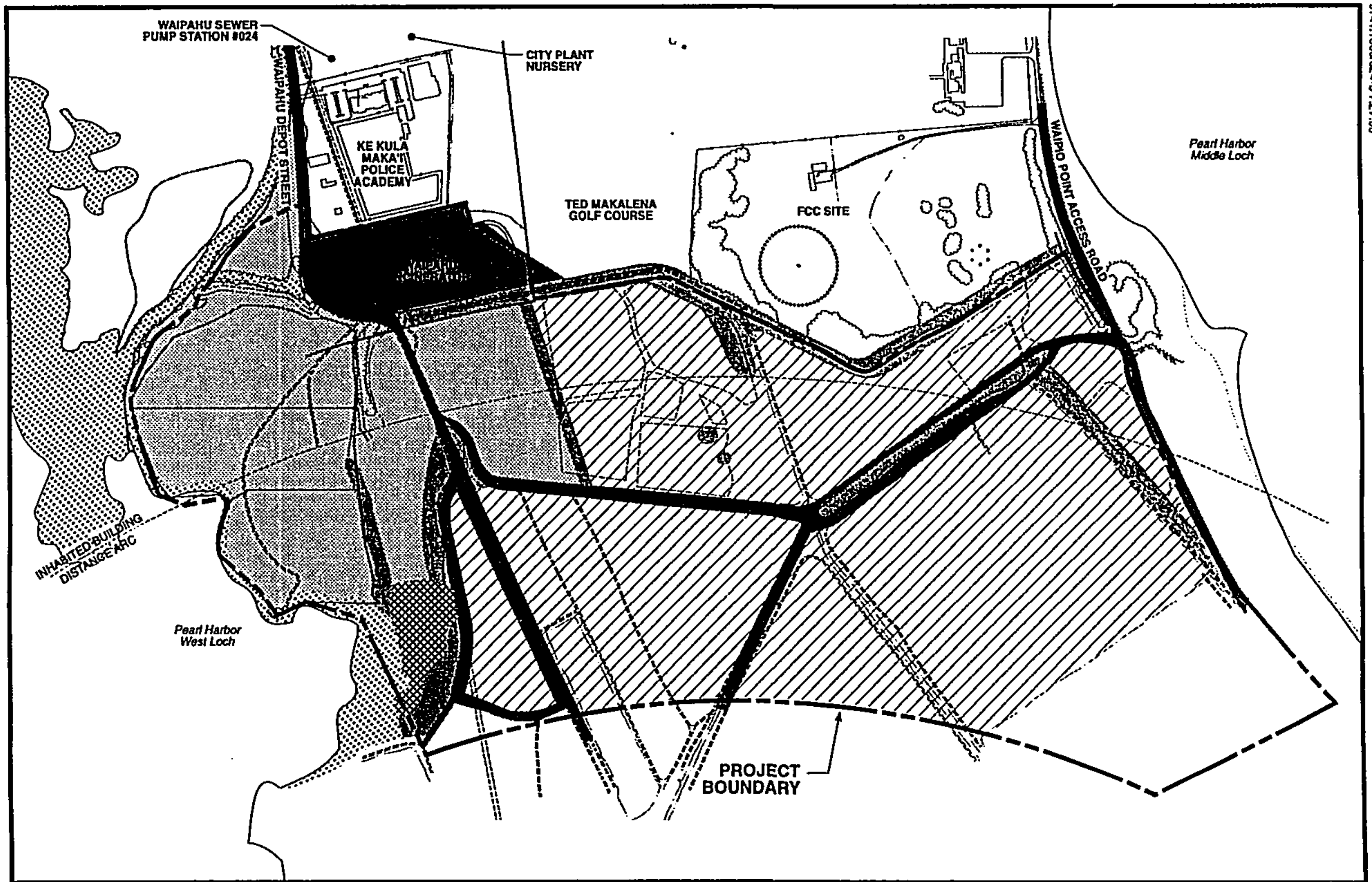
A three-day pedestrian botanical survey of the entire soccer park site was conducted in February 1998 (Appendix C). The results of that survey indicated a total of 84 plant species on the site, with 5 or 6 being native plants (*Sesuvium portulacastrum* [*ʻakulikuli*], *Jacquemontia ocalifolia* [*paʻu-o-Hiʻiaka*], *Abutilon incanum* ([*maʻo*] questionably native), *Sida fallax* (*ʻilima*), *Bacopa monnieri* (water hyssop), and *Waltheria indica* [*ʻuhaloa*]. None of the native plants are endemic to Hawaii. The remaining 78 to 79 plant species are introduced species and most of them are naturalized weeds. A few, such as *Bougainvillea x buttiana* (bougainvillea), *Nerium oleander* (oleander), *Cassia x nealii* (rainbow shower), *Cordyline fruticosa* (ti plant), *Schefflera actinophylla* (octopus tree), and *Carica papaya* (papaya), are only found in cultivation. Three others, *Saccharum officinarum* (sugar cane), *Moringa oleifera* (horse-raddish tree), and *Roystonea regia* (royal palm), are cultivated species that appear to have persisted in one or more places long after cultivation.

Because of decades of disturbance, mostly from the cultivation of sugar cane and the creation of landfills, no original vegetation is found at the site. The existing disturbed vegetation is not homogeneous but can be divided into seven plant communities as described in Appendix A. The seven plant communities are: (1) Managed Land Vegetation, (2) Secondary Scrub/Grassland, (3) *Cenchrus* Grassland, (4) Leucaena Scrub, (5) Pickleweed Marsh, (6) Freshwater Marsh, and (7) Mangrove Forest (Figure 3-4).

The last six, while not considered to be "native vegetation" because they are dominated by alien (introduced) species, are natural and in stable condition. The Secondary Scrub/Grassland community is further divided into four sub-plant associations: (a) Castor Bean Scrub Association; (b) California Grass Association; (c) Guinea Grass Association; and (d) Mixed Species Association.

The boundaries between the communities shown on Figure 3-4 and discussed in Appendix C are not always clear because the vegetation types often grade into each other and do not fit into discrete areas. There are no federally listed or candidate threatened or endangered plant species found on the site. Wetlands on the site are discussed below. All of the vegetation on the site is disturbed and no sensitive plant communities, other than the wetlands noted above, are present.

Three possible wetland areas on or next to the soccer park site were identified during the February 1998 botanical survey: (1) Pickleweed Marsh; (2) Freshwater Marsh; and (3) Mangrove Swamp (see Figure 3-4). However, a subsequent wetlands survey indicated none



Note: Locations are approximate.

Figure 3-4
SOCCER PARK SITE VEGETATION MAP
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

of the three sites meet the U.S. Army Corps of Engineers criteria for hydric soils.[15] Therefore, there are no wetlands within the proposed project area.

Wetlands outside the proposed project area exist along the shorelines of Middle and West Loch. These wetlands include Pou-hala Marsh, located just northwest of Kapakahi Stream, west of Waipahu Depot Street and two non-contiguous units of the Pearl Harbor National Wildlife Refuge located on the Pearl City Peninsula just across Middle Loch from the soccer park site on Waipio Peninsula. These areas would be unaffected by the soccer park.

3.6.2 Potential Impacts

3.6.2.1 Environmental Issues and Significance Criteria

The primary environmental issues associated with the vegetation of the site include removal or alteration of sensitive and protected species and habitats and the types of plant materials to be used on the soccer park site. Impacts to the vegetation of the site would be considered significant if:

- The proposed soccer park results in the destruction or alteration of sensitive or protected plant habitats or species; or
- The proposed soccer park results in the violation of local, state, or federal law with respect to the protection of biological resources.

3.6.2.2 Potential Impacts

Development of the proposed soccer park would result in the majority of the existing vegetation of the site being removed to allow for construction of the playing fields. As indicated above, there are no federally listed or candidate threatened or endangered species of plants found on the site. Similarly, there are no critical plant habitats on the site. Therefore, the proposed soccer park is not expected to result in any significant adverse effects to the flora of the site or state. The wetlands along the shorelines of Middle and West Loch would be unaffected by development of the proposed soccer park.

3.6.3 Proposed Mitigation Measures

Plant materials to be used on the soccer park site will include those that are salt and drought tolerant, low maintenance, disease and pest resistant, have a low fertilizer requirement, and, to the extent practicable, are native grasses, shrubs, and trees.

Because the site is vegetated almost entirely by introduced plant species and because there are no wetlands within the soccer park site, the proposed soccer park would not adversely

[15] U.S. Army Corps of Engineers. January 1987.

affect the plant resources of the site or state. Re-landscaping and planting the site in turf will offset the removal of the existing vegetation. Other mitigation measures are not required.

3.7 FAUNA

3.7.1 Existing Conditions

3.7.1.1 Birds, Mammals, and Waikele Stream Fauna

A two and one-half day pedestrian bird and mammal survey of the entire site was conducted in April 1998 (Appendix D). Walking counts for birds were concentrated during the morning hours between 6:00 and 11:00 a.m., the peak bird activity time. Counts were also made between 4:00 and 8:00 p.m. to detect Newell's Shearwater overflying the site.

To detect the presence of endangered Hawaiian hoary bats (*'Ope'ape'a*) (*Lasiurus cinereus semotus*), two stationary remote bat census stations were set up at night. In addition, visual scans for bats were made during crepuscular periods (dusk and dawn).

A total of 20 avian species representing 13 families were detected within the immediate vicinity of the site. All but one of the species recorded are introduced. The remaining species detected was a lone Northern Shoveler (*Anas clypeata*) flying over the site heading northeast. No endangered or threatened avian species were detected within the proposed soccer park site. Of the 19 introduced species, Zebra Dove (*Geopelia striata*), Common Myna (*Acridotheres tristis*), Red-whiskered Bulbul (*Pycnonotus jocosus*), and House Finch (*Carpodacus mexicanus mexicanus*) were the most abundant.

Two mammalian species, domestic dog (*Canis familiaris familiaris*) and small Indian mongoose (*Herpestes auropunctatus auropunctatus*), were detected on the site. While no rodents were sighted during the survey, it is likely that roof rats (*Rattus rattus*), Norway rats (*Rattus norvegicus*), and house mice (*Mus musculus*) are present. It is also possible that cats (*Felis catus*) are found on the site. All of the mammalian species are introduced and are deleterious to the avian populations. Hawaii's sole endemic terrestrial mammal, the endangered Hawaiian hoary bat, was not detected on the site.

3.7.1.2 Waikele Stream Fauna

A biological survey of the section of Waikele Stream that would be affected by the non-potable irrigation water system (see Section 3.12.2 below) was conducted in May and June 1998 (Appendix H). Three areas were sampled: Station 1 was the estuary area of the stream where it enters West Loch; Station 2 was at the Waipahu Street Bridge and extended downstream through the Waipahu Cultural Plantation Village; and Station 3 started slightly downstream of H-1 and continued upstream to the boundary of the Upper Kipapa Military Reservation and included Waikele Springs.

During the survey, 15 native aquatic species and 13 introduced aquatic species were found in Waikele Stream. Most of the native species were marine and estuarine species observed in the Waikele estuary area, that is, at the mouth of the stream in West Loch. Important food fish, such as the native *aholehole* (*Kuhlia sandvicensis*) and *'ama'ama* or striped mullet (*Mugil cephalus*) were abundant up to a concrete barrier formed by a U.S. Geological Survey (USGS) Gaging Station weir. Tilapia (*Sarotherodon melanotheron*) were the dominate species from Waikele Springs downstream to the marine and estuarine portions of West Loch.

Three of five native *'o'opu* species were captured or observed during the stream biotic survey: *'O'opu nakea* (*Awaous guamensis*), *'O'opu naniha* (*Stenogobius hawaiiensis*), and *'O'opu akupa* (*Eleotris sandwicensis*). No post-larva 'o'opu were observed during the sampling and only one *'O'opu nakea* was observed in lower Waikele Stream. Native fish were not observed in the vicinity of Waikele Springs.

Introduced bristle-nosed or armored catfish (*Ancistris* sp.) were abundant in faster water run and riffle areas in Station 3. Densities were high above the influence of cold-water Waikele Springs and were also high below the spring input area. Fish species composition observed or collected during the 1998 survey were consistent with the results of a 1993 assessment of Waikele Stream.[16] No new alien fish species were observed as compared to the 1993 surveys.

The aquatic insect fauna in Waikele Stream was dominated by native and introduced dragonflies and introduced damselflies. Native *Megalagrion* spp. damselflies were not observed in lower Waikele Stream. The scarlet skimmer dragonfly (*Crocothemis servillia*), a recent introduction to the state, was common.

A new species of introduced freshwater shrimp (*Neocaridina denticulata*) was abundant in the stream from the USGS gaging station to the Kipapa Military Reservation border. Indigenous estuarine shrimp included *Palaemon debilis* and *Perclimenes* (*Harpilius*) sp. Native crenulated blue crabs (*Thalamita crenata*) were abundant in the Waikele Stream tidal mudflat area.

'O'opu nakea was the only native species of fish found in Kapakahi Stream and it was uncommon. Eight species of introduced fish species were dominant, including tilapia, *Mugiliogobius cavifrons*, and numerous species of live-bearing fish (Poeciliidae). Excluding amphipods and isopods, only one species of introduced crustacean, *Procambarus clarki*, was found in Kapakahi Stream. Several species of native indigenous dragonflies, such as the common green darner (*Anax junius*) and the wandering glider (*Pantala flavescens*) were abundant, as were the introduced scarlet skimmer and roseate skimmer (*Orthemis ferruginea*). Native damselflies observed included Rambur's forktail (*Ischnura ramburi*) and the fragile forktail (*Ischnura posita*). These species were common. Kapakahi Stream fauna also included apple snails (*Pomacea canaliculata*), but there were not observed in Waikele Stream.

A complete listing of the native and introduced aquatic animals in Waikele and Kapakahi Streams observed or captured during the biotic survey is included in Appendix H.

[16] Englund. 1993.

3.7.2 Potential Impacts

3.7.2.1 Environmental Issues and Significance Criteria

The primary faunal environmental issue is the potential effect of the soccer park on sensitive and protected species and habitat. Significant adverse effects to the fauna of the soccer park site would occur if:

- The proposed soccer park resulted in adverse effects on any federally or state listed or candidate endangered or threatened species;
- The proposed soccer park resulted in the loss or long-term degradation of sensitive faunal habitats; or
- The proposed soccer park would result in the violation of local, state, or federal law with respect to the protection of biological resources.

3.7.2.2 Potential Impacts

The proposed soccer park will affect the existing fauna of the site through removal of the existing vegetation and replacing that vegetation primarily with turf grass, shrubs, and trees (see Section 3.6). The watered grass areas may attract Hawaiian Stilts and any number of migratory shorebirds. The field lights may attract Newell's Shearwaters and Hawaiian hoary bats. Because all but one bird species presently inhabiting the site and those that might inhabit the site are introduced species, no significant adverse effects to the wildlife of the site are expected to result from the proposed soccer park.

There have been significant changes in the bird fauna of Waipio Peninsula following the cessation of sugar cane cultivation in 1994. Between the late 1890s and 1995-1996, the man-made wetlands on the peninsula supported large numbers of waterbirds, including the four extant endangered Hawaiian waterbird species found on the main islands: Hawaiian Duck (*Anas wyvilliana*) and Hawaiian Coot (*Fulica alai*), which are endemic at the species level, and the Common Moorhen (*Galinula chloropus sandvicensis*) and Hawaiian Stilt (*Himantopus mexicanus knudseni*), which are endemic at the sub-species level.[17,18] The area was also a major migratory shorebird and waterbird stopping off point between September and April each year. Many of the more than 80 species of migratory and extralimital bird species that have been recorded from Hawaii have been recorded from the peninsula.

Between 1995 and the present, the settling ponds have dried up and become overgrown with a mix of castor bean (*Rininus communis*), California grass (*Brachiaria mutica*), Buffle grass (*Cenchrus ciliaris*), Guinea grass (*Panicum maximum*) and many other introduced weed species (see Section 3.6 above). No wetland habitat suitable to sustain waterbirds or shorebirds

[17] U.S. Fish and Wildlife Service. 1992.
[18] Hawaii Department of Land and Natural Resources. 1986.

remains within the soccer park site. Further, the shoreline along the western side of the site is heavily vegetated with red mangrove (*Rhizophora mangle*) all but obscuring the beach mudflats. This dense vegetation precludes the use of the intertidal zone by shorebirds.

There are several wetlands that support the four extant endemic waterbird species currently found on Oahu relatively close to the soccer park site. The closest wetland is Pou-hala marsh located just northwest of Kapakahi Stream on the west side, but outside of the soccer park site. The State Department of Land and Natural Resources (DLNR), U.S. Fish and Wildlife Service (USFWS) and Ducks Unlimited (DU) are working on an enhancement plan for this wetland. Also, there are two non-contiguous units of the Pearl Harbor National Wildlife Refuge (PHNWR) located on the Pearl City Peninsula just across Middle Loch from the soccer park site. Another PHNWR unit is located on the west side of West Loch immediately adjacent to the West Loch Golf Course. There would be no reservoirs or ponds within the soccer park site. A reservoir will be reconstructed at the Ted Makalena Golf Course. The soccer park site would not be an attractant for resident and migratory water birds. It is likely that water birds would fly over the soccer park site as they move between units of the PHNWR.

Because the avian and mammalian populations of the site are dominated by introduced species and because the proposed soccer park will not affect the mangrove swamp areas to the west of the soccer park site or the Pouhala Marsh, the proposed soccer park will not adversely affect the faunal resources of the site or Hawaii. Similarly, development of the non-potable irrigation water source at the Waikele Stream diversion would not significantly affect either the stream or West Loch biota (Appendix H).

No potentially significant impacts to the wetlands, shoreline, or sanctuaries, or species contained therein, are expected from exposure to residual agricultural or turf chemicals for the following reasons:

1. During construction, direct contact of birds with soil containing residual chemicals on the project site is unlikely, as this site is not preferred habitat for foraging, nesting, or resting for these species.

2. Any contaminants which may be present in shoreline waters near the Navy lease property result from past land use and are not expected to increase in concentration or number as a result of the soccer park development. Grading will occur only in accordance with best management practices minimizing sediment runoff, especially near the shoreline or wetlands.

3. Mitigation measures will be employed to minimize the impacts of windblown soil during construction. Thus, exposure of waterfowl to residual chemicals carried off-site will be minimized. Based on soil sampling and analysis, the existing soils in the lease area do not pose an ecological risk to waterbirds.

4. Shoreline water sampling performed by the City in 1995 (in association with planned closure of the nearby landfill) found that the landfill is generally not affecting nearby ocean water quality (GMP Associates, Inc., 1996).

5. Agricultural chemicals used in the past at the lease property generally consist of very large molecules specifically designed to prefer (partition to) soil rather than water. Therefore, these chemicals are not expected (or intended) to be easily mobilized by rain water/irrigation water and leached to underlying groundwater. Irrigation of the proposed soccer park is intended to be conservative of water supplies and of fertilizers, and will be designed to avoid excess leaching of irrigation water to groundwater.

6. Many of the agricultural chemicals possibly used at the lease property have relatively short half-lives and would not survive many months or years in the open environment.

7. Sampling and analysis of 38 soil samples from the lease property indicate that analyte concentrations were well below action levels protective of human health (i.e., preliminary remediation goals [PRGs] for residential soils) for organic chemicals and heavy metals. It is likely that these low levels would also be protective of the health of the wildlife of the area. Slightly elevated concentrations of arsenic and chromium are characteristic of Hawaiian soils.

8. With regard to the potential impacts of siltation, soil runoff is anticipated to be minimal once the soccer park's turf has established itself and landscaping has been completed. Based on soil sampling and analysis, the existing soils at the project area do not pose an ecological risk to waterbirds.

9. Regarding petroleum contamination, the only source of potential petroleum contamination associated with the proposed soccer park is runoff from parking lots, which will comprise a very minor component of drainage flow.

10. Turf management at the soccer park will include a computerized irrigation system to monitor the volume of water used to irrigate the soccer parks. Such a system is an important component of an overall integrated turf management program which will be implemented to minimize the application of fertilizers and pesticides on the soccer fields.

Regarding possible noise impacts from from cheering crowds emanating from the sports complex, this will be short-term in duration and only occurring intermittently. This noise will originate a half-mile away from the habitat, and the existing vegetative buffer should help in baffling and masking noise. The adaptive abilities of birds with regard to noise impacts has been widely studied and documented. In many instances, birds have been observed to successfully breed and rear young in close proximity to sources of loud noise, such as airport runways (for example, Kanaha Pond adjacent to Kahului Airport on Maui). Thus it is expected that noise impacts on birds utilizing areas near the project site will be minimal.

3.7.3 Proposed Mitigation Measures

Because there are no listed or candidate endangered or threatened bird or mammal species found on the site, and because the site may continue to be suitable habitat for some introduced species, no adverse effects to the faunal characteristics of the site are expected.

To avoid the downing of Newell's Shearwaters resulting from interactions with external lights, the lights will be shielded to the extent possible. Also, to avoid disturbance to Hawaiian Stilts and other waterbird species using the Pou-hala Marsh south and outside the soccer park site, the mangrove barrier on the northwest side of the soccer park site would not be disturbed.

3.8 ARCHAEOLOGICAL, HISTORICAL, AND CULTURAL RESOURCES

3.8.1 Existing Conditions

An archaeological surface and subsurface inventory of the soccer park site was conducted in May 1998 (Appendix F). The soccer park site and adjacent area (Ted Makalena Golf Course, Federal Communications Commission (FCC) site, Ke Kula Maka'I Police Academy, and Navy lease lands south of the soccer park site) formerly contained, from the prehistoric and early historic period, three large traditional Hawaiian fishponds: *Loko Eo* (State Site No. 50-80-09-123), *Loko Ulumoko* (State Site No. 50-80-09-120), and *Loko Hanaloa* (State Site No. 50-80-13-125), (Figure 3-5). Other smaller fishponds in the area have also been identified (see Appendix F).

According to the results of the inventory survey conducted, there are no cultural resources within the soccer park site. *Loko Ulumoku* fishpond, *Miki* Fishpond, *Kuaalau* Fishpond, *Aielole* Fishpond, *Maaha* Fishpond, and historic homesteads registered on the Land Commission Awards within the soccer park site, revealed no cultural remains. *Loko Ulumoku* Fishpond has been buried to a depth of 10 feet in ash, fill, and slag from the former Oahu Sugar Company mill. The remaining fishponds have been obliterated by the construction of reservoirs, cane fields, mud ponds, roads, and raised ditches related to former sugar cane cultivation operations.

Remnants of two small pumping stations and the main distribution ditch of the lowland irrigation system for the former sugar cane cultivation operations were recorded during the archaeological surface and subsurface inventory in the western portion of the soccer park site in the former settling pond area. A description of the pumping station is included in Appendix F. The sugar irrigation complex is a remnant of an important industry that helped shape modern Hawaii. A stone wall was also recorded on the southern boundary of the FCC property. Due to its location and elevation, it appears that the wall was constructed by Oahu Sugar Company as a property boundary (see Figure 3-5).

Within the vicinity, but outside the boundaries of the soccer park site, is an old Oahu Railway and Land Company (OR&L) right-of way spur (Figure 3-5), portions of which are listed on the

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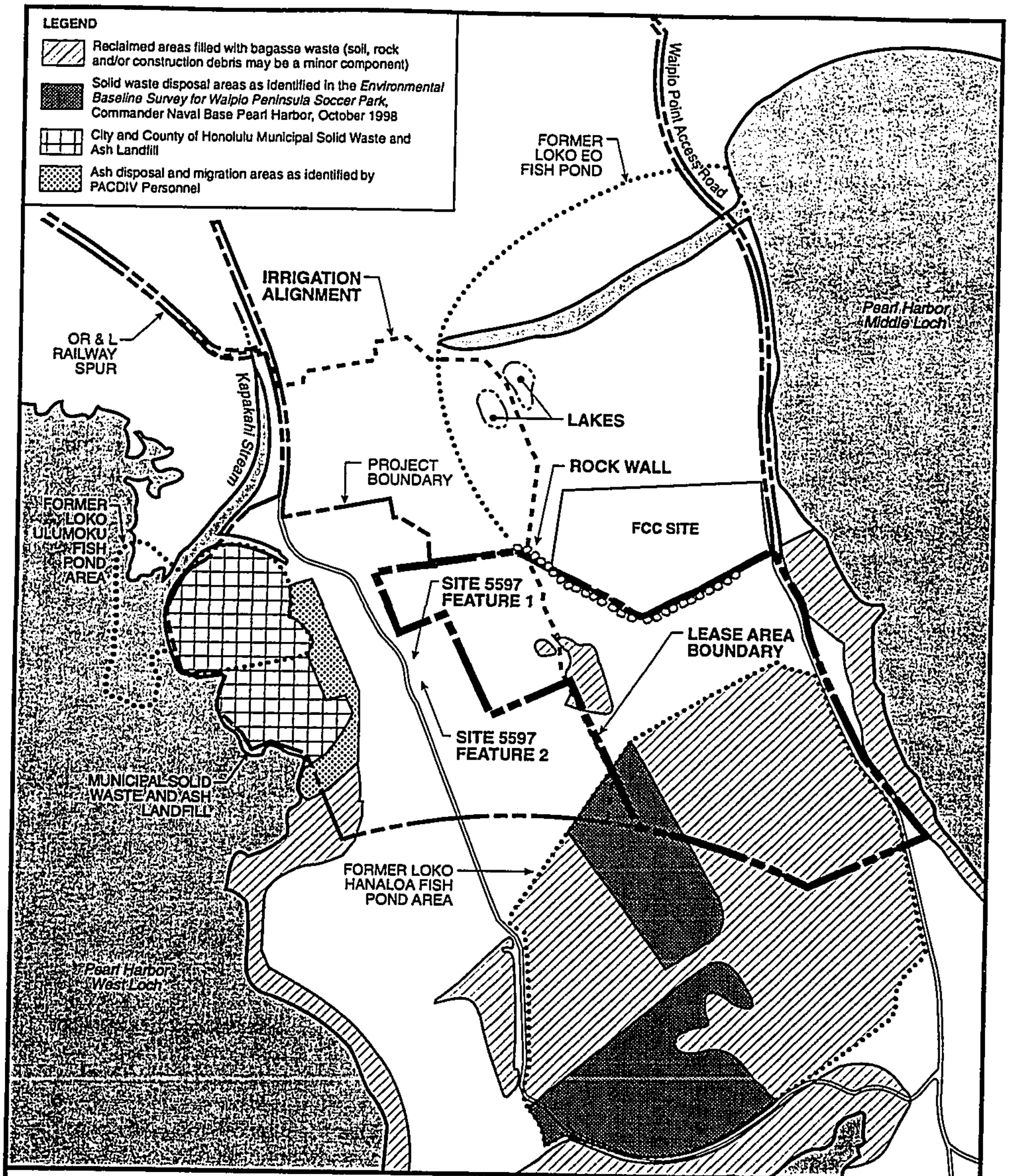

Source: Hart Crowser, August 1995. Note: Locations are approximate.

NORTH

0 600 1200
SCALE IN FEET

Figure 3-5
ARCHAEOLOGICAL AND CULTURAL SITES
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August 1998

National Register of Historic Places. This right-of way is outside the soccer park site and proposed soccer park development area.

No resources that would appear to be Traditional Cultural Properties (as described in the National Historic Preservation Act of 1996, as amended, Section 101), or those that would meet Section 6E of the Hawaii Revised Statutes (HRS) or the State of Hawaii Guidelines for Assessing Cultural Impacts, were identified in the soccer park area. The likelihood of such properties is very low because traditional access to the peninsula has been restricted for the last 100 years.

3.8.2 Potential Impacts

3.8.2.1 Environmental Issues and Significance Criteria

The primary environmental issues potentially affected by the proposed soccer park are the extent and nature of features existing on-site and past cultural uses of the site. Evaluation of significant impacts on historical, archaeological, and cultural resources are guided by criteria for listing these resources on the National Register of Historic Places (NRHP), as defined in 36 Code of Federal Regulations (CF R) 60.4, and augmented by the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, appropriate State statutes and guidelines, and in consultation with the State Historic Preservation Division (SHPD). Any damage, physical alteration, or neglect to an eligible site within the soccer park site would be considered significant.

The archaeological inventory survey revealed two potentially significant sites located in the project area, but outside the soccer park site:

- *Loko Eo* (State Site No. 50-80-09-123): This site appears to be significant for its information content and has yielded or may be likely to yield information important in prehistory or history.
- OR&L Spur Right-of-Way (State Site No. 50-80-12-9714): This site is listed on the NRHP.

One potentially significant site was identified within the soccer park site:

- Sugar Cane Irrigation Complex (State Site No. 50-80-13-5597): This site appears to meet two significance criteria as defined by the National Historic Preservation Act of 1966: (1) sites that are associated with events that have made a significant contribution to the broad patterns of our history, and (2) sites that have yielded, or may be likely to yield, information important to prehistory or history. This complex comprises important features of the sugar cane industry, which was a very important period in Hawaii's history. This complex also has the potential to yield information that is important to history.

3.8.2.2 Potential Impacts

The State Historic Preservation Division concurs that the proposed soccer park and offsite improvements would have no effect on the precontact fishponds, deeply buried precontact sites, sugar cane irrigation system, and wall section of probable historic age. In addition, the Division concurs that there would be no adverse effect on the OR&L spur. This concurrence is subject to final approval of the inventory survey report, which has been revised in response to Division comments and submitted for final approval.

The Sugar Cane Irrigation Complex (State Site No. 50-80-13-5597) would be within the developed soccer park and therefore impacted by development of the soccer park. Although the *Loko Eo* Fishpond and OR&L Right-of-Way (State Site No. 50-80-13-5597) are outside the soccer park boundaries, they will be impacted by excavation associated with the proposed irrigation transmission line.

Because the soccer park site has been under the control of the Navy or private parties for almost 100 years and used for various military and civilian agricultural activities, there have been no native Hawaiian or other cultural practices at the site during this period. Consequently, the proposed soccer park would not affect any on-going Hawaiian cultural practices.

3.8.3 Proposed Mitigation Measures

In keeping with the recommendations of the archaeological, historical, and cultural resources survey, the following mitigation measures will be taken:

- The Sugar Irrigation Complex (State Site No. 50-80-13-5597) is a remnant of an important industry that helped shape modern Hawaii. Because the significance of these features is limited to their informational content, and that they have been adequately recorded, no further work for these sites is necessary. Based on informal discussions with the SHPD, preservation of these sites is not warranted or feasible.

- The spur of the OR&L railroad (State Site No. 50-80-13-5597) that is near the soccer park area appears to be significant for its informational content only. The Right-of-Way, which presently serves as a previously established and disturbed utility corridor, would be trenched for the non-potable irrigation water transmission line. The trenching activities would be archaeologically monitored so that construction details of the railroad foundation can be recorded. This information recording will mitigate any adverse effect of the construction activities.

- A portion of the proposed irrigation line will cross Ted Makalena Golf Course and will require the excavation of a portion of the golf course within the perimeter of the former *Loko Eo* Fishpond, as will two irrigation lakes associated with the transmission line. It is anticipated that the impact of this activity will be limited to the excavation of fill material and will not likely extend into subsurface strata beneath the fill. Mitigation measures to address any potential impacts to subsurface remnants of the pond could include work stoppage by the contractor and consultation with an archaeologist if archaeological remains are uncovered during excavation or monitoring of excavation activities by an archaeologist. The criteria for work stoppage would be determined during consultation with the SHPD.

3.9 SOCIOECONOMIC ENVIRONMENT

The socioeconomic characteristics of the proposed soccer park site and area are described in the Socioeconomic Impact Assessment Report contained in Appendix E. The following is a brief summary of the existing conditions portion of that report.

3.9.1 Existing Conditions

3.9.1.1 Existing Social Conditions

The soccer park site is located within the Central Oahu Development Plan (DP) area, as defined by the City and County of Honolulu. The Central Oahu and Ewa DP areas (see Figure 3-6), which are immediately adjacent to and west of the soccer park site, have been designated as areas for future urban growth. The Ewa DP area has been designated as the Secondary Urban Center for the island.

For most of this century, Central Oahu was dominated by plantation agriculture. Pineapple plantations in concentrated the Wahiawa area, while in the southern portion of Central Oahu (near Waipahu), sugar was the primary crop. With the decline of agriculture following World War II, a considerable amount of plantation land was converted to housing, facilitating the growth of the region as an urban zone. In 1990, Central Oahu had about 130,000 residents, almost 16 percent of the island's population. Several factors have influenced the growth of the Central Oahu urban core:

- The availability of large tracts of former agricultural land at relatively inexpensive prices;
- Need for new residential areas to support Oahu's urban growth; and
- Need for housing to support military communities (Schofield Barracks and Wheeler Army Airfield).

More recently, the region has undergone rapid growth around Mililani and Waipahu. Development has continued to spread throughout the region at a rapid pace in planned communities and infill projects. In 1990, Central Oahu contained 13 percent of the island's residential units.

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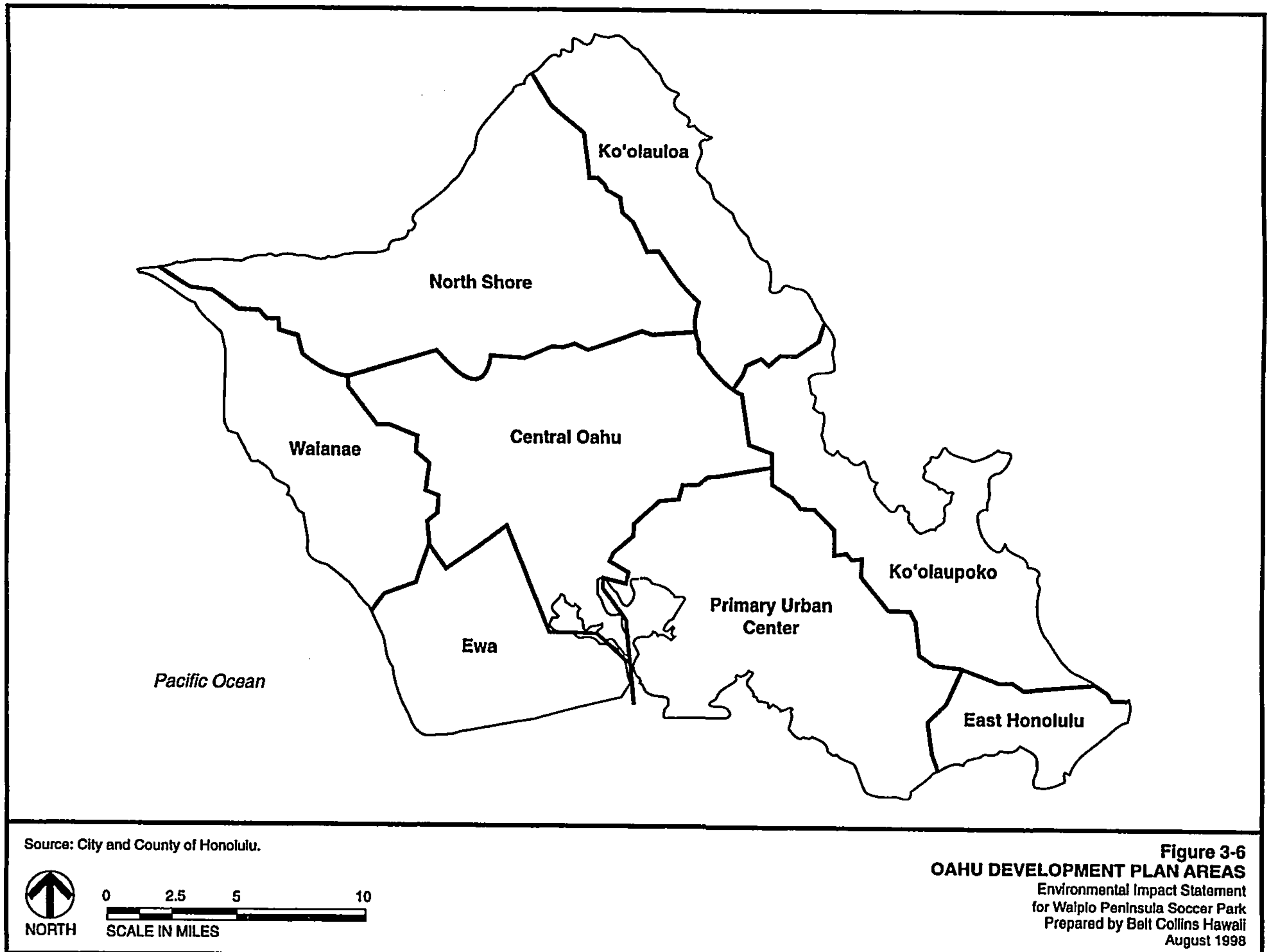


Source: City and County of Honolulu.

Figure 3-6
OAHU DEVELOPMENT PLAN AREAS
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

Central Oahu contains both established communities that have long served as plantation towns — Waipahu and Wahiawa — and newer developments. Of the newer developments, Mililani Town is a planned community with homes, a light-industrial/technology park, and a major shopping center. Waikele includes both extensive residential areas and a major shopping center.

While Central Oahu is much more populous than the Ewa DP area, the two areas' populations are very similar. In 1990, about 30 percent of the population was age 17 and under. About one-quarter of the population in both were of Filipino ancestry. Caucasians formed the largest single ethnic group, but amounted to only 30 percent of the population in Central Oahu and 40 percent of the population in Ewa.

Household incomes were slightly higher for Ewa households. The average household size in Central Oahu — 3.49 persons per household — was slightly lower than the Ewa average, but still much higher than the island-wide average of 3.02 persons per household. (See Appendix G for additional demographic data.)

3.9.1.2 Existing Economic Conditions

The State of Hawaii has nearly 1,200,000 residents and about 160,000 visitors present on any given day. Its economy is highly dependent upon tourism and government spending. Direct visitor expenditures equal about $1.0 billion annually, nearly one-third of Hawaii's Gross State Product (GSP). Other sectors, notably construction, also depend on tourism and government spending.

Military activity ranks as Hawaii's third largest industry or economic sector, after tourism and construction. The percent of GSP that federal military spending represents has remained above 9 percent and has even reached 11.5 percent. While construction and tourism have been subject to major swings, military spending has been relatively constant. Construction of more military housing as well as base modifications at Pearl Harbor and elsewhere have also had an impact on federal spending in Hawaii during the 1990s. Despite the closing of Naval Air Station Barbers Point in 1999, military manpower and spending are expected to remain at or near current levels over the next few years.

The military share of the state economy is estimated at about 12 to 14 percent and military land on Oahu amounts to 21 percent of the island's surface area. Military activity in the state is located primarily on Oahu.

The construction industry in Hawaii has witnessed a steady decline over the last several years. The total value of construction put in place has decreased from a high of $4.3 billion in 1991 to $3.2 billion in 1996. During that same period, the number of jobs in construction decreased from 33,550 to 23,450, a drop of 30 percent. Construction on Oahu has exhibited similar trends. In 1991, the value of construction put in place was $3.6 billion, and it dropped by 23 percent in 1996 to $2.7 billion.

This decline is very noticeable in new residential construction. Home builders have scaled back on the construction of new housing units because of the existing housing inventory. On Oahu, housing unit authorizations dropped more than 50 percent during 1996.[19] New home absorption on Oahu has also been affected by increased military housing construction. Combined with military personnel reductions, these have reduced housing demand by the military population.

Historically, the sugar plantations were an important aspect of the state's and island's economy. Over the last several years, there has been a rapid acceleration of the demise of these plantations. The result of the closure of these operations has been the opening up of former sugar cane lands to other uses. On Oahu, some of the former sugar cane lands in Central Oahu and Ewa have been converted to short-term agricultural leases. This has resulted in more small and medium-sized farms and the development of greater diversification of agricultural crops. Urbanization is expected for much of the remainder of former sugar cane lands.

Tied to the development of alternative uses of former sugar cane lands is the issue of the availability of water. This is true whether the land is put to other agricultural uses or is urbanized. Use of lands for sugar in the Central and Ewa regions of Oahu was dependent on water imported from the windward side of the island via the Waiahole Ditch and by the drilling of wells by private developers. For the region, the key issue is the availability of Waiahole Ditch water. While this matter is under appeal to the Hawaii Supreme Court, water for existing Central Oahu agricultural uses most likely will remain available. Waipio Peninsula lands (including part of the soccer park site) were formerly planted in sugar cane, and irrigated by wells drilled by Oahu Sugar. The availability of these wells for the proposed soccer park is in question. Current soccer park plans call for construction of an irrigation water transmission system.

3.9.2 Potential Impacts

3.9.2.1 Environmental Issues and Significance Criteria

The primary socioeconomic issues are associated with the opportunities the soccer park presents for attracting visitors to tournaments, camps, and clinics. The primary social impacts are associated with the provision of greater outdoor recreation opportunities for Hawaii residents, lessened demand for other sports facilities, expansion of sports tourism, possible noise and traffic impacts on nearby communities, the potential of providing new customers for businesses along Farrington Highway, development of a community focus, and the potential problems of public safety due to large low-lighted parking areas.

Socioeconomic issues have to do with present demand for soccer fields, the adequacy of existing fields, and the potential economic stimulus of the soccer park for Oahu in general and

[19] Bank of Hawaii. 1998.

more specifically, Central Oahu and the Waipahu area. Significant adverse socioeconomic effects could be experienced if:

- The proposed soccer park does not contribute significantly to meeting outdoor recreation requirements of the City and County of Honolulu;
- The proposed uses are incompatible with nearby land uses;
- The proposed uses result in public safety problems;
- The proposed uses result in disproportionately high and adverse effects on minority and low-income populations or on children; or
- The proposed soccer park results in adverse economic effects on the State and City and County of Honolulu.

3.9.2.2 Potential Social Impacts

The potential social and economic impacts of the proposed soccer park are fully described in Appendix E. The following is a brief summary of those impacts.

The soccer park would encourage the development of a sport enjoyed by many on Oahu, while providing an opportunity for expanding sports tourism.

For Waipahu, the soccer park will serve as a stimulus to encourage sports among the residents of the older areas near the site. It could moreover bring together residents of newer and older areas in a common activity, helping to establish a shared identity for residents of the community.

Nearby residential areas will see increased traffic and could be affected by parking or noise associated with large events. These small neighborhoods are now isolated on the makai side of Farrington Highway, so even occasional congestion and noise would be a major change in their local conditions. For Waipahu High School, which is located along Waipio Access Road, the soccer park would offer additional sports fields. However, traffic congestion associated with events at the high school could be worsened if events occur at the same time at the soccer park.

Public safety would be affected by operational considerations. The parking areas cannot be lit by overhead lighting due to Navy regulations that rule out any structures in the southern part of the site. There would be low, closely spaced, bollard-type light fixtures that would provide lighting. The lack of overhead lighting could raise concerns about people's physical safety and make police supervision of the site difficult. As many as five additional officers could be needed to patrol, not including officers called on duty for special events.

The soccer park adjoins the Ke Kula Maka'i Police Academy. Activities at the Academy would be visible from the berm surrounding the tournament field and from the soccer park Training Center. As a result, security of activities there could be compromised unless steps are taken to screen the Academy from soccer park facilities.

3.9.2.3 Potential Economic Impacts

Table 3-2 summarizes the economic impacts of the soccer park. Construction of Phase 1 will cost some $12.6 million, while ultimate build-out (Phase 2) costs are estimated as $36.0 million. Some 92 person-years of construction work are involved in Phase 1 (supporting an additional 235 indirect and induced jobs). At build-out, 264 person-years of construction work will be generated which will support an additional 419 person-years of indirect and induced construction-related work.

The soccer park will provide employment for a few people at the site and in the Navy agricultural area south of the soccer park. Statewide impacts would come, after build-out is fully in operation, to some 28 direct, indirect, and induced jobs annually, earning approximately $704,000 (1997 dollars).

Table 3-2
Economic Impacts of Proposed Soccer Park

Impacts	Phase 1	Build-out	Cumulative Through 2020
Construction			
Direct Jobs	92	264	
Total Jobs*	244	683	
Total Income	$8,624,895	$24,218,494	
Operations			
Direct Jobs	7	15	
Total Jobs*	12	28	
Total Income	$2,983,939	$7,745,823	
City and County of Honolulu Balance of Revenues Over Costs			
Base Case Estimate	$1,068,847	$4,439,786	$5,508,633
Worst Case Estimate	$(3,672,797)	$(6,536,472)	$(10,209,269)
State of Hawaii Balance of Revenues Over Costs			$17,169,318

Source: SMS Research and Marketing. 1998. (See Appendix E).
* - Direct, indirect and induced jobs.

Revenues and costs to government agencies were studied. Revenues for the City and County would depend on arrangements with an operator and with youth soccer organizations. Based on preliminary estimates, City and County revenues would range from an annual profit of approximately $178,000 to an annual loss of approximately $349,000 in Phase 1 (see

Appendix E). After build-out is completed, revenues are estimated to range from an annual profit of $463,000 to an annual loss of $535,000.

The state would gain tax revenue from construction and operations onsite and cash flow associated with visitor spending. The cumulative total by the year 2020 is estimated at about $17.2 million.

3.9.3 Proposed Mitigation Measures

Lighting will be low but the area will be well lit. The park will be secured at night after hours. Additional police patrol may be needed, with a consequent increase in personnel for each watch, for a total of five new positions.

As stated in Chapter 2, the Department of Parks and Recreation will develop standard operating procedures for the soccer park to deal specifically with coordination with other agencies and nearby facilities prior to major events, as well as plans for emergencies, traffic management, security, and other operational issues as needed.

3.10 ROADWAYS AND TRAFFIC

A traffic impact study has been performed to identify existing traffic conditions in the vicinity of the soccer park site and the potential traffic impacts of the proposed soccer park (Appendix G). The following is a brief summary of that study.

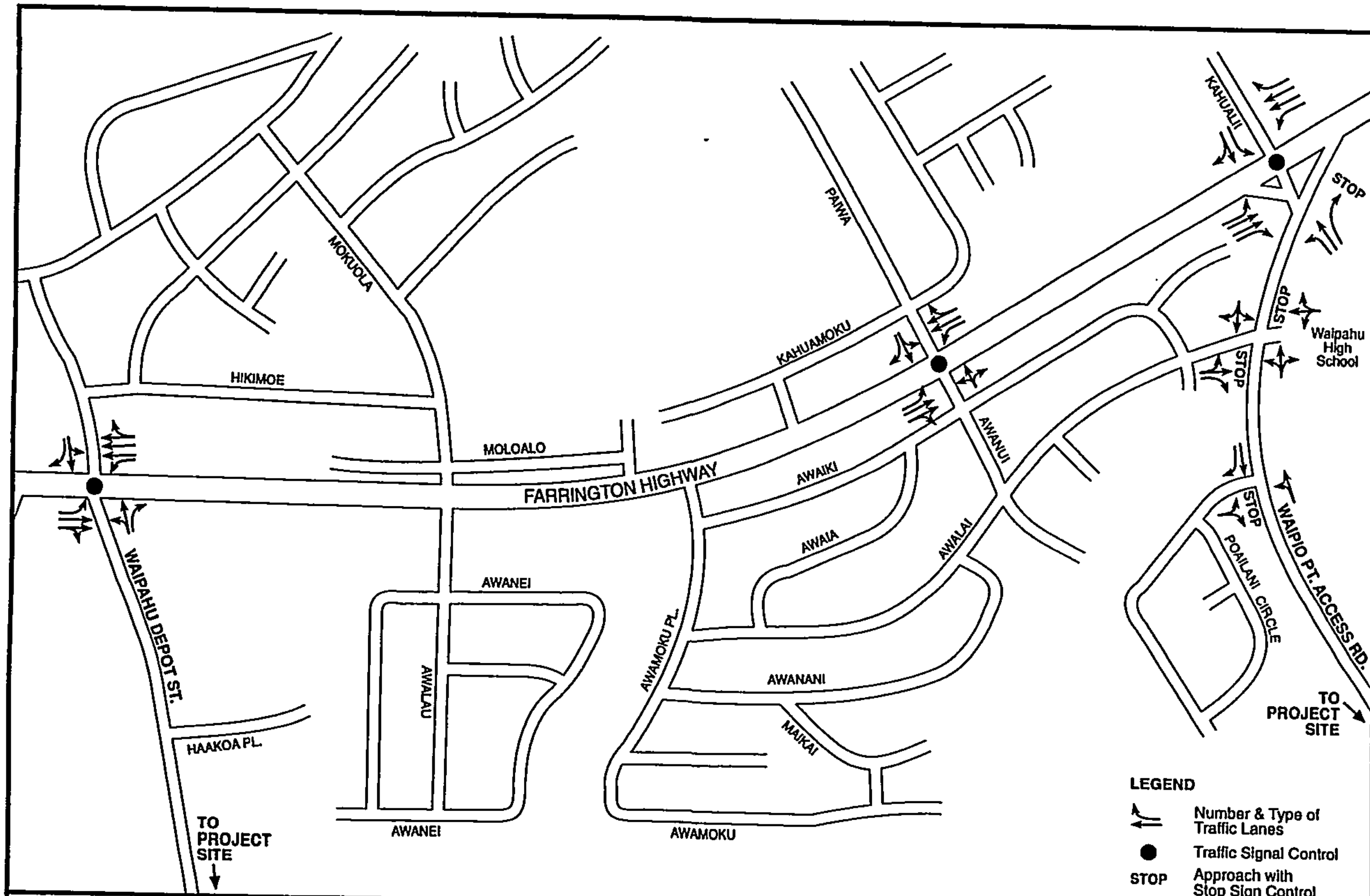
The key roadways and intersections near the soccer park site are depicted in Figure 3-7, with the type of traffic controls and number of lanes indicated at the key intersections.

3.10.1 Existing Roadways

Farrington Highway - This state highway serves east-west traffic through Waipahu and extends westward through the Ewa District and Waianae Coast areas. Farrington Highway connects to Kamehameha Highway, the H-1 Freeway, and the H-2 Freeway in the Waiawa interchange complex, located approximately ¾-mile east of the Waipio Point Access Road intersection.

These roadways provide access to the site from parts of Oahu east and north of Waipahu. In the study area, Farrington Highway is a four-lane median-divided roadway with left-turn lanes provided at cross streets. The westbound direction widens to provide three through lanes through the Waipahu Depot Street intersection. Traffic signal controls are provided at most key cross streets.

Waipio Point Access Road - This two-lane collector street under City and County jurisdiction, with 11-foot-wide lanes from Farrington Highway to the soccer park site, provides access to Waipahu High School, the residential areas along the west side of the street, the Ted Makalena



Source: Wilbur Smith Associates (June 1998)

Figure 3-7
AREA ROADWAY SYSTEM
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

Golf Course, and Navy operations. The roadway intersects Farrington Highway opposite of Kahualii Street to form a standard four-leg intersection. Channelized right-turn lanes are provided for traffic turning to or from the Waipio Point Access Road.

Waipahu Depot Street - South of Farrington Highway, this two-lane City and County street, with 10-foot-wide lanes from Farrington Highway to the soccer park site, provides access to adjacent land uses, Waipahu Incinerator, and Ke Kula Maka'I Police Academy. The segment north of Farrington Highway provides access to the commercial center of Old Waipahu Town. Paiwa Street - This two- to four-lane City and County street connects Farrington Highway to the H-1 Freeway via the Paiwa interchange, and to the Waikele commercial center and residential areas north of the H-1 Freeway. Awanui Street intersects Farrington Highway opposite Paiwa Street to form a four-leg intersection.

3.10.2 Existing Traffic Conditions (1998)

Traffic counts were made during the afternoon and evening hours on a Tuesday and a Saturday in April 1998. Traffic turning movement counts were made at each of the key intersections on the Saturday and all but the Waipahu Depot Street intersections on the weekday. The counts were recorded by 15-minute periods.

For the weekday afternoon and evening, the traffic counts were summarized for three one-hour periods:

- Afternoon Peak Hour, which represents the highest hourly traffic volumes at most of the intersections. This peak hour occurred between 3:45 and 4:45 p.m. at the highest volume locations.
- Early Evening, 6:00 to 7:00 p.m. period, which would reflect conditions between the changeover between the afternoon users and evening users of the proposed soccer park. This period would also represent conditions during the arrival period for any special evening events.
- Late Evening, 8:30 to 9:30 p.m. period, which would reflect conditions at the departure time for most of those using the sports fields or attending a weekday event.

For Saturday afternoon and evening, the traffic counts were summarized for three one-hour periods:

- Midday Peak Hour, which represents the highest hourly traffic volumes at most of the intersections. This peak hour occurred between noon and 1:00 p.m. at the highest volume locations.
- Early Evening, 6:30 to 7:30 p.m. period, which would reflect conditions between the changeover between the afternoon users and evening users of the proposed soccer

park. This period would also represent conditions during the arrival period for any special evening events.

- Late Evening 9:00 to 10:00 p.m. period, which would reflect conditions at the departure time for most of those using the sports fields or attending a weekend event.

Existing Traffic Volumes

The highest traffic volumes on Saturday along Farrington Highway occur east of the Waipio Point Access Road intersection, with a total of about 1,500 vehicles westbound and 1,200 vehicles eastbound.

The peak hour traffic volumes along Waipio Point Access Road decrease from a total of about 430 vehicles at Farrington Highway to 170 vehicles south of Poailani Circle. Slightly more vehicles travel southbound during the peak hour. Approximately one-half of the vehicles enter or exit the road at the intersection with the High School Driveway and Awalai Street. The school traffic includes both staff and student trips, as well as persons using the school's athletic facilities.

The traffic volumes decrease considerably between the peak hour and the 6:00-7:00 p.m. period. The total volume on Farrington Highway east of Waipio Point Access Road decreases to about 2,060 vehicles, or about 75 percent of the peak hour volume. On Waipio Point Access Road, the southbound volume declines to about 65 percent of the peak hour but the northbound volume remains similar to the peak hour volumes. The high northbound volume appears to reflect vehicles leaving the golf course.

The traffic volumes during the 8:30 - 9:30 p.m. period amount to about 30 to 40 percent of the afternoon peak hour volumes. Very little traffic uses Waipio Point Access Road south of Poailani Circle.

On Saturdays, the midday peak hour traffic volumes at the eastern end of Farrington Highway (2,450 vehicles) are approximately 90 percent of those during the weekday afternoon peak hour. The traffic volumes at Waipahu Depot Street total about 2,250 vehicles, or slightly less than those at the eastern end of the study area.

The Saturday midday peak hour volumes along Waipio Point Access Road approximate 85 percent of the weekday afternoon peak hour volumes. The traffic decreases by more than half between south of Farrington Highway (367 vehicles) and south of Poailani Circle (158 vehicles).

Most of the Saturday traffic volumes during the 6:30-7:30 p.m. period are about 40 percent lower than those in the midday peak hour. The exception is the volume along Farrington Highway at the western end of the study area, which is about 25 percent below those of the mid-day peak hour.

Traffic volumes during the late Saturday evening period are similar to and slightly lower than those for the weekday late evening period.

Existing Traffic Conditions at Key Intersections

The 1998 traffic conditions for the weekday afternoon and early evening periods are summarized in Table 3-3. Although not included in Table 3-3, the conditions for the late evening hour were analyzed and the results are discussed in the paragraphs that follow.

Table 3-3
Existing (1998) Traffic Conditions at Key Intersections

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Road	0.551	13.3	B	0.487	12.7	B
Waipio Point Access Road at Awalai St./School Driveway	NC	7.2	B	NC	6.1	B
Waipio Point Access Road at Poailani St.	NC	4.7	A	NC	4.5	A
Farrington Hwy. at Paiwa St./Alanui St.	0.69	13.9	B	0.630	14.4	B
Farrington Hwy. at Waipahu Depot St.	NC	NA	NA	NA	NA	NA
SATURDAY						
Farrington Hwy. at Waipio Point Access Road	0.508	10.1	B	0.333	10.2	B
Waipio Point Access Road at Awalai St./School Driveway	NC	6.3	B	NC	4.7	A
Waipio Point Access Road at Poailani St.	NC	4.8	A	NC	4.1	A
Farrington Hwy. at Paiwa St./Alanui St.	0.546	11.2	B	0.391	11.6	B
Farrington Hwy. at Waipahu Depot St.	0.522	15.4	C	0.408	13.8	B

Source: Wilbur Smith and Associates. 1998. (See Appendix H).
Legend: V/C – Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV – Average delay per vehicle, in seconds.
LOS – Level of Service (see Appendix D for definition).
NC – Not Calculated. V/C is not calculated for intersections with STOP signs.
NA – Not Analyzed.

The Transportation Research Board (TRB), a division of the National Science Foundation, has developed standardized methods for use in evaluating the effectiveness and quality of service for roadways and streets. Different methodologies are available for analyzing traffic signal-controlled intersections and other types of roadways.

The TRB evaluation method uses a concept known as level-of-service (LOS). This concept describes facility operations on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively. The methods generally compare traffic volumes on a roadway to the roadway's theoretical capacity. Capacity is estimated based on the roadway's physical characteristics (e.g., number and width of lanes), traffic characteristics (e.g., types of vehicles), and type of traffic controls. The comparisons are frequently referred to as the volume-to-capacity (V/C) ratio. The methodologies are described in the 1994 Highway Capacity Manual (1994 HCM).[20] A description of the characteristics and criteria associated with LOS A through LOS F is provided in Table 3-4.

Table 3-4
Level-Of-Service Criteria for Signalized and Unsignalized Intersections

LOS	Average Stopped Delay (Seconds/Vehicle)
Signal-Controlled Intersections	
A	0.0 to 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	60.1 +
Unsignalized Intersections	
A	<5.0
B	5.1 to 10.0
C	10.1 to 20.0
D	20.1 to 30.0
E	30.1 to 45.0
F	≥ 45.0

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Chapter 10. 1994.

The Farrington Highway intersections with Waipio Point Access Road and Paiwa Street each operate at very acceptable levels of service during the weekday hours. Present weekday afternoon peak hour traffic uses approximately 55 percent of the capacity of the Waipio Point Access Road intersection and 69 percent of the Paiwa Street intersection capacity. The level of use is slightly lower in the early evening period. Vehicle delays are at LOS B at both intersections.

In the late evening hour (8:30-9:30 p.m.), traffic uses 24.3 percent and 29.2 percent of the estimated capacity of the Waipio Point Access Road and Paiwa Street intersections, respectively. The intersections operate at LOS B with average delays of about 10 seconds per vehicle.

[20] Transportation Research Board. 1994.

The conditions at the Awalai Street/High School Driveway intersection with Waipio Point Access Road are for the left-turn movement out of Awalai Street; the conditions shown for the Poailani Street are for the left-turn from Poailani Street. Both left-turn movements operate at very acceptable conditions due to the low traffic volumes along Waipio Point Access Road and the low volume of turning vehicles. In the late evening, both intersections operate at LOS A.

Field observations during the traffic counts confirm the results of the analyses, with no long delays or queuing of vehicles at the intersections.

The traffic conditions for the Saturday afternoon and early evening periods are also summarized in Table 3-3. Although not included in Table 3-3, the conditions for the late evening hour were analyzed and the results are discussed in the following paragraphs.

Each of the three intersections along Farrington Highway operate at very acceptable conditions on Saturdays. During the midday peak hour, the existing traffic amounts to 50 to 55 percent of the capacity of the intersections, with conditions at LOS B or C. The lower traffic volumes in the early evening use only 33 to 41 percent of capacity at each intersection, with conditions at LOS B. During the late evening period, the traffic approximates 22 to 23 percent of the capacity at each of the three intersections with average delays per vehicle of 9 to 12 seconds (LOS B). The average delays for vehicles turning left from Awalai and Poailani Streets on Saturday are similar to those during the weekday hours, with conditions at LOS A or B. Unacceptable traffic conditions would be experienced if the LOS level were E or F.

3.10.3 Potential Impacts

3.10.3.1 Environmental Issues and Significance Criteria

The primary roadway and traffic issues related to the proposed soccer park are projected traffic demand and roadway and intersection adequacy. Significant adverse effects would be experienced if:

- Existing roadways and intersections are inadequate to handle peak traffic demands; or
- Appropriate mitigation measures cannot be taken to minimize or eliminate potential adverse effects.

3.10.3.2 Projected Traffic Without the Proposed Soccer Park (2001)

Phase 1 of the soccer park is planned for completion and beginning of use in year 2001. The traffic forecasts and analyses of conditions in 2001 without the soccer park serve as a baseline from which to identify the impacts of Phase 1.

No planned roadway improvements were identified for the key intersections and roadway segments by 2001, other than those included as part of the soccer park. The State has discussed the construction of a roadway connection between Waipio Point Access Road and the Leeward Community College campus to provide an additional access route for traffic traveling to/from the campus. This roadway, if constructed, would connect Waipio Point Access Road south of Poailani Circle and would increase traffic through each of the intersections along Waipio Point Access Road that were analyzed for the soccer park. This potential roadway connection has not been included in the traffic forecasts and analyses for soccer park because the analyses were completed prior to announcement of the proposed Leeward Community College access route.

Traffic volumes (Table 3-5) are expected to increase over 1998 conditions at the study intersections primarily as a result of general increases in area economic activity and development outside the study area. There are several potential development sites along Waipio Point Access Road. However, no development is expected by 2001.

General area traffic increases were estimated through the development of a traffic growth factor based on traffic increases recorded in the area in recent years. These increases were developed from historic traffic count data recorded at the State Department of Transportation count station #8-C, located at the intersection of Farrington Highway and Waipahu Depot Street. Traffic volumes at this station have increased an average of about 0.6 percent per year between 1992 and 1996. This average annual growth rate was assumed to continue through 2001 and apply to all roadways in the study area.

This annual growth rate would result in a 2.1 percent increase in traffic volumes by late 2001. The traffic volumes at each intersection and for each time period were increased by this amount to represent traffic volumes without the soccer park.

As summarized in Table 3-5, the forecast traffic increases would result in small increases in the proportion of the intersection capacity used and the average delay times at the intersections controlled by traffic signals. The small increase in average delay time at the Farrington Highway intersection with Waipio Point Access Road for the weekday afternoon peak hour, from existing 13.3 seconds per vehicle to 16.8 seconds estimated for 2001, would change the LOS from B to C, still a very acceptable condition.

Conditions at the two STOP sign controlled intersections would be similar to existing conditions.

Table 3-5
2001 Traffic Conditions at Key Intersections Without the Proposed Soccer Park

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Road	0.566	16.8	C	0.499	12.8	B
Waipio Point Access Road at Awalai St./School Driveway	N/C	7.3	B	N/C	6.2	B
Waipio Point Access Road at Poailani St.	N/C	4.8	A	N/C	4.6	A
Farrington Hwy. at Paiwa St./Alanui St.	0.698	14.4	B	0.651	15.1	C
SATURDAY						
Farrington Hwy. at Waipio Point Access Road	0.520	10.2	B	0.343	11.0	B
Waipio Point Access Road at Awalai St./School Driveway	N/C	6.4	B	N/C	4.7	A
Waipio Point Access Road at Poailani St.	N/C	4.9	A	N/C	4.2	A
Farrington Hwy. at Paiwa St./Alanui St.	0.566	11.4	B	0.401	11.7	B
Farrington Hwy. at Waipahu Depot St.	0.536	15.5	C	0.417	13.9	B

Source: Wilbur Smith and Associates. 1998. (See Appendix G).
Legend: V/C – Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV – Average delay per vehicle, in seconds.
LOS – Level of Service (see Appendix D for definition).
NC – Not Calculated. V/C is not calculated for intersections with STOP signs.
NA – Not Analyzed.

3.10.3.3 Projected Traffic With Soccer Park (2001)

Vehicle Trip Generation

The estimated number of vehicle trips projected for 2001 with the soccer park are summarized in Table 3-6. For the weekday afternoon peak hour, the use of Phase 1 facilities is estimated to generate a total of 660 vehicle trips ends, with one-half arriving at the site and one-half departing the site. This reflects the simultaneous completion of the preceding games/practice sessions and departure of those users with the arrival of the participants for the next set of games and practices.

Table 3-6
Phase 1 Vehicle Trip Generation (2001)

Event Type and Time Period	Average Site Population	Arriving Vehicles	Departing Vehicles	Total Trip Ends
Typical Weekday Play or Practice				
Afternoon Peak Hour	330	330	330	330
Early Evening Hour	330/100	170	220	390
Late Evening Hour	100	0	60	60
Daily	—	750	750	1,500
Typical Saturday Play or Practice				
Midday Peak Hour	480	480	480	960
Early Evening Peak Hour	480/100	22	320	540
Late Evening Hour	100	0	60	60
Daily	—	1,500	1,500	3,000
Saturday Tournament				
Midday Peak Hour	900	900	900	1,800
Daily	—	2,700	2,700	5,400
Special Event				
Arrival Hour	3,000	1,200	60	1,260
Departure Hour	3,000	60	1,200	1,260

Source: Wilbur Smith Assoc. (See Appendix G).

Traffic generation during the early evening period amounts to about 60 percent of that generated in the afternoon peak hour. The lower number of vehicle trips results from fewer vehicles arriving for nighttime use. Nighttime use is constrained by the limited number of illuminated fields. In the late evening hour, the 60 departing vehicles represent the total population of nighttime users of the Phase 1 facilities. The Phase 1 facility is estimated to generate approximately 1,500 vehicle trips to or from the site on a typical weekday.

Daytime use for typical practice and games on a Saturday would generate about 50 percent more traffic during the peak traffic hour than the weekday use. The evening use would be similar to that for the weekday evening due to the limited number of fields with lighting. The total daily traffic generation on a typical Saturday (3,000 vehicle trips to or from site) would be twice that for the weekday due to the use during the Saturday morning and early afternoon hours, combined with the larger population at any one time during the day.

A large youth soccer tournament that extends from morning until late afternoon on a Saturday is estimated to generate approximately 5,400 vehicles trips to or from the site during the day. About 1,800 vehicle trips, or one-third of the total, could be generated during the peak one-hour period with simultaneous start times for the games on all of the fields.

A special event with 3,000 attendees could generate approximately 1,260 vehicle trip ends before the event and a similar number after the event.

Increases in Weekday Traffic Volumes

Because the soccer park will serve the entire island, the distribution and assignment of soccer park trips was based on the projected population distribution for Oahu in 2005, as forecast by the City and County of Honolulu. The areas from the Waianae Coast to Aiea, including Central Oahu, were given a double weighting in the estimation of trip origins/destinations to reflect greater use that might be expected by those located closer to the site. Based on this assumption, the largest number of trips, over 70 percent, are expected to approach and depart the site via Farrington Highway between Waipio Point Access Road and the Waiawa interchange.

The numbers of vehicles traveling to or from the soccer park and the proportional increase to the forecast 2001 weekday traffic volumes with the soccer park are summarized in Table 3-7 for several key roadways providing access to the site.

Table 3-7
Phase 1 Weekday Proportional Increases in Traffic (2001)

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	466	16.5	276	8.3	42	3.5
Waipio Point Access Rd. South of Farrington Hwy.	654	147.6	386	113.5	59	41.5
Farrington Hwy. West of Paiwa St.	78	3.1	46	2.5	7	0.7
Paiwa St. North of Farrington Hwy.	90	15.8	53	10.7	8	2.6

Source: Wilbur Smith Assoc. (See Appendix G).

The afternoon peak hour would experience both the largest numerical and proportional increase in traffic volumes due to the soccer park. During this peak hour, the soccer park would more than double the number of vehicles using the Waipio Point Access Road during the late afternoon period (approximately 4:00 to 5:00 p.m.). However, this would occur after the peak traffic associated with students and staff leaving the high school and would represent about 40 percent higher volumes as compared to the traffic volumes on Waipio Point Access Road during the peak hour for the school traffic.

The soccer park would also double traffic volumes on Waipio Point Access Road during the early evening hour (6:00-7:00 p.m.). The soccer park would result in much lower increases during the other afternoon and evening hours.

These increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. Staggering the start times for the use of the fields could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the table.

Increase in Saturday Traffic Volumes

The number of vehicles traveling to or from the soccer park and the proportional increase to the forecast 2001 Saturday traffic volumes with the soccer park are summarized in Table 3-8 for several key roadways providing access to the site. The proportional increases to midday and early evening Saturday traffic would be substantially greater than for the weekday. This results from both the higher volumes of soccer park traffic and the lower volumes of non-soccer park traffic on Saturdays. The smaller proportional increase in the late evening hour results from the lower Saturday non-soccer park traffic since the same level of use is anticipated for both weekdays and weekend evenings.

As with the weekday forecasts, these increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown Table 3-8.

Table 3-8
Phase 1 Saturday Proportional Increases in Traffic (2001)

	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
Location	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	678	27.1	382	25.3	42	3.8
Waipio Point Access Rd. South of Farrington Hwy.	950	251.9	535	256.0	59	48.4
Farrington Hwy. West of Paiwa St.	11	5.0	62	4.2	7	0.7
Paiwa St. North of Farrington Hwy.	132	29.1	74	20.5	8	4.7

Source: Wilbur Smith Assoc. (See Appendix H).

Traffic Conditions at Key Intersections

Based on the above projections, traffic conditions were analyzed at the key intersections with the traffic volumes forecast for the afternoon and early evening hours for typical weekday and Saturday use. The analysis included an estimate of the increase in the number of vehicle trips and levels-of-service. The results are summarized in Table 3-9 for the key intersections for both the weekday and Saturday hours with typical practice and games at the soccer park.

Table 3-9
Phase 1 Traffic Conditions at Key Intersections (2001)

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Weekday						
Farrington Hwy. at Waipio Point Access Rd.	0.817	24.4	C	0.651	18.1	C
Waipio Point Access Rd. at Awalai St./School Dwy.	N/C	27.0	D	N/C	12.2	C
Waipio Point Access Rd. at Poailani St.	N/C	13.8	C	N/C	8.4	B
Farrington Hwy. at Paiwa St./Awanui St.	0.772	16.8	C	0.709	18.1	C
Saturday						
Farrington Hwy. at Waipio Point Access Rd.	0.858	30.5	D	0.573	20.6	C
Waipio Point Access Rd. at Awalai St./School Driveway	N/C	39.6	E	N/C	11.3	C
Waipio Point Access Rd. at Poailani St.	N/C	25.6	D	N/C	9.9	B
Farrington Hwy. at Paiwa St./Awanui St.	0.679	14.1	B	0.474	12.0	B
Farrington Hwy. At Waipahu Depot Street	0.549	15.5	C	0.426	13.9	B

Source: Wilbur Smith and Associates. 1998. (See Appendix G).
Legend: V/C - Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV - Average delay per vehicle, in seconds.
LOS - Level of Service (see Appendix D for definition).
NC - Not Calculated. V/C is not calculated for intersections with STOP signs.
NA - Not Analyzed.

Traffic to/from the soccer park site for typical weekday games and practice would substantially increase the proportion of capacity used at the intersection of Farrington Highway with Waipio Point Access Road. However, the usage would remain at very acceptable levels (81.7 percent in afternoon peak hour). The forecast traffic would result in acceptable levels of delay (LOS C). The number of vehicles turning left from westbound Farrington Highway onto Waipio Point Access Road during the afternoon peak hour (399 vehicles) would likely result in a queue of waiting vehicles that exceeds the 180-foot length of the left-turn lane. This could result in the stacking of vehicles waiting to turn left into the adjacent through lane. The length of the left-turn lane would have to be extended to nearly 400 feet to accommodate this volume without blockage of the through lane. Alternatively, the start times for use of each field could be staggered to spread the arrival/departure times, which could reduce the length of the turn lane to about 300 feet to avoid blockage of the through lane.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The largest impact would be on traffic turning left from Awalai Street, with the average wait time for these vehicles increasing in the afternoon peak hour from about 7 seconds (LOS B) without the soccer park to 27 seconds (LOS D) with the soccer park.

The soccer park would result in an increase to capacity utilization and average delay at the Farrington Highway intersection with Paiwa Street, primarily due to the increase in vehicles turning left from Paiwa Street enroute to the soccer park site. Traffic conditions would remain at acceptable levels, i.e, at LOS C or better.

The traffic conditions in the area should remain at acceptable levels of capacity and delay that should not require mitigative actions. Note that this analysis reflects simultaneous start times for use of all of the fields as worst case. Traffic conditions could be improved by the staggering of the start times for games and practices on each of the fields.

At the intersection of Farrington Highway with Waipio Point Access Road, the changes in traffic conditions with typical Saturday games and practice at the soccer park would parallel those for the weekday. The soccer park would result in a substantial increase in the proportion of capacity used by the traffic, but the usage would remain at acceptable levels (85.8 percent in the peak hour). The forecast traffic should result in acceptable levels of delay, although the conditions would be at LOS D during the midday peak hour. The number of vehicles turning left from westbound Farrington Highway onto Waipio Point Access Road during the Saturday midday peak hour (467 vehicles) would likely result in a queue of waiting vehicles that exceeds the 180-foot length of the left-turn lane. The length of the left-turn lane would have to be extended to 400 feet to accommodate this volume without blockage of the adjacent through lane. Use of staggered start times for the fields could reduce the left-turn volume to about 300 vehicles, and the length of the turn lane would have to be about 300 feet to minimize queuing into the through lanes.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The average wait time for traffic turning left from Awalai Street would worsen to LOS E in the midday peak hour, with an average delay of 39.6 seconds.

Saturday traffic conditions at the Farrington Highway intersections with Paiwa Street and Waipahu Depot Street would remain at very acceptable levels of service.

Traffic conditions were analyzed for the intersections along Waipio Point Access Road with a large Saturday tournament of local youth teams that would use all of the Phase 1 facility. The assessment was made for the midday peak hour with the combined highest non-soccer park and soccer park traffic volumes. The initial analysis was based on the simultaneous start time for games on all of the fields, and the departure of the participants for all the games in the preceding time bracket.

The forecast midday Saturday peak hour traffic would exceed the capacity of the Farrington Highway intersection by about 19 percent, with conditions at LOS F without any mitigation measures being taken to minimize adverse traffic conditions. The traffic turning left from the cross streets and driveways along Waipio Point Access Road would experience very long delays in waiting for an opportunity to enter the roadway, with conditions at LOS F.

3.10.3.4 Projected Traffic Without the Soccer Park (2010)

The full development of the soccer park master plan (build-out) is planned for completion and availability for use in 2010. The following provides the traffic forecasts and analyses of conditions in 2010 without the soccer park to serve as a baseline from which to identify the impacts of the soccer park build-out.

Increases in Traffic Volumes

Traffic volumes are expected to increase at the study intersections primarily as a result of general increases in area economic activity and development outside the study area. There are several potential development sites along Waipio Point Access Road. One site has been discussed for potential development with about 150 units of senior citizen housing. No development is reflected in the 2010 forecasts. If developed, a senior citizen project of that size would generate no more than several dozen vehicle trips in the peak hours and should not significantly affect the findings of this study.

General area traffic increases were estimated through the development of a traffic growth factor based on traffic increases recorded in the area in recent years. These increases were developed from historical traffic count data recorded at the State Department of Transportation count station #8-C, located at the intersection of Farrington Highway and Waipahu Depot Street. Traffic volumes at this station have increased an average of about 0.6 percent per year between 1992 and 1996. This average annual growth rate was assumed to continue through year 2010 and apply to all roadways in the study area.

This annual growth rate would result in a 7.8 percent increase in traffic volumes by late 2010. The traffic volumes at each intersection and for each time period were increased by this amount to represent traffic volumes without the soccer park. No roadway improvements were identified for the key intersections and roadway segments by 2010, other than those that may be included as part of the soccer park.

Traffic Conditions at Key Intersections

Traffic conditions in year 2010 without any development of the soccer park site are summarized for the key intersections in Table 3-10. Traffic at each intersection would operate at acceptable conditions during each of the analysis hours, with conditions similar to existing (1998) conditions.

Table 3-10
2010 Traffic Conditions at Key Intersections Without Build-out

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Weekday						
Farrington Hwy. at Waipio Point Access Rd.	0.600	17.4	C	0.529	13.1	B
Waipio Point Access Rd. at Awalai St./School Dwy.	N/C	7.7	B	N/C	6.4	B
Waipio Point Access Rd. at Poailani St.	N/C	4.9	C	N/C	4.6	A
Farrington Hwy. at Paiwa St./Awanui St.	0.747	16.1	C	0.697	16.6	C
Saturday						
Farrington Hwy. at Waipio Point Access Rd.	0.550	10.5	B	0.362	1101	B
Waipio Point Access Rd. at Awalai St./School Dwy.	N/C	6.7	B	N/C	4.8	A
Waipio Point Access Rd. at Poailani St.	N/C	5.0	A	N/C	4.8	A
Farrington Hwy. at Paiwa St./Awanui St.	0.598	11.7	B	0.426	12.1	B
Farrington Hwy. At Waipahu Depot Street	0.568	15.8	C	0.441	14.1	B

Source: Wilbur Smith and Associates. 1998. (See Appendix G).
Legend: V/C – Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV – Average delay per vehicle, in seconds.
LOS – Level of Service (see Appendix D for definition).
NC – Not Calculated. V/C is not calculated for intersections with STOP signs.
NA – Not Analyzed.

3.10.3.5 Projected Traffic at Build-out (2010)

Vehicle Trip Generation

For the weekday afternoon peak hour at build-out, the use of the facilities is estimated to generate a total of 1,236 vehicle trip ends, with one-half arriving at the site and one-half departing the site (Table 3-11). This reflects the simultaneous completion of the preceding games/practice sessions and departure of those users at the same time as the arrival of the participants for the next set of games and practices. The build-out trips would be almost double the number of vehicle trips estimated for the Phase 1 facilities.

Table 3-11
Vehicle Trip Generation at Build-out (2010)

Event Type and Time Period	Average Site Population	Arriving Vehicles	Departing Vehicles	Total Trip Ends
Typical Weekday Play or Practice				
Afternoon Peak Hour	660	618	618	1,236
Early Evening Hour	660/325	334	400	734
Late Evening Hour	325	0	164	164
Daily	—	1,400	1,400	2,800
Typical Saturday Play or Practice				
Midday Peak Hour	1,000	1,785	1,665	3,450
Early Evening Peak Hour	1,000/625	599	615	1,213
Late Evening Hour	625	0	299	299
Daily	—	3,200	3,200	6,400
Saturday Tournament				
Midday Peak Hour	2,000	1,785	1,665	3,450
Daily	—	3,200	3,200	6,400
Special Event				
Arrival Hour	15,000	5,000	0	5,000
Departure Hour	15,000	0	5,000	5,000

Source: Wilbur Smith Assoc. (See Appendix G).

Traffic generation during the early evening period at build-out amounts to about 60 percent of that generated in the afternoon peak hour. The lower number of vehicle trips results from fewer vehicles arriving for nighttime use. Nighttime use is constrained by the limited number of illuminated fields. In the late evening hour, 164 vehicles would depart the soccer fields and the Training Center. At full build-out of the master plan, the facility is estimated to generate approximately 2,800 vehicle trips to or from the site on a typical weekday, as compared to 1,500 estimated for Phase 1.

Daytime use for typical practice and games on a Saturday would generate about 50 percent more traffic during the peak traffic hour than the weekday use. The evening use would be almost double the weekday evening use due to use of the Training Center to host an event. The total daily traffic generation on a typical Saturday at build-out (6,400 vehicle trips to or from site) would be twice that for the weekday due to the use during the Saturday morning and early afternoon hours, combined with the larger population at any one time during the day. This would be more than double the 3,000 vehicle trips on a Saturday with Phase 1.

A large youth soccer tournament that extends from morning until late afternoon on a Saturday at build-out is estimated to generate approximately 10,400 vehicles trips to or from the site during the day. About 3,450 vehicle trips, or one-third of the total, could be generated during the peak one-hour period with simultaneous start times for the games on all of the fields.

A special event with 15,000 attendees could generate approximately 5,000 vehicle trip ends before the event and a similar number after the event.

Increases in Traffic Volumes

Because the soccer park will serve the entire island, the distribution and assignment of soccer ark trips was based on the projected population distribution for Oahu in 2010, as forecast by the City and County of Honolulu. As with Phase 1, the areas from the Waianae Coast to Aiea, including Central Oahu, were given a double weighting in the estimation of trip origins/destinations to reflect greater use that might be expected by those located closer to the site. Based on this procedure, the largest number of trips, over 70 percent, are expected to approach and depart the site via Farrington Highway between Waipio Point Access Road and the Waiawa interchange.

The numbers of vehicle traveling to or from the soccer park and the proportional increase to the forecast 2010 traffic volumes without the soccer park are summarized in Table 3-12 for several key roadways providing access to the soccer park site.

The afternoon peak hour would experience both the largest numerical and proportional increase in traffic volumes due to the soccer park. During this peak hour, the soccer park would more than triple the number of vehicles using the Waipio Point Access Road during the late afternoon period (approximately 4:00 to 5:00 p.m.). This peak traffic would occur after the peak traffic associated with students and staff leaving the high school and would represent volumes approximately double those on Waipio Point Access Road during the earlier peak hour for the school traffic.

The soccer park would also double traffic volumes on Waipio Point Access Road during the early evening hour (6:00 - 7:00 p.m.). The soccer park would result in much lower increases during the other afternoon and evening hours.

Table 3-12
Build-out Weekday Proportional Increases in Traffic (2010)

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	874	29.3	519	23.3	116	9.3
Waipio Point Access Rd. South of Farrington Hwy.	1,224	261.5	727	202.5	162	109.5
Farrington Hwy. West of Paiwa St.	144	5.4	85	4.4	19	1.7
Paiwa St. North of Farrington Hwy.	168	27.9	101	19.3	22	6.9

Source: Wilbur Smith Assoc. (See Appendix G).

The increases in the Table 3-12 reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the table.

The number of vehicles traveling to or from the soccer park and the proportional increase to the forecast 2010 traffic volumes without the soccer park for a typical Saturday are summarized in Table 3-13 for several key roadways providing access to the site.

Table 3-13
Build-out Saturday Proportional Increases in Traffic (2010)

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	1,316	49.8	858	53.7	211	18.2
Waipio Point Access Rd. South of Farrington Hwy.	1,842	464.0	1,202	546.4	296	234.9
Farrington Hwy. West of Paiwa St.	216	4.6	142	9.2	35	3.3
Paiwa St. North of Farrington Hwy.	53.2	53.2	166	43.6	41	23.3

Source: Wilbur Smith Assoc. (See Appendix G).

The proportional increases to midday, early evening, and late evening Saturday traffic would be substantially greater than for the weekday. This results from both the higher volumes of soccer park traffic and the lower volumes of non-soccer park traffic on Saturdays

As with the weekday forecasts, these increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in Table 3-13.

Traffic Conditions at Key Intersections

Traffic conditions were analyzed at the key intersections with the traffic volumes forecast for the afternoon and early evening hours for typical weekday and Saturday use. The analysis results are summarized in Table 3-14 for the key intersections for both the weekday and Saturday hours with typical practice and games at the soccer park and without the implementation of any mitigation measures.

Table 3-14
Build-out Traffic Conditions at Key Intersections (2010)

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Weekday						
Farrington Hwy. at Waipio Point Access Rd.	1.090	0	F	0.826	30.4	D
Waipio Point Access Rd. at Awalai St./School Dwy.	N/C	279.6	F	N/C	26.1	D
Waipio Point Access Rd. at Poailani St.	N/C	40.6	E	N/C	14.9	C
Farrington Hwy. at Paiwa St./Awanui St.	0.890	23.0	C	0.778	18.3	C
Saturday						
Farrington Hwy. at Waipio Point Access Rd.	1.263	0	F	0.926	48.2	E
Waipio Point Access Rd. at Awalai St./School Dwy.	N/C	999.9	F	N/C	39.7	E
Waipio Point Access Rd. at Poailani St.	N/C	277.9	F	N/C	35.3	E
Farrington Hwy. at Paiwa St./Awanui St.	0.803	15.9	C	0.592	13.3	B
Farrington Hwy. At Waipahu Depot Street	0.593	15.9	C	0.458	14.1	B

Source: Wilbur Smith and Associates. (See Appendix G).
Legend: V/C – Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV – Average delay per vehicle, in seconds.
LOS – Level of Service (see Appendix D for definition).
NC – Not Calculated. V/C is not calculated for intersections with STOP signs.
NA – Not Analyzed.
* – Delay not calculated because answer would be unreliable where traffic substantially exceeds capacity.

At full build-out, the estimated weekday traffic volumes in the afternoon peak traffic hour, with simultaneous start of play on all of the fields in use on a typical day, would exceed the capacity of the Farrington Highway with Waipio Point Access Road by about 9 percent, with conditions at LOS F. The large number of vehicles turning left from westbound Farrington Highway would result in the stacking of waiting vehicles well beyond the 180-foot length of the present left-turn storage lane. The lane would have to be extended to a length of about 640 feet to avoid blockage of the adjacent through lane. The early evening hour traffic would result in acceptable conditions at the intersection.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The largest impact would be on traffic turning left from Awalai Street during the afternoon peak hour, with the extremely long wait times (LOS F) for these vehicles with the soccer park.

The soccer park would result in an increase to capacity utilization and average delay at the Farrington Highway intersection with Paiwa Street, primarily due to the increase in vehicles turning left from Paiwa Street enroute to the soccer park site. Traffic conditions would remain at acceptable levels.

Conditions at the Waipio Point Access Road intersections with Farrington Highway and with Awalai Street would warrant mitigative actions for the afternoon peak hour.

The typical Saturday midday peak hour traffic volumes at build-out would exceed the capacity of the Farrington Highway intersection with Waipio Point Access Road by approximately 26 percent, based on simultaneous for use of the play fields. The large volume of vehicles turning left onto Waipio Point Access Road would result in a stacking problem, with a storage lane length of about 770 feet needed to minimize blockage of the adjacent through lane. Traffic volumes in the early evening hour would use about 92 percent of capacity with conditions at LOS E.

Both the Awalai Street and Poailani Circle intersections would experience extremely long delays during the midday peak hour for vehicles turning left onto Waipio Point Access Road.

Both the Farrington Highway intersections with Paiwa and Waipahu Depot Streets would operate at acceptable levels of service.

Conditions at the Waipio Point Access Road intersections with Farrington Highway, Awalai Street, and Poialani Circle would warrant mitigative actions for the midday peak hour.

3.10.4 Proposed Mitigation Measures

Alternative roadway improvements and traffic safety management measures have been evaluated relative to their ability to maintain, at build-out, the current LOS experienced on the roadways in the vicinity of the soccer park site, or to provide an acceptable LOS. The analysis has been governed by the traffic impact study performed for the soccer park (Appendix H). Table 3-3 indicates existing LOS conditions at the key intersections. As shown in Table 3-3, at build-out, all intersections and roadways would have to operate at LOS of C or above to maintain existing conditions.

For Phase 1, the worst traffic conditions would occur with a Saturday tournament, and at build-out with a Saturday evening special event at the stadium. It has been conservatively assumed that all attendees would arrive in the one hour preceding the event and depart within one hour following the event. Using this assumption, for Phase 1, traffic volumes would exceed the capacity of the Farrington Highway/Waipio Point Access Road intersection by about 19 percent. At build-out, with the worst case situation, traffic volumes would approximate four times the capacity of the Farrington Highway/Waipio Point Access Road intersection. The inbound traffic would also result in LOS F for traffic turning left from the cross streets and driveways along Waipio Point Access Road.

For Phase 1, two mitigative measures were analyzed:

- Stagger start times of the games and increase length of left-turn lane on Farrington Highway to 300 feet. Start games on one-half of the fields in each hour throughout the day.
- Open Waipahu Depot Street for access to/from the tournament. Provide an unimproved (gravel) roadway from the soccer park road connecting to the incinerator road.

The first measure would cost approximately $50,000 and would result in an LOS of D at the Farrington Highway/Waipio Point Access Road intersection, as well as prevent blockage of Farrington Highway by left-turning vehicles. While LOS D is less than the desired level of LOS C, LOS D is generally considered by traffic engineers to be an acceptable level of service for peak traffic periods or events.

The second measure by itself, which would cost approximately $150,000, would result in LOS E at the Farrington Highway/Waipio Point Access Road intersection. If both alternatives are combined, i.e., staggering the start times of the games and allowing access to and use of Waipahu Depot Street, the result would be LOS C, which is equal to existing conditions.

At build-out, for worst case conditions, major roadway improvements would be required for Waipio Point Access Road and/or Waipahu Depot Street to maintain existing traffic conditions. The following roadway improvements were examined:

- Widen Waipio Point Access Road to three lanes; extend the existing westbound left-turn lane at the Farrington Highway/Waipio Point Access Road intersection to 400 feet and add a second 400-foot left-turn lane; and add a right-turn eastbound acceleration lane on Farrington Highway. This measure is estimated to cost $3.1 million. During design, parking for NISMF would be provided for in the roadway widening layout.

  During normal use, two lanes on Waipio Point Access Road, which would merge into one lane, would be for southbound traffic, i.e., into the site, and one lane would be for northbound traffic. After special events, two lanes would be used for northbound traffic, i.e, out of the soccer park site. This measure would require coning Waipio Point Access Road for inbound and outbound traffic and the use of traffic control officers to facilitate smooth traffic flow.

- In addition to the first measure, widen Waipio Point Access Road to four lanes into the site and create a new right-turn lane from Waipio Point Access Road onto Farrington Highway. This measure is estimated to cost $4.0 million and is the preferred mitigative measure. This option would not require coning or traffic control officers.

- Extend the existing westbound left-turn lane at the Farrington Highway/Waipio Point Access Road intersection to 400 feet and add a second 400-foot left-turn lane; widen Waipio Point Access Road to two lanes south bound for 1,500 feet to accept the new Farrington Highway left-turn lane traffic; and add a right-turn eastbound acceleration lane on Farrington Highway. This measure is estimated to cost $1.3 million and would also require coning Waipio Point Access Road and the use of traffic control officers.

- Add a left-turn lane both ways on Waipio Point Access Road where it intersects Awalai Street and the entrance to Waipahu High School. This would help to alleviate congestion during large athletic events.

The analysis for build-out conditions presumed that the Phase 1 measures would be in place, i.e., game times would be staggered, the Farrington Highway left-turn lane would have been extended to 300 feet, and Waipahu Depot Street would be available for use. Additionally, to maintain existing traffic conditions at build-out, with a special Saturday evening event, preliminary events would have to be scheduled to spread the arriving traffic over a longer period of time.

Implementation of the first measure at build-out, with a Saturday evening special event, in conjunction with both Phase 1 measures and scheduling preliminary events, would result in LOS C at the Farrington Highway/Waipio Point Access Road intersection. However, traffic control officers would be required to direct traffic as well as cone-off one southbound lane on Waipio Point Access Road so that it could be used for northbound traffic.

Implementation of the second measure, under the same conditions, would also result in LOS C at the Farrington Highway/Waipio Point Access Road intersection and eliminate the need to cone off Waipio Point Access Road and to use traffic control officers.

Implementation of the third measure would require southbound traffic on Waipio Point Access Road to merge into one lane at the end of the 1,500-foot two-lane configuration, and traffic control officers would be required to cone off the roadway at the completion of events.

For events at both Phase 1 and build-out, sponsors should be required to (1) develop specific traffic safety management plans to facilitate the arrival and departure of event traffic, and, (2) use traffic control officers to help direct and move traffic into and out of the soccer park site.

Table 3-15 lists the proposed traffic mitigation measures , the projected LOS levels at key intersections for the worst case events in Phase 1 and at build-out and the costs of the measures described above.

Table 3-15
Traffic Mitigation Measures, Key Intersection LOS, and Roadway Improvement Costs

Proposed Traffic Mitigation Measures	Projected LOS	Estimated Costs[1]
Phase 1		
Stagger start times of games	D	$0.05
Open Waipahu Depot Street	E	$0.15
Implement both of above	C	$0.20
Build-out		
In addition to both Phase 1 measures, widen Waipio Point Access Road to three lanes; extend the existing west bound left-turn lane at the Farrington Highway/Waipio Point Access Road intersection to 400 feet and add a second 400-foot left-turn lane; and add a right-turn east bound acceleration lane on Farrington Highway.	C	$3.1
In addition to the first measure, widen Waipio Point Access Road to four lanes into the site and create a new right-turn lane from Waipio Point Access Road onto Farrington Highway.	C	$4.0
Extend the existing westbound left-turn lane at the Farrington Highway/Waipio Point Access Road intersection to 400 feet and add a second 400-foot left-turn lane; widen Waipio Point Access Road to two lanes southbound for 1,500 feet to accept the new Farrington Highway left-turn lane traffic; and add a right-turn eastbound acceleration lane on Farrington Highway.	C	$1.3

1 Construction costs in millions of dollars (1998). Costs do not include traffic control officers or other traffic safety management measures.

Implementation of any one of the three options at build-out would result in traffic conditions being equal to existing (1998) conditions. However, implementation of either the first or third options would require the use traffic control officers to cone off Waipio Point Access Road and direct traffic to facilitate the smooth flow of traffic in and out of the soccer park site. Further, implementation of either the first or third alternative would result in significant delays for cross-street traffic to exit toward Farrington Highway.

3.11 INFRASTRUCTURE AND UTILITIES

The existing utilities serving the soccer park site or in the vicinity of the soccer park site are shown in Figure 3-8.

3.11.1 Potable Water

3.11.1.1 Existing Conditions

At present, there is no potable water service to the soccer park site. The site is within the Pearl Harbor Ground Water Management Area (PHGWMA). The Waipahu Incinerator is served by a 12-inch (in.) water main that is maintained by the City and County Board of Water Supply (BWS).

At the approximate intersection of Waipahu Depot Street and the existing railroad right-of-way, the 12-in. main connects to an 8-in. main which extends from this point to Farrington Highway. The 8-in. main is scheduled to be replaced with 12-in. piping at some later date to make this main 12-in. in diameter along its entire length. Due to existing conditions, the maximum flow for the main is limited by the 8-in. pipe. According to BWS, the 12 in. diameter portion of this main is scheduled to be replaced, as a separate project, with work beginning in the later part of 1999 or early 2000, in time to serve Phase 1 of the proposed soccer park.

3.11.1.2 Environmental Issues and Significance Criteria

The primary environmental issue associated with potable water is the system capacity to meet forecast demand. Significant adverse effects would be experienced if the existing or planned potable water system improvements were not able to meet projected demand.

3.11.1.3 Potential Impacts

The proposed soccer park includes the extension of the potable water system serving the Waipahu Incinerator to the soccer park site. The soccer park is estimated to require a maximum of approximately 82.5 gallons per minute (gpm). According to BWS, the current capacity of the 12-in. line serving the incinerator is approximately 1,500 gpm or 2.16 mgd.

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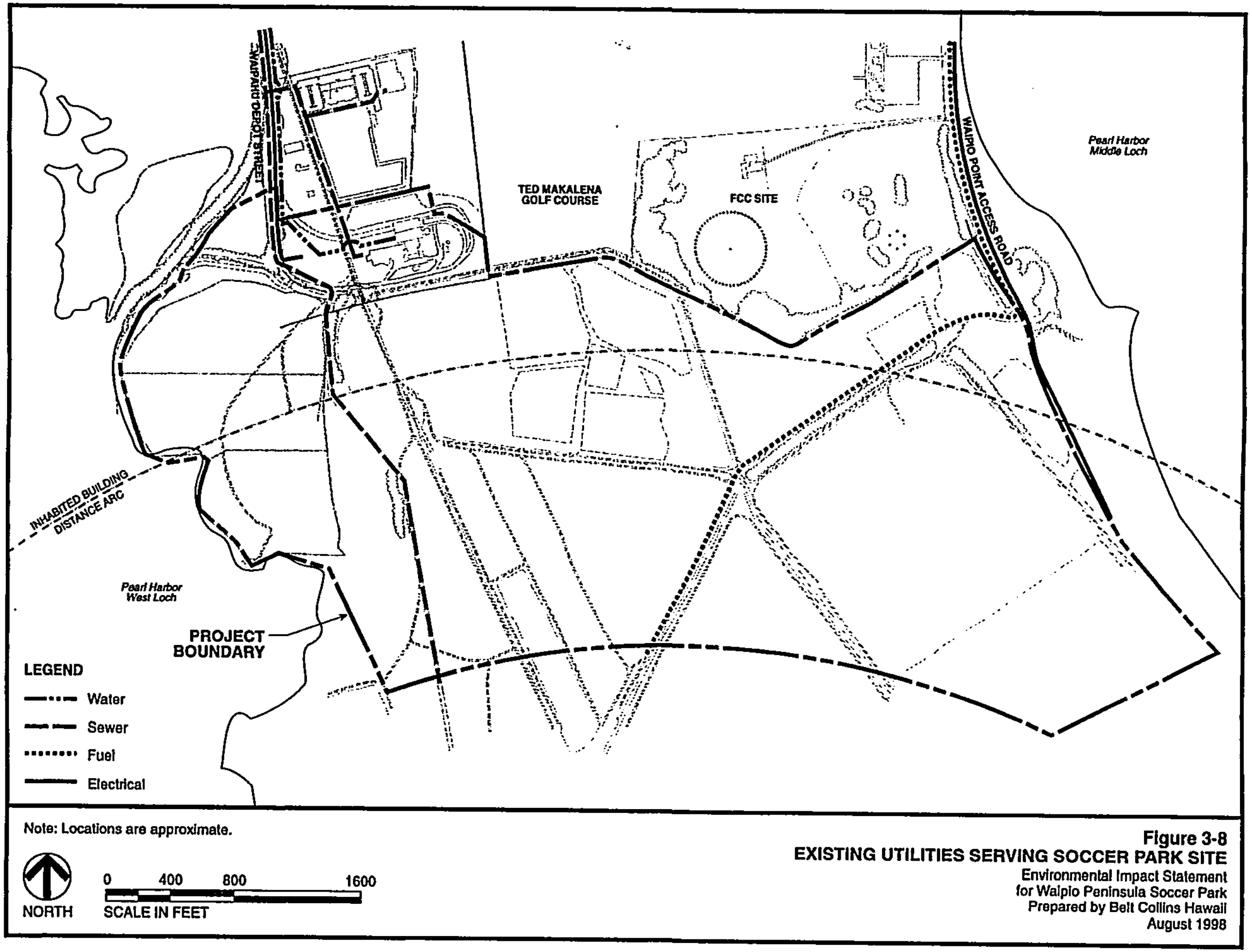


Figure 3-8
EXISTING UTILITIES SERVING SOCCER PARK SITE
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

Water availability will be requested from the BWS. The current capacity of the 12 in. line, due to the smaller pipe diameter up stream is approximately 1,500 gpm (2.16 mgd). Therefore, the existing line is expected to be adequate for domestic consumption.

Phase 1 of the proposed soccer park includes the construction of comfort stations and parking lots only. Fire flow is not to be provided by the domestic water system in Phase 1, but will be provided by the irrigation water system.

3.11.1.3 Proposed Mitigation Measures

The quantity required by the soccer park can be supplied without adversely affecting existing uses and/or Central Oahu water supplies or sources. Consequently, no significant adverse effects on the existing or planned potable water system are expected to result from development of the proposed soccer park and no mitigation measures are required.

3.11.2 Non-Potable (Irrigation) Water

3.11.2.1 Existing Conditions

At present, no non-potable water system serves the soccer park site. Non-potable water sources in the area occur as spring flow from the basal aquifer in the Koolau Basalt. This water is non-potable when it occurs as seepages in pools and in drainage ways. The greatest volume discharges into Waikele Stream channel. The non-potable water sources in the immediate vicinity of the soccer park site have not been developed. Oahu Sugar Company developed surface water sources from Waikele Stream (WP-18) as one of their irrigation water sources. This irrigation water source is approximately one mile from the soccer park site and is considered the preferred source of irrigation water for the proposed project.

The soccer park site is within the PHGWMA. Water development by forced draft in the PHGWMA would require an allocation issued by the State Commission on Water Resource Management (CWRM). Development of the spring water may not require an allocation, but permits would have to be issued by the CWRM.

3.11.2.2 Environmental Issues and Significance Criteria

An important element of the proposed soccer complex development is the development of an irrigation water transmission line to serve the soccer park, the Ted Makalena Golf course, and the Navy agriculture lands south of the soccer complex. Projections of water use for the soccer park are based on applying 1.75 in. per week for the playing fields, and one-half of this amount for the other landscaped areas along roads and parking, around the irrigation water storage lake, and around other features. Some areas will be planted with grass or ground cover but will not be irrigated after the grow-in period. The Ted Makalena Golf Course presently uses 0.5 million gallons per day (mgd) of domestic water from the City and County of

Honolulu system for golf course irrigation. This domestic water irrigation use will be eliminated when water is provided from the soccer park system.

The demand for the golf course is based on full coverage of all irrigated areas at a supply rate of 1.5 in. per week. The soccer park, with exception of the fields, will have plants to make optimum use of water. The irrigation system will be designed and operated to minimize water uses. Both the golf course and the soccer park will be designed to reduce the application rates during drought periods and reduce use rates in less critical areas. The demand for irrigation water for the Navy agricultural lands south of the soccer park is based on a projected agricultural requirement of 3,500 gallons per acre per day.

The irrigation water demand is estimated to be:

Soccer Complex	1.2 mgd
Ted Makalena Golf Course	0.9 mgd
Agricultural Requirements - up to	2.5 mgd
Total	4.6 mgd

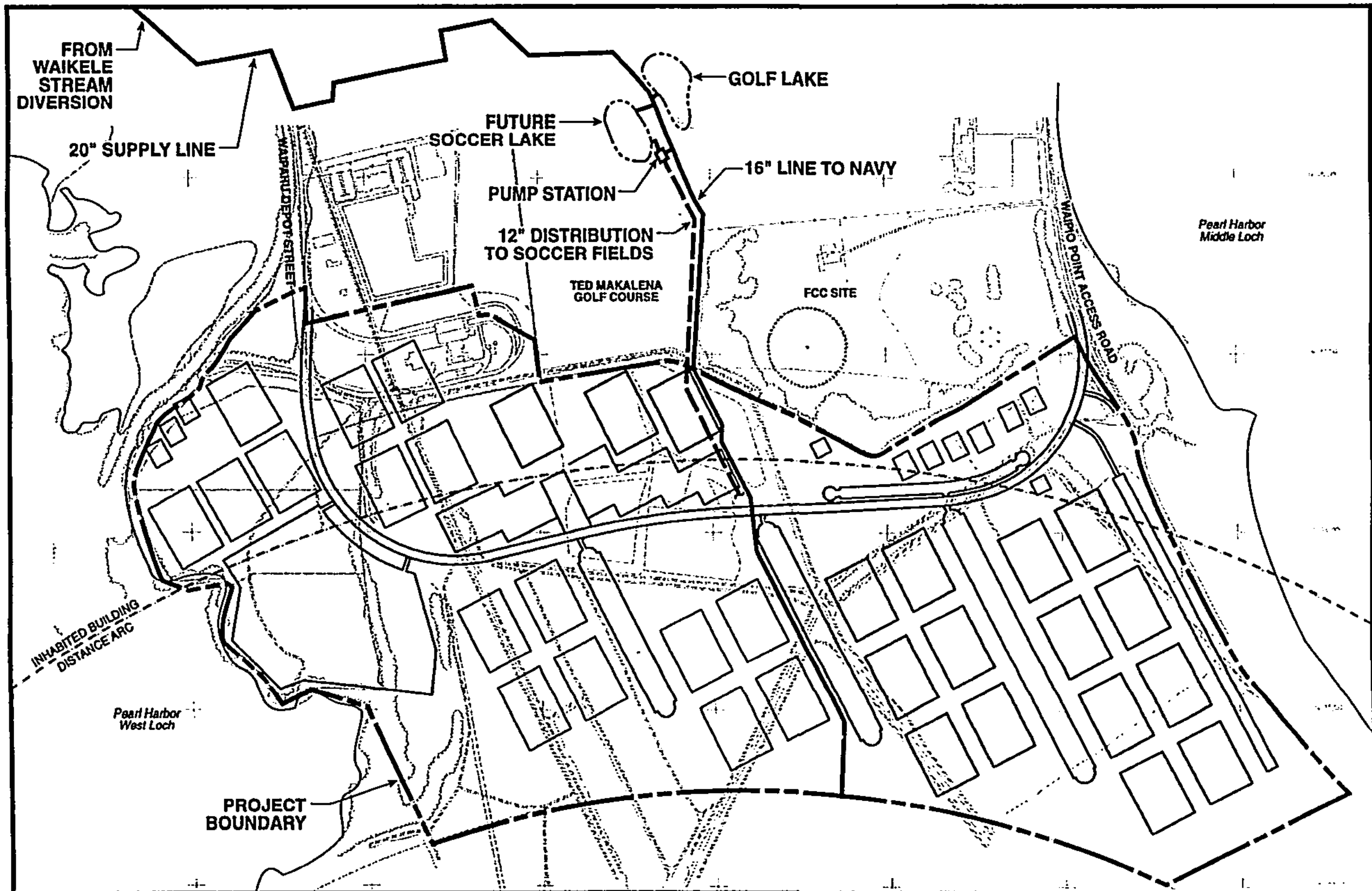
A reservoir in the Ted Makalena Golf Course would provide sufficient capacity to supply peak irrigation demand of the golf course and the first phase of the soccer park, plus the soccer park Phase 1 fire flow with approximately a one and one-half day reserve supply. A second reservoir may be constructed in the golf course when the soccer park is expanded.

The primary issues associated with non-potable water are demand, allocation of water resources, maintenance of existing or historical in-stream flows, and the possible re-use of treated effluent.

The development of an irrigation water source and transmission system to the site for use on the soccer fields, as well as the Ted Makalena Golf Course and the Navy agricultural lands immediately south of the soccer park site, is one of the conditions of the lease from the Navy for the soccer park property. The law authorizing the Navy to lease its property to the City and County of Honolulu (Public Law 105-45 Section 127, September 30, 1997) states that the City and County of Honolulu must develop the irrigation water transmission system. Because there are no readily available irrigation water sources or supplies to transmit, the City and County of Honolulu must develop the source and transmission system to fulfill its obligations under the lease agreement.

Alternative irrigation water transmission line routings are shown in Figures 3-9 and 3-10. Alternative irrigation water source development schemes included:

- Development of entirely new irrigation water wells in the vicinity of the proposed soccer park;



Note: Locations are approximate.

Figure 3-9
PREFERRED ALTERNATIVE NON-POTABLE IRRIGATION WATER SYSTEM CONFIGURATION
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

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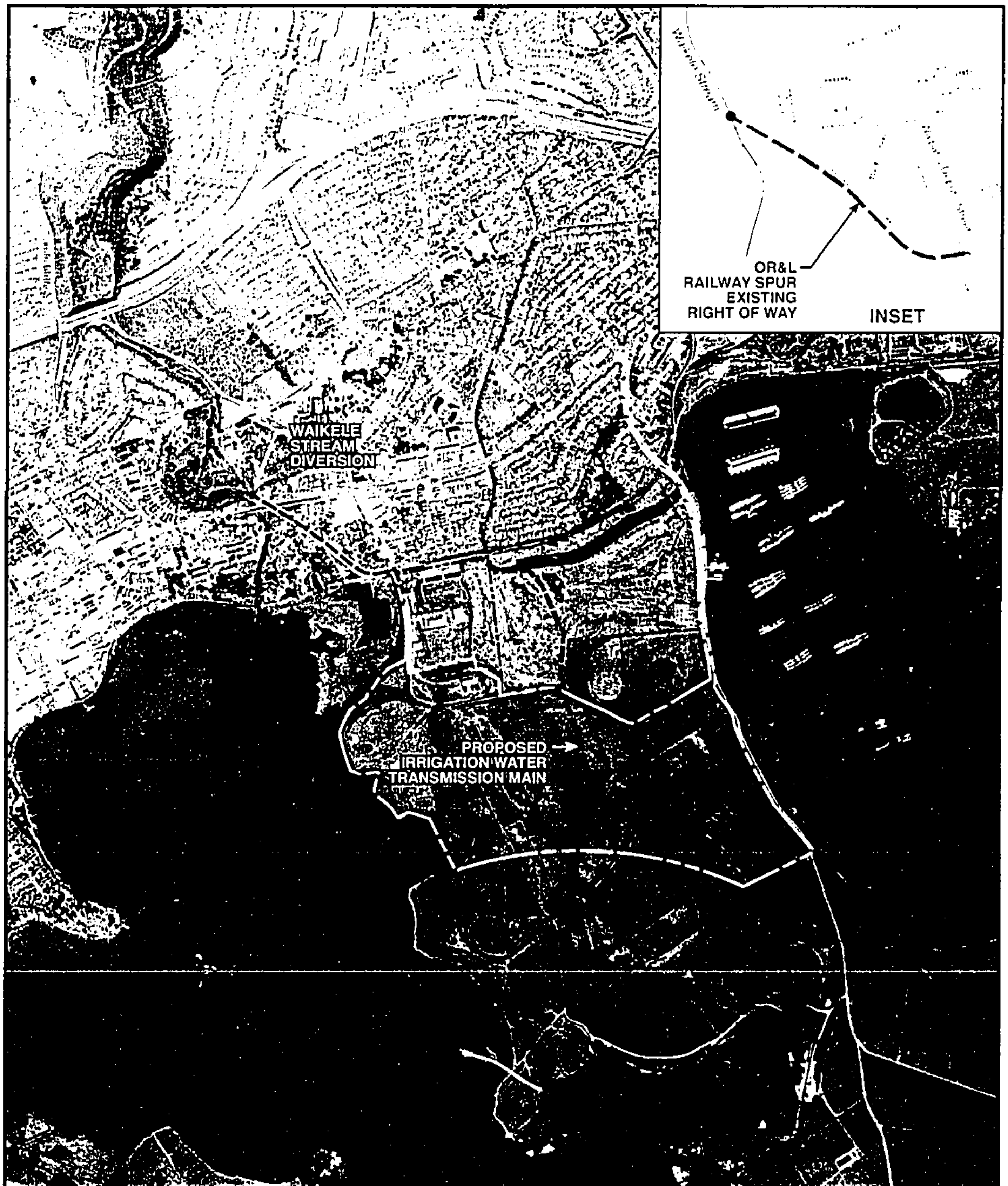

Source of aerial photo: Air Survey Hawaii, December 1995.

NORTH

0 1000 2000 4000

SCALE IN FEET

Figure 3-10
CONCEPTUAL OFFSITE WATER SOURCE AND PREFERRED ALTERNATIVE TRANSMISSION LINE ROUTE

Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

- Revival of a former Oahu Sugar Company Waikele Stream source, pump facility, and diversion, supplemented with a new well;

- Purchase of water from existing privately owned wells near the former Waipahu Sugar Mill (WP 7); and

- Use of treated sewage effluent from the City and County of Honolulu Honouliuli Waste Water Treatment Plant (WWTP) via a transmission line to the soccer park site from the WWTP.

Based on analyses performed by the BWS,[21] as well as discussions with the owner of the sugar mill well, the use of the former Oahu Sugar Company pumping facility, known as WP 18, is the most cost effective and efficient means of providing the required amount of irrigation water to the proposed soccer park and the Navy agricultural lands (Table 3-16).

Table 3-16
Estimated Costs of Irrigation Water Alternatives

Alternative	Quantity Available	Estimated Cost[1]
Waikele Stream Diversion and New Well	4.6 MGD	2.1
Amfac Well No. WP 7	>4.6 MGD	1.0
Honouliuli WWTP	>5.0 MGD	7.4
New Wells	>4.6 MGD	2.4

1 Estimated costs do not include cost of additional treatment that may be required or costs of purchasing water from private sources. Costs shown are for source and transmission infrastructure development only. Costs in millions of dollars (1998).

The use of the Waikele Stream diversion alternative is a revival of the former Oahu Sugar Company irrigation water source. Additionally, the water extracted from this source would be used for recreational facilities and agricultural purposes, that is, irrigation of the soccer complex, the Ted Makalena Golf Course, and the Navy agricultural lands south of the soccer park site. Based on water quality analyses of Waikele Stream (Appendix H), the stream water is good quality water for irrigation purposes. Further, the transmission line from the stream diversion to the soccer park site would follow an existing utility corridor.

It is estimated[22] that 2.5 mgd of irrigation water will be required for full diversified agricultural use of the Navy lands. The soccer park will require approximately 1.2 mgd and the Ted Makalena Golf Course will require approximately 0.9 mgd. The estimated costs of the various irrigation water source and transmission line development costs are shown in Table 3-16.

The City and County of Honolulu has held preliminary discussions with Amfac regarding the possible purchase of water from Well No. WP 7 and use of serviceable portions of the

[21] Lau, C. 1998.
[22] City and County of Honolulu. 1998.

transmission line to the soccer park site. This well served the sugar cane fields previously located on the Waipio Peninsula site, and the portion of the transmission line to Farrington Highway are in good enough condition to serve the soccer park. This facility is capable of producing more water than is needed for the soccer park. The costs of purchasing the water from Amfac, unknown at this time, would have to be negotiated. This alternative offers a reasonable and practical solution and a source of good irrigation quality water. However, this alternative has not been selected due to the probable higher costs to purchase the water.

Use of treated wastewater from the City and County of Honolulu Honouliuli WWTP has also been investigated. According to City and County of Honolulu Department of Environmental Services, the WWTP could supply the required 4.6 mgd for the soccer park, Navy agricultural lands, and Ted Makalena Golf Course. Use of this source would require the City and County of Honolulu to construct an approximately three-mile-long transmission line from the WWTP to the soccer park site. The acceptability of this water, as direct effluent from the WWTP, is questionable in that it does not meet treatment standards (R-1) for use on public parks and/or vegetable crops. Additionally, the cost of the transmission line and necessary pumps would be approximately $7.4 million. The transmission line would follow the old Oahu Railway and Land Company (OR&L) right-of-way along the west side of West Loch to the head of the Loch, where it would turn east and then into the soccer park site along Waipahu Depot Street (Figure 3-11).

While the use of this source of water, with appropriate treatment, could be environmentally and agronomically acceptable, the cost of developing the transmission line is prohibitive and would not allow development of Phase 1 of the soccer park as presently planned. Additional treatment of the effluent would be required, which could raise the price of the water significantly. For these reasons, the goals and objectives of the soccer park would not be met and, therefore, this is an unacceptable water source development alternative.

Based on previous engineering analyses, the development of new wells on the Waipio Peninsula would result in water that is too brackish for irrigation purposes and, therefore, this alternative is not technically feasible. Wells located just above Farrington Highway next to Waikele Stream, near the WP 18 stream diversion facility, could be feasiblely developed. However, diverting the Waikele Stream water using the existing stream diversion is the more desirable alternative because stream water is used that would otherwise flow into the ocean. Impacts of diversion on the Pearl Harbor Estuary were evaluated and found to be not significant.

No significant health risk from the use of untreated stream water for irrigation on soccer fields is anticipated. Pathogens that may be present in stream water have rapid die-off rates upon application to dry land and are unlikely to represent a health risk (Memorandum for the Record, Roger Fujioka, Director, Water Resources Research Center, University of Hawaii, September 1998). This includes leptosporosis, which has not been specifically identified in Waikele Stream but is common in Hawaii. Leptosporosis is very susceptible to sunlight and

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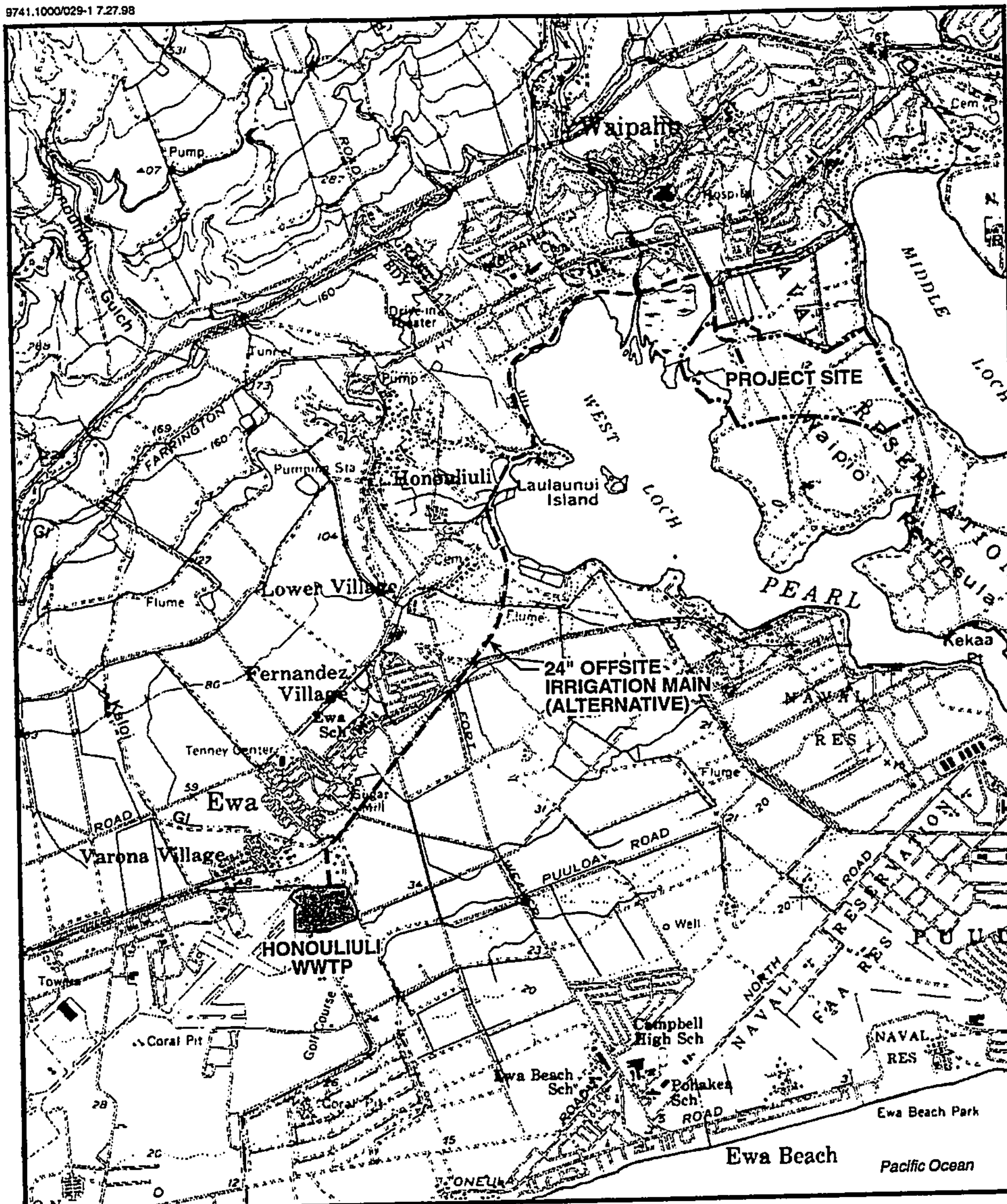

Note: Locations are approximate.

NORTH

0 2000 4000 8000
SCALE IN FEET

Figure 3-11
ALTERNATIVE NON-POTABLE IRRIGATION WATER SYSTEM
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

drying (Memorandum for the Record, David Sasaki, Epidemiologist, Department of Health, State of Hawaii, September 1998).

The proposed soccer park would result in significant adverse impacts to the non-potable water environment if non-potable water sources could not meet projected demands for the proposed soccer park site or agriculture outlease parcels south of the lease site.

3.11.2.3 Potential Impacts

The proposed use of the site for the soccer park will include the off-site development of a non-potable water source capable of delivering approximately 4.6 mgd to the soccer park site with approximately 2.5 mgd of that to be transmitted to the Navy agriculture outlease parcels south of the proposed soccer park site. Based on the environmental, engineering, and economic analysis conducted, the preferred option is to revive the previously used Oahu Sugar Company Waikele Stream diversion system.

The Waikele Stream diversion system will be augmented by a groundwater well drilled in close proximity to the diversion site. The irrigation water supply will also function as the fire protection service to the soccer park site.

Based on engineering analyses conducted by BWS, the redevelopment of the Waikele Stream diversion and supplemental well would not adversely affect potable or non-potable groundwater supplies within the PHWMA. Also, in-stream flow over the diversion weir, that is water not diverted to the irrigation water system, would be equal to or greater than historical minimum flows of approximately 4.0 mgd, so there would be no adverse effect on down-stream flows or supplies (see Appendix H).

The downstream biological and chemical oceanographic studies conducted specifically for the soccer park master plan development (see Appendix H), indicate no significant effects on the down-stream water quality or biota. Similarly, no significant effects on the nutrient loading or water quality of Pearl Harbor would result from the reduction in flow entering the harbor.

As indicated above, the re-use of treated wastewater effluent from the Honouliuli Wastewater Treatment Plant has been investigated and found to be an uneconomical alternative due infrastructure costs (see Table 3-13). Further, the wastewater, as it presently exits the WWTP is not of sufficient quality to meet the requirements for use on a public park or cultivated crops. Additional costly treatment would be required before it could be acceptable for use. Therefore, although this could be an environmentally acceptable irrigation water source, reuse of treated effluent is not the preferred option.

3.11.2.4 Proposed Mitigation Measures

The development of a non-potable irrigation water source for the Waipio Peninsula Soccer Park, as well as an irrigation water source for the Ted Makalena Golf Course and the Navy lands makai of the soccer park, is being designed to maximize the use of non-potable water supplies for irrigation purposes and to allow the agricultural development of the Navy lands. Other mitigation measures are not required.

3.11.3 Wastewater Collection, Treatment, and Disposal

3.11.3.1 Existing Conditions

The soccer park site is not presently served by a wastewater collection system, but the Waipahu Incinerator is connected to the City and County wastewater system via a 4-in. force main and on-site pump station. This 4-in. force main is owned and maintained by the Department of Environmental Services Refuse Division. Two additional force mains, 42-in. and 48-in. run through the western half of the site from the Waipahu Sewage pump station to the Honouliuli WWTP. No other sewer infrastructure exists on the site.

3.11.3.2 Environmental Issues and Significance Criteria

The primary wastewater collection, treatment, and disposal issues associated with the proposed soccer park include forecast quantities, adequacy of the existing or improved system to meet those quantities, and potential reuse of treated wastewater. The proposed soccer park would result in significant adverse effects if the existing or improved system were not capable of handling the forecast quantities of wastewater to be generated.

3.11.3.3 Potential Impacts

It is estimated that the proposed soccer park will generate a maximum of about 46,000 gpd of wastewater in Phase 1 and 257,000 gpd at build-out. These peak flow estimates are based on seven soccer games per day on every field with each participant and spectator using the comfort station once. The flow should vary daily, as weekday usage is expected to be significantly less than the estimated peak flow. The design average flow at build-out is estimated to be 53,700 gpd.

The proposed method of treatment and disposal of the wastewater will be via a new gravity system that will collect the wastewater onsite and deliver the effluent to the closest acceptable manhole with the aid of a pump station to be provided as part of the project. From this point, the effluent will be conveyed via existing force mains and lines to the Honouliuli WWTP for treatment and offshore disposal. As an alternative, disposal via separate septic tanks/leach fields for each restroom has been investigated and found to be unacceptable in the long-term.

3.11.3.4 Proposed Mitigation Measures

Collection and disposal of the soccer park site wastewater via a new gravity system will not result in significant adverse effects on the existing City and County of Honolulu collection, disposal, and treatment system. The system will comply with applicable federal, State of

Hawaii, and City and County of Honolulu rules, regulations, and ordinances. No other mitigation measures are required.

3.11.4 Solid Waste Collection

3.11.4.1 Existing Conditions

Because there are no activities on the soccer park site at present, there is no solid waste collection service to the site. However, nearby residences and commercial/industrial businesses are served by the City and County of Honolulu Department of Environmental Services - Refuse Division.

3.11.4.2 Environmental Issues and Significance Criteria

There are no significant solid waste collection and disposal environmental issues related to the proposed soccer park. However, significant effects could be experienced if:

- The City and County of Honolulu Department of Environmental Services - Refuse Division were unable to collect solid waste from the site; or
- The City and County of Honolulu waste disposal facilities could not handle waste generated at the site.

3.11.4.3 Potential Impacts

The proposed soccer park is expected to generate approximately 10 tons per day (TPD) of solid waste materials at build-out. It is expected that the various soccer associations utilizing the facilities would initiate a recycling program for all recyclable items, such as, aluminum cans, corrugated cardboard, glass, and plastic containers. Also, it is presumed maintenance crews would collect green wastes and stored onsite for use as mulch or provided to a commercial compost business for processing and reuse. Those materials not recycled would be collected by the City and County of Honolulu Department of Services - Refuse Division and disposed of either at the Waimanalo Gulch Landfill or H-POWER plant. In either case, both facilities have sufficient capacity to accept the solid waste generated at the soccer park site. Therefore, solid waste collection and disposal are not expected to generate any significant environmental impacts related to solid waste collection and disposal.

3.11.4.4 Proposed Mitigation Measures

Because the proposed soccer park is not expected to result in adverse impacts to the solid waste collection or disposal system of the City and County of Honolulu, no mitigation measures, other than the possible recycling programs noted above, are proposed or warranted.

3.11.5 Electrical Service

3.11.5.1 Existing Conditions

Overhead utility lines presently run along the west side of Waipahu Depot Street to the City and County of Honolulu Waipahu Incinerator and along Waipio Point Access Road to Navy facilities south of the proposed soccer park site. There are no electrical or telephone drops into the soccer park site.

3.11.5.2 Environmental Issues and Significance Criteria

There are no significant electrical power environmental issues related to the proposed soccer park. However, significant effects could be experienced if existing Hawaiian Electric Company (HECO) generation, transmission and distribution capabilities were unable to handle the increased loads from the proposed soccer park.

3.11.5.3 Potential Impacts

Development of the proposed Waipio Peninsula Soccer Park will require the installation of electrical service to the various components of the complex. It is estimated that, at build-out, the soccer park complex will require approximately 1,054 kilovolt amperes (kVa) of electrical power. HECO has indicated to the City and County of Honolulu that the primary service to the soccer park site (12,000 volts) is more than adequate to serve the soccer park field lighting, restrooms, concession stands, and all other proposed facilities on the site. Field and building lighting will conform to the City and County of Honolulu's Building Efficiency Standards (State Model Energy Code) and the State's "Green Light" program.

Additionally, the City and County of Honolulu design for buildings could include solar water heaters, and an energy management system to reduce, to the maximum extent possible, the use of electrical power. The City and County of Honolulu would continue to work with HECO to assure sufficient electrical power is provided to the complex.

3.11.5.4 Proposed Mitigation Measures

The proposed soccer park is not expected to cause serious demand requirements on the generating capabilities of HECO. Therefore, no significant adverse effects are anticipated and no mitigation measures, other than the energy efficiency measures noted above, are proposed or warranted.

3.11.6 Telephone and Television

3.11.6.1 Existing Conditions

The proposed soccer park site does not currently have either telephone or television service. However, there are Hawaiian Telephone Company overhead lines along Waipahu Depot Street to the Waipahu Incinerator site.

3.11.6.2 Environmental Issues and Significance Criteria

There are no significant telephone or television environmental issues related to the proposed soccer park. However, significant effects could be experienced if existing Hawaiian Telephone Company or Oceanic Cable Company capabilities were unable to handle the increased loads from the proposed soccer park.

3.11.6.3 Potential Impacts

Although the total number of telephone lines required to serve the ultimate master planed soccer park are unknown, Hawaiian Telephone Company has indicated that their existing service along Waipahu Depot Street may not currently be adequate for the final configuration of the soccer park. However, additional cabling could be provided on existing overhead poles along Waipahu Depot Street without adversely affecting their system. Similarly, Oceanic Cable Company has indicated they currently do not have service along Waipahu Depot Street; however, service could be provided on the existing overhead poles without adversely affecting their system.

3.11.6.4 Proposed Mitigation Measures

Because the proposed soccer park will not adversely affect either Hawaiian Telephone Company or Oceanic Cable Company, no mitigation measures are proposed or warranted.

3.12 PUBLIC SERVICES AND FACILITIES

The existing health care, police, and fire protection services, as well as the potential impacts of the proposed soccer park to these services, and proposed mitigation measures are described in the following paragraphs. Although the proposed soccer park is not expected to adversely affect any of these services, adverse effects could occur if the services were not able to handle increased demand or respond in a timely manner.

3.12.1 Health Care

3.12.1.1 Existing Conditions

Hospitals: The nearest hospitals to the soccer park site are Pali Momi Medical Center in Aiea, approximately four to five miles away, and the St. Francis Medical Center West, also approximately four to five miles away. Both facilities provide a full range of hospital services including emergency care, outpatient treatment, and laboratory and X-ray facilities.

Emergency Ambulance Services: The Emergency Medical Services Division (EMS) of the City and County's Department of Emergency Services, under contract with the State Department of Health, would have primary responsibility to respond to medical emergencies at the soccer park site. Responses to such emergencies would generally be dispatched from either the Waipahu unit, co-located with the Waipahu Fire Company at 94-121 Leonui Street, or from the Makakilo unit, located at St. Francis Medical Center West in Ewa. By the time build-out of the soccer park is complete, it is likely that there will be two additional units capable of responding to emergencies at the site, one in Kapolei and another possibly in Nanakuli.

3.12.1.2 Potential Impacts

The proposed soccer park and/or activities at the site would not likely materially affect the operations of either of the two hospital facilities near the soccer park site.

Ambulance response times could vary, but on average it is estimated that it would take between 6.5 and 7 minutes to respond to an emergency at the soccer park site. EMS has arrangements with the Honolulu Fire Department (HFD) to provide backup for quicker response if necessary. The HFD has increasing capability to respond to medical emergencies and provide stabilization prior to the arrival of the ambulance. They are able to respond in 3 to 4 minutes.

Presumably, emergency calls from the soccer park site would be mostly for sports injuries, and these response times would be considered adequate.

3.12.1.3 Proposed Mitigation Measures

In general, because of the lack of expected adverse effects on health care facilities serving the soccer park, specific mitigation measures are not warranted. Standard operating procedures to be established by the Department of Parks and Recreation will require league and tournament organizers to have plans for handling emergencies.

3.12.2 Police Protection

3.12.2.1 Existing Conditions

The proposed soccer park will be located within District 3 of the City and County of Honolulu Police Department. District 3 covers the area from Red Hill to Village Park and Waipahu and includes the major residential areas of Pearl City, Aiea, Waipio, Waikele, Village Park and Waipahu. The main station is located at 1100 Waimano Home Road in Pearl City, approximately three miles from the soccer park site. There is a storefront facility in the Waipahu Shopping Center (94-144 Farrington Highway) which also houses the department's Alternative Call Servicing Program.

3.12.2.2 Potential Impacts

The soccer park will not bring new residents to the area. At full development, the proposed soccer park will draw a substantial number of people into the area to attend events held at the complex. Overall, it is not anticipated that the soccer park will have a negative impact on police operations for the district (personal communication, Sgt. Farias, Honolulu Police Department, Community Policing Team, May 1998). It could, though, increase the number of calls to the police department from nearby residents complaining of traffic and parking problems.

With the soccer park, there could be a need for five additional officers for patrol purposes, not including officers called on duty for special events and/or private traffic control officers (personal communication, Sgt. Farias, May, 1998).

3.12.2.3 Proposed Mitigation Measures

In addition to the possible requirement for five additional police officers for patrol purposes, it is likely that event organizers and sponsors will contract with private security firms to provide traffic control and other security measures. This would alleviate some of the potential increased calls the Police Department may receive.

3.12.3 Fire Protection

3.12.3.1 Existing Conditions

There are two fire stations in the vicinity of the soccer park site. One is the Manana military fire station, approximately two miles north of the soccer park site, which responds to civilian emergencies as needed. The second is the City and County of Honolulu Waipahu fire station, approximately two miles to the west. A new station in Waikele (at the corner of Lumiaina Street and Lumiaina Place) will be operational no later than February 1999, and would also respond to emergencies at the soccer park site. Backup for these stations would come from the station in Pearl City.

3.12.3.2 Potential Impacts

Neither phase of the soccer park is expected to have a material impact on the ability of the fire department to respond to emergencies. All facilities would be designed, constructed, and operated in conformance with applicable fire codes. As indicated in the roadways and traffic section previously (Section 3.10 above), adequate emergency service vehicle access would be provided to the site and complex at all times.

3.12.3.3 Proposed Mitigation Measures

Because the proposed soccer park is not expected to adversely affect either the ability of the Honolulu Fire Department (HFD) to respond to emergencies at the site, mitigation measures are not proposed or warranted. The fire flow and fire protection systems for the proposed soccer park would be designed and constructed to meet applicable building and fire codes.

3.13 NOISE

3.13.1 Existing Conditions

Ambient noise conditions at the soccer park site are low, probably in the 40 to 50 decibels [A-weighted scale (dBA)] level given there are no major generators of noise in the vicinity of the site. Natural noise generators, such as the wind blowing through the limited vegetation on the site, as well as noise generated by the nearby Naval Inactive Ships Maintenance Facility (NISMF), minimal noises generated by the adjacent City and County of Honolulu maintenance yard at the old Waipahu Incinerator, and noise generated at the City and County of Honolulu Police Department Ke Kula Maka'i Academy are the primary noise sources. With the exception of the natural noises, all others are off-site and do not significantly affect the site.

3.13.2 Environmental Issues and Significance Criteria

Existing sound levels at the soccer park site are low, in the 40 to 50 dBA or less range. Additionally, there are no significant noise generating sources, especially in the nighttime hours. The primary environmental issues affecting or potentially affected by noise are existing sound levels at the site, increased traffic noise, and possible special event noise levels. The significance of noise generated by the proposed use of the soccer park site, is addressed based on the potential for aggravating noise levels to be experienced at noise-sensitive receptors beyond the soccer park site boundaries. Noise-sensitive receptors are land uses associated with indoor and outdoor activities that would be impacted by noise, such as residences, schools, churches, or hospitals.

Maximum permissible sound levels from sources within a specified zoning district or beyond property lines are defined in HAR Title 11, Chapter 46, Community Noise Control (September 23, 1996). This regulation is applicable to stationary noise sources as well as construction and industrial related equipment and activities. The proposed soccer park site is located in a "Class

A" noise zoning district and significant adverse impacts from the proposed soccer park would result if:

- Noise levels generated during construction exceeded maximum allowable levels (55 dBA in daytime or 45 dBA at nighttime); or
- Noise levels generated during operations of the soccer park disturb noise-sensitive receptors beyond the soccer park site boundaries.

3.13.3 Potential Impacts

The soccer park site is approximately one-half mile from the nearest residences and is buffered from those residences by the Ke Kula Maka'i Police Academy, Ted Makalena Golf Course, and FCC site. The prevailing northeast tradewind is away from the residences. Noise generated at the soccer park site would be attenuated by wave divergence (e.g. distance alone) by a factor of 29 decibels over a distance of 2,500 feet (½ mile), compared with the sound that would be experienced 100 feet away. Sound generated at the soccer park site would not be impulse noise, nor would it be low frequency noise that propagates for longer distances. Similarly, noise generated at the soccer park site is not expected to affect operations at the FCC site. However, soccer park site noise could affect training operations at the Ke Kula Maka'I Police Academy.

The State Department of Health maximum permissible sound levels for Class A noise zone district are 55 dBA during the daytime (7:00 a.m. to 10:00 p.m.) and 45 dBA for nighttime hours (10:00 p.m. to 7:00 a.m.). For this noise level to be exceeded, noise generated at the soccer park would need to exceed 84 dBA during the daytime and 74 dBA at night. This is unlikely in that noise measurements taken at other similar sports related activities ranged from about 50 dBA to 60 dBA at 100 feet from the source. However, anecdotal information indicates that nighttime events at Aloha Stadium and the Waikiki Shell exceed allowable noise levels. Should this be the case at the soccer park, special measures may be required to be taken by event sponsors.

3.13.4 Proposed Mitigation Measures

During construction, all equipment will be muffled and required to meet State DOH noise level requirements. Construction activities will be limited to weekday daytime hours, generally 7:00 a.m. to 5:00 p.m. Construction noise will short-term and intermittent and is not expected exceed permissible levels or cause significant adverse effects on nearby noise-sensitive receptors.

During operation of the proposed soccer park, activities during the week will generally be limited to the hours of 3:00 p.m. to no later than 10:00 p.m., and the primary noise generators will be youth and adult soccer players and traffic. On Saturdays, sports activities will be conducted all day from about 8:00 a.m. to 5:00 p.m. and on Sundays activities will take place from about 10:00 a.m. to 4:00 p.m. The primary noise sources during these times will be cheering adults and youth as well as traffic movements in and out of the soccer park. Sound levels generated by these activities are expected to be less than 50 dBA at the nearest residential noise-sensitive receptors.

To avoid possible adverse noise effects on the Ke Kula Maka'i Police Academy, event sponsors would be required to coordinate timing of the events with the Academy to avoid or minimize impacts on police training activities.

On occasion (presently estimated to be no more than about six times per year) there may be special nighttime events that will add to the sound levels of the area. These events are expected to be completed by 10:00 p.m. and are not expected to adversely affect the nearest residential noise-sensitive receptors. Normal operational activities are not expected to aggravate the nearest residential noise-sensitive receptors and/or cause significant adverse effects.

The noise situation will be monitored and appropriate management measures adopted, as needed, to address the issue of noise from special events.

3.14 VISUAL AND SCENIC RESOURCES

3.14.1 Existing Conditions

The proposed soccer park site is uninhabited former sugar cane fields and a sugar mill wastewater disposal area. The site does not contains any significant visual features. However, the site does offer inland (mauka) views towards the Waianae Mountains to the west and the Koolau Mountains to the east, as well as Mt. Kaala, the highest peak on Oahu. Similarly, the site offers limited seaward (makai) views of Pearl Harbor.

Existing visual intrusions into nearby areas from the vicinity of the soccer park site include night lighting at the Ke Kula Maka'i Police Academy. There are no known complaints by nearby residents from this lighting.

3.14.2 Environmental Issues and Significance Criteria

The primary environmental issues potentially affecting the visual and scenic resources of the soccer park site include the effect of the action on Pearl Harbor National Historic Landmark (PHNHL), the effect of the action on landward (mauka) and seaward (makai) view planes, and the potential effect of increased night lighting on the nearby residential areas. Impacts of the proposed soccer park on the scenic resources of the site and area would be considered significant if:

- The proposed soccer park resulted in view planes to scenic resources being blocked or altered; or

- Night lighting from the proposed soccer park adversely affected nearby residential areas.

3.14.3 Potential Impacts

Given the present limited public access, the site of the proposed soccer park does not serve as a significant visual resource to the military or civilian population of Oahu. The proposed soccer park would primarily consist of ground level play fields and low-rise restrooms and concession stands. The soccer park is not expected to significantly adversely affect the scenic resources of the area or island. The proposed soccer park would not affect the status or stature of the PHNHL.

Night lighting of the playfields and training center may cause increased light levels in the nearby residential areas, even though those areas are over one-half mile away from the soccer park site.

3.14.4 Proposed Mitigation Measures

Because the proposed soccer park would not have any adverse effects on the scenic resources of the site or area, mitigation measures are not proposed or warranted. To mitigate potential nighttime lighting impacts, pole lights will be back-shielded to the extent practicable to prevent intrusion into areas north of the soccer park site and turned off immediately following nighttime events. Similarly, the lighting would be directed so as not to over-illuminate areas outside the soccer park site.

CHAPTER 4
CONSISTENCY WITH LAND USE PLANS, POLICIES, AND CONTROLS

4.1 HAWAII STATE PLAN

The Hawaii State Plan (Chapter 226, HRS, 1995) consists of a series of broad goals, objectives, and policies that serve as guidelines for the growth and development of the State. In general, the development of the Waipio Peninsula Soccer Park is consistent with the intent of the Hawaii State Plan. Below is a discussion of the project's relationship to the State Plan's specific goals, objectives, policies, and implementing actions.

Overall Themes, Goals, Objectives, and Policies

Section 226-4—State Goal

In order to guarantee, for present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:

(2) *A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.*

The proposed soccer park is consistent with the goals of the State Plan. It will provide a much-needed public recreational facility that combines active recreational opportunities with passive leisure amenities. To a large extent, it will allow patrons and visitors alike to appreciate the views of the area. Moreover, it will assure the long-term protection of special natural features and sensitive coastal resources. The intrinsic beauty of the site and surrounding areas will be enhanced by landscaping and retention of most of the property in open space.

Section 226-11—Objectives and Policies for the Physical Environment—Land-Based, Shoreline, and Marine Resources

(a) *Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:*

- *Prudent use of Hawaii's land-based, shoreline, and marine resources.*
- *Effective protection of Hawaii's unique and fragile environmental resources.*

(b) *To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:*

- *Exercise an overall conservation ethic in the use of Hawaii's natural resources.*

- *Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.*

- *Take into account the physical attributes of areas when planning and designing activities and facilities.*

- *Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*

- *Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.*

- *Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.*

- *Pursue compatible relationships among activities, facilities, and natural resources.*

- *Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.*

The preparation of this FEIS is part of a review process mandated by State law. It provides a vehicle for the community to obtain information and offer input on the proposed soccer park. The EIS discloses information on soils, drainage, plants, animals, agricultural potential, historic sites, natural hazards, noise, air quality, traffic, utilities, and socioeconomic conditions, and provides descriptions of anticipated impacts. The EIS also provides possible mitigation measures to reduce or remove any negative project impacts.

Overall, the project minimizes impacts on natural resources by appropriate management practices. Park facilities will be selectively sited to avoid or minimize effects on sensitive coastal areas. The soccer park will enable residents and visitors to appreciate the natural outdoor setting. The soccer park design philosophy notably enhances the existing natural landscape for public enjoyment.

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

(a) *Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.*

(b) *To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:*

- *Promote the preservation and restoration of significant natural and historic resources.*
- *Provide incentives to maintain and enhance historic, cultural, and scenic amenities.*
- *Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.*
- *Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.*
- *Encourage the design of developments and activities that complement the natural beauty of the islands.*

Enhancement of the site's natural beauty through carefully chosen landscape plants and inherent cultural/historic value was considered in the planning process. There will be only minimal alteration to land near the shoreline, and development will be low-key. Coastal and mountain views will be preserved.

Significant cultural resources have been identified and appropriate mitigation will be carried out in consultation with the State Historic Preservation Division.

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

(a) *Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:*

- *Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.*

- *Greater public awareness and appreciation of Hawaii's environmental resources.*

(b) *To achieve the land, air, and water quality objectives, it shall be the policy of this State to:*

- *Promote the proper management of Hawaii's land and water resources.*

- *Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.*

- *Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.*

- *Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*

- *Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.*

- *Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures, and visitors.*

The proposed soccer park will not have significant adverse impacts on air and water quality. Activities will not generate significant amounts of air pollutants. Construction-related dust and emissions will be short-term and mitigation measures would minimize potential impacts.

Surface and marine waters would not be significantly impacted as a result of the proposed improvements. The components of fertilizer and biocides on the new soccer fields would remain near the surface of the ground and would not penetrate to groundwater and subsequently drift to marine waters.

The proposed soccer park is subject to natural hazards such as flooding, hurricanes and earthquakes, but property damage would be minimal because most of the site will remain in open space. All above ground structures will be designed and constructed in compliance with applicable building codes and standards.

The proposed landscape treatment and the new drainage system are expected to result in no more than a zero net gain in runoff from the property. The use of swales and on-site drainage basins will control surface runoff and reduce the dangers of flooding downstream of the project site.

Section 226-14—Objective and Policies for Facility Systems—In General

(a) *Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.*

(b) *To achieve the general facility systems objective, it shall be the policy of this State to:*

- *Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*

- *Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*

- *Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.*

- *Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.*

The proposed soccer park is in keeping with the State's long-range plan for the improvement of recreational facilities to meet growing recreational needs in the region over the next 10 to 15 years. Improvements will be developed in phases to accommodate the incremental growth in user demand as well as to phase the cost of construction to match the availability of funds. Incremental development also provides opportunities to be flexible and to make plan revisions and updates as needed.

Section 226-23—Objective and Policies for Socio-Cultural Advancement—Leisure

(a) *Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.*

(b) *To achieve the leisure objective, it shall be the policy of this State to:*

- *Foster and preserve Hawaii's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.*

- *Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.*

- *Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.*

- *Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.*

- *Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.*

- *Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.*

- *Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaii's people.*

- *Assure adequate access to significant natural and cultural resources in public ownership.*

The Waipio Peninsula Soccer Park will provide for the increased recreational needs of the community. The project is intended to enhance the enjoyment of recreational experiences through new facilities, educational programs, strong safety measures, tight security provisions, and upgraded maintenance operations.

4.2 STATE FUNCTIONAL PLANS

The State Functional Plans are intended to provide more detail to the Hawaii State Plan in 14 specific areas of concern—agriculture, conservation lands, education, higher education, employment, energy, health, historic preservation, housing, human services, recreation, tourism, transportation, and water resource development. As defined in Chapter 226, Hawaii Revised Statutes, a functional plan sets forth "the policies, programs and projects designed to implement the objectives of a specific field of activity when such activity or program is proposed, administered, or funded by an agency of the State." These plans have been reviewed to determine their relationship to the proposed Waipio Peninsula Soccer Park project, and a discussion summarizing their relationship is provided below.

4.2.1 State Agriculture Functional Plan

The State Agriculture Functional Plan sets forth the policies, programs, and measures for implementing the agricultural and agricultural-related objectives, policies, and priority guidelines contained in the Hawaii State Plan.

Policy H(2) of the State Agriculture Functional Plan states "conserve and protect important agricultural lands in accordance with the Hawaii State Constitution." The soccer park site, while previously utilized for sugar cane cultivation, presently consists of sparse, weedy vegetation. The area is classified as Prime Agricultural Land according to the Agricultural Lands of Importance to the State of Hawaii (ALISH) (B16i, B77, E76, and C/E without irrigation). The area south of the project site will be retained by the U.S. Navy for diversified agricultural activities and would be provided irrigation water as a part of the proposed soccer park.

4.2.2 State Conservation Lands Functional Plan

Completed in 1991, the State Conservation Lands Functional Plan provides a management program that allows judicious use of the State's natural resources. It provides a framework for the protection and preservation of the State's pristine lands and shorelines. The project site is located primarily on lands designated Agriculture. A small portion of the project site on the west side of the former landfill is designated Conservation. The City and County of Honolulu will be required to have this portion of the site redesignated Urban or Rural if this portion of the site is to be used as part of the overall buildout project. The proposed soccer park is in keeping with the objectives of the Conservation Lands Functional Plan in that it will provide additional recreational opportunities to residents and visitors, retain the open space character of the site, and preserve or enhance the natural resources of the site, including native and migratory birds which would be attracted to new open water and turfgrass areas.

4.2.3 State Education Functional Plan

The State Education Functional Plan contains policies and strategies of the Department of Education (DOE). It is not applicable to the Waipio Peninsula Soccer Park project.

4.2.4 State Employment Functional Plan

The intent of this plan is to "guide employment, training, and human resources services in Hawaii." Its major focus is on education and preparation for employment, followed by recommendations for meeting current and anticipated labor shortages as well as improving the quality of the workplace for workers. It does not directly relate to the proposed soccer park. However, the proposed soccer park will directly add to the State's employment during construction and operations. Similarly, the soccer park will indirectly generate employment by private sector concessionaires for food and retail services.

4.2.5 State Energy Functional Plan

The objectives of the State Energy Functional Plan are to achieve dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people, and to achieve increased energy self-sufficiency. These relate both to overall land use planning and to specific building design and equipment selection decisions. While specific building designs have not been completed for the proposed soccer park, final design will adhere to energy conservation standards, wherever practicable.

4.2.6 State Higher Education Functional Plan

There are no policies or implementing actions in this functional plan that directly relate to the proposed soccer park.

4.2.7 State Health Functional Plan

The State Health Functional Plan focuses primarily on changing the State's role in public health from that of individual health care provider to one of advocacy and a catalyst for public and private sector efforts. Several of the plan's implementing actions relate to the Department of Health permit/approval processes which the proposed soccer park is subject to. These include the review of private wastewater treatment systems; discharges to air and surface water/ground water; treatment and disposal of solid wastes; new sources of drinking water; and air conditioning and mechanical ventilation systems for buildings that are used by the public. These topics and their relationship to the proposed soccer park are discussed in various sections of this EIS. Also discussed is the relation of the proposed soccer park to the provisions for public services, emergency medical services, solid waste collection, wastewater collection and disposal, potable water, and non-potable irrigation water.

4.2.8 State Historic Preservation Functional Plan

The State Historic Preservation Functional Plan endorses enhanced public support of historic preservation, creates preservation priorities and parameters, evaluates the relationship of development to the preservation of history, explores community interest and involvement with the remnants of its past, and determines the outcome of developing a Statewide History Center. In keeping with the State Historic Preservation Functional Plan, an archaeological surface and subsurface inventory survey of the soccer park site was conducted. Based on informal discussions with the State Historic Preservation Office, and in compliance with appropriate federal and state laws, statutes, and rules and regulations, appropriate mitigation measures will be taken for important cultural sites and resources.

4.2.9 State Housing Functional Plan

The objectives, policies, and implementing actions of this functional plan do not directly relate to the proposed Waipio Peninsula Soccer Park.

4.2.10 State Human Services Functional Plan

These State objectives and policies do not relate directly to the proposed Waipio Peninsula Soccer Park.

4.2.11 State Recreation Functional Plan

The State Recreation Functional Plan (SRFP) calls for acquiring or preserving lands of recreational value, providing adequate recreation facilities and programs, and assuring public access to recreation areas. The State Comprehensive Outdoor Recreation Plan (SCORP) provides the technical basis and planning assumptions used to develop the SRFP.

The SRFP identifies recommended actions and proposes strategies for addressing those actions. Below are relevant recommended strategies and actions of the SRFP that are directly related to the proposed Waipio Peninsula Soccer Park.

Strategies to Address Funding Reductions

<u>Revenue Enhancement</u>

1. Establish more user fees to supplement regular appropriations. The user fees should be placed in a special fund to directly benefit the resource to help cover operations and maintenance costs.

The City and County of Honolulu is investigating the possibility of establishing a non-profit organization that would be responsible for the operation and maintenance of the soccer park. Presumably, the non-profit organization would charge a fee for use of the facilities. Fees would be based on the type and duration of activity. For example, regular youth and adult soccer organizations could be charged one fee for use of the fields for practice and games. Private entities using the facilities for training camps, tournaments, and exhibitions could be charged another fee. Similarly, special events could be charged another fee along with some percentage of the gross receipts. All fees would go directly for the operation and maintenance of the facility and salaries of any employees of the non-profit organization. City and County of Honolulu operations and maintenance funds would be offset accordingly.

Management

<u>A.</u> <u>Maintenance</u>

1. Establish preventive maintenance programs in the state and county recreation agencies.

As indicated above, the non-profit organization established by the City and County of Honolulu would handle all maintenance and operations of the proposed soccer park. This would negate the need for the City and County of Honolulu Department of Parks and Recreation having to dedicate operations and maintenance funds or personnel to the complex.

Constraints to Recreation Access

C Disabled Access

1. Assure that all new facilities meet the Uniform Federal Accessibility Standards for handicapped access.

The proposed soccer park will be designed such that facilities meet the Americans with Disabilities Act (ADA) Uniform Federal Accessibility Standards for handicapped access.

4.2.12 State Tourism Functional Plan

The State Tourism Functional Plan serves as a guide in helping organize the various sectors of government and private industry toward achieving statewide objectives on tourism development. One of the relevant objectives of the tourism functional plan with respect to the proposed soccer park is Objective IIA: *Development and maintenance of well-designed visitor facilities and related developments which are sensitive to the environment, sensitive to neighboring communities and activities, and adequately serviced by infrastructure and support services.*

The proposed soccer park is intended to provide expanded recreational opportunities to both residents and visitors in an environmentally and socially compatible way. Adequate infrastructure and support services will be provided to serve the Waipio Peninsula Soccer Park.

4.2.13 State Transportation Functional Plan

The overall objective of the plan is to provide for the efficient, safe, and convenient movement of people and goods. Transportation issues are addressed in the traffic analysis section of this document. The soccer park is consistent with State transportation goals.

4.2.14 State Water Resources Development Functional Plan

This functional plan is directed primarily at State operations and, to some extent, to private industry. The plan presents general objectives and policies for the management of potable water supply, floodplains, agricultural water, and estuarine environments that could be considered relevant to this project. The soccer park is consistent with this functional plan. Appropriate permits for water resources development and transmission facilities will be acquired from the Commission on Water Resource Management (see Section 4.9) and City and County of Honolulu Board of Water Supply.

4.3 STATE LAND USE LAW

The lands encompassed in the project area are classified in the State Land Use Agricultural and Conservation districts (see Figures 2-5 and 2-6). Phase I can be implemented under the current land use designation. For buildout to proceed, the City and County of Honolulu will either request a land use boundary amendment from Conservation to Urban or Rural or request a Conservation District Use Permit (CDUP) from the Board of Land and Natural Resources.

4.4 COUNTY GENERAL PLAN

The General Plan is a written commitment by the City and County of Honolulu government to a future for Oahu that it considers desirable and attainable. The Plan is a statement of long-range social, economic, environmental, and design objectives for the general welfare and prosperity of the people of Oahu. It is also a statement of broad policies that facilitate the attainment of the objectives of the Plan. The Culture and Recreation Section (X), Objective D of the Plan is most applicable to the proposed soccer park. Objective D states:

> *To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.*

The following policies, relative to the proposed Waipio Peninsula Soccer Park, have been formulated under this objective to assist in the attainment of the objective:

Policy 1 **Develop and maintain community-based parks to meet the needs of different communities on Oahu.**

Policy 2 **Develop a system of regional parks and specialized recreation facilities.**

Policy 7 **Provide for recreation programs which serve a broad spectrum of the population.**

Policy 10 **Encourage the private provision of recreation and leisure-time facilities and services.**

Policy 14 **Encourage the State and Federal governments to transfer excess and underutilized land to the City and County of Honolulu for public recreation use.**

The proposed Waipio Peninsula Soccer Park is in concert with all of the above policies. The soccer park will meet the needs of different Central Oahu communities; provide a specialized recreation facility; serve a broad spectrum of the population; provide encouragement for the formation of a private non-profit entity to operate and maintain the facility. The proposed action is consistent with Policy 14, notwithstanding the fact that the land is fully utilized for federal program purposes.

4.5 CITY AND COUNTY DEVELOPMENT PLAN AND PUBLIC FACILITIES MAP

4.5.1 City and County Central Oahu Development Plan

The proposed soccer park site is designated as follows on the City and County of Honolulu Central Oahu Development Plan Land Use Map (see Figures 2-5 and 2-6): Park; Public Facilities; Residential; Preservation; and Military

4.5.2 City and County Central Oahu Public Facilities Map

The proposed soccer park site is designated as follows on the City and County of Honolulu Central Oahu Development Plan Public Facilities Map: Publicly funded park/golf course; publicly funded solid waste modification; and publicly funded sewer.

4.6 CITY AND COUNTY OF HONOLULU ZONING

The Waipio Peninsula Soccer Park site is presently zoned AG-2 (general agriculture); F-1 (military and federal reservation); P-1 (restricted preservation); and P-2 (general preservation).

4.7 HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The Hawaii Coastal Zone Management (CZM) Act 188, SLH 1977, which became Chapter 205A, Hawaii Revised Statutes, establishes specific objectives and policies in seven broad categories, discussed below. A CZM application and addendum have been submitted to the State CZM program in the Department of Business, Economic Development and Tourism, certifying that the project is consistent with CZM objectives and policies.

4.7.1 Recreational Resources

The proposed Waipio Peninsula Soccer Park will offer a diversity of recreational activities, which are consistent with the policies and objectives of the CZM.

4.7.2 Historic Resources

The proposed soccer park is consistent with CZM policies and objectives relative to historic resources.

4.7.3 Scenic and Open Space Resources

The proposed soccer park will consist primarily of landscaped turf playing fields. With the exception of the proposed stadium, new structures will be integrated into the terrain below ground level or one story in height and conducive of a park setting.

The structures will be well spaced, landscaped, and surrounded by open land. View corridors through the soccer park will be preserved. The project will maintain scenic and open space resources in compliance with CZM policies and objectives.

4.7.4 Coastal Ecosystems

No buildings or structural improvements will be located on the shoreline. These areas will be unaffected by the proposed Waipio Peninsula Soccer Park.

4.7.5 Economic Uses

The provision of the Waipio Peninsula Soccer Park amenities to visitors is expected to enhance their stay on the island and attract additional visitors to tournaments, camps, and clinics held at the site.

4.7.6 Coastal Hazards

The proposed improvements will be located primarily inland of the shoreline. Coastal hazards, such as tsunami inundation and storm waves, would not impact planned soccer park facilities because of their location approximately three miles inland from the mouth of Pearl Harbor. Historically, the site has not been flooded by either severe tropical storms or intense rainfall.

Also, the proposed soccer park is being designed to assure there will be no overall net gain in surface runoff from the site. A system of sedimentation basins are planned to be installed.

4.7.7 Managing Development

This EIS is a tool for communicating to the public during the early planning stage the potential impacts of the proposed soccer park. It is intended to facilitate public participation in the project's planning and review process.

4.7.8 Public Participation

The objective and corresponding policies of "Public Participation" relate to stimulating public awareness, education, and participation in coastal management. The EIS provides for public notification, public comments, and community input in the decision process regarding the proposed activities and associated impacts.

4.7.9 Beach Protection

The policies of this objective relate to the protection of beaches for public use and recreation. The proposed soccer park will include physical improvements that are located away from the shoreline where no coastal and offshore waters would be directly impacted.

4.7.10 Marine Resources

The objective and corresponding policies of "Marine Resources" relate to implementing the State's ocean resources management plan. The proposed soccer park is a land-based development that will not directly affect ocean resources.

4.8 SPECIAL MANAGEMENT AREA

The soccer park project is not subject to Special Management Area (SMA) use permit requirements since (1) lands owned by the federal government are not subject to state planning and regulatory processes, as such lands are excluded from the definition of coastal zone under the Coastal Zone Management Act of 1972; and (2) actions taken by the federal government involving federal lands within the coastal zone (in this case, lease of federal property for development of the project) are not subject to City and County of Honolulu SMA permitting requirements. The project is subject to the Coastal Zone Management (CZM) consistency review process, as explained in Section 4.7.

4.9 COMMISSION ON WATER RESOURCE MANAGEMENT

A stream diversion works permit, required for new diversions or when existing diversions are modified, will have to be obtained from the Commission. Well permits will also be required. No alterations to the stream bed or banks are planned, so a stream channel alteration permit is not required.

CHAPTER 5
TOPICAL ISSUES

5.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

The Waipio Peninsula Soccer Park site possesses a number of physical attributes that make it desirable for park development. These attributes include relatively flat useable land, ocean and mountain views, relatively calm wind conditions, and warm climate. The special studies performed as part of this EIS have also determined that the proposed project is compatible with the existing natural environment and overall, will enhance the use and appearance of the area.

During the site analysis stage of the EIS preparation, it was determined that there would be no short-term exploitation of resources that could generate long-term negative consequences. Overall, the proposed soccer park will have long-term benefits to future generations, including the productive use of land presently not in use, the provision of recreational facilities to serve central Oahu residents and visitors, and the provision of economic and social benefits.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Development of the proposed project will result in the irreversible and irretrievable commitment of certain natural, human, and fiscal resources. Major resource commitments will include the land on which the project is to be developed, as well as monies for construction, construction materials, manpower, and energy.

A significant portion of the property will remain as open space, so the commitment of land is partially mitigated.

5.3 PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED AND OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

The City and County of Honolulu has long recognized the need for additional sports facilities, especially playing fields, throughout the island. The Waipio Peninsula Soccer Park will serve the anticipated regional resident population and visitor growth over the next 10 to 15 years, as well as provide a venue for local and regional soccer groups to train and compete, and to attract world-class soccer teams for year-round training for regional, national, and international tournaments. The project will help alleviate the present shortage of soccer fields for youth groups in the Waipahu, Pearl City, Aiea, and other Central Oahu communities, as well as provide a recreational activity site for both residents and visitors. The soccer park will provide a unique opportunity to develop a training and competition soccer facility for Oahu's athletes, including military personnel and their dependents, to improve their level of play while attracting the international sports community. This project, in conjunction with other proposed and existing sports-related projects, will allow the State and City and County of Honolulu to continue to attract and host international sporting events, thereby increasing the number of visitors to the State and providing direct recreational benefits to the residents of Oahu.

5.4 UNRESOLVED ISSUES

Various issues have been raised during the preliminary meetings and earlier correspondence with the community. Notably, the outcome to some of these issues cannot be known in detail until final design or development actually occurs, particularly in Phase 2 which depends on the availability of future funding. It is expected, however, that all of the issues can be resolved without undue difficulty through mitigation measures.

The following are issues that remain unresolved. They are primarily design, permitting, or operational issues.

- Extent and timing of surface street improvements
- Availability and use of public funding for Phase 2
- Landfill closure and permitting issues (Phase 2)
- Special event and management requirements to minimize noise impacts
- Issues relating to reuse of the Waipahu Incinerator Building, such as the presence of potential hazardous materials
- Lease of State lands in Phase 2

Several of the issues identified in the DEIS have been resolved as planning and design have progressed.

CHAPTER 6
CONSULTED PARTIES AND COMMENTS ON THE EIS PREPARATION NOTICE

The City and County of Honolulu Department of Design and Construction consulted with the agencies listed below in the preparation of this EIS. Agency responses to the EISPN follow this list. (Note: Many of the City and County of Honolulu agency names have changed since the EISPN for the proposed soccer park was prepared and reviewed. The new department names are shown in parentheses next to the previous names.)

U.S. Government:

- Department of the Navy: Commander Naval Base Pearl Harbor (COMNAVBASE)
- Federal Aviation Administration
- Federal Communications Commission
- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Army Corps of Engineers, Pacific Ocean Division

State of Hawaii:

- Department of Transportation
- Department of Business, Economic Development and Tourism
- Department of Land and Natural Resources
- Department of Health
- Office of Hawaiian Affairs
- State Parks Division, Department of Land and Natural Resources
- Department of Hawaiian Home Lands

City and County of Honolulu

- Office of the Mayor
- Office of the Managing Director
- Planning Department
- Department of Public Works (Department of Facility Maintenance)
- Department of Land Utilization (Department of Planning and Permitting)
- Department of Transportation Services
- Department of Parks and Recreation (Department of Parks and Recreation Services)
- Board of Water Supply
- Police Department
- Fire Department
- Department of Wastewater Management (Department of Environmental Services, Division of Wastewater Management)

Community Groups:

- Waipahu Neighborhood Board
- Waipahu Business Association
- Soccer Committee of the Mayor's Public-Private Partnership Sports Task Force

BENJAMIN J. CAYETANO
GOVERNOR

FILE COPY

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

December 17, 1997

Mr. Randall K. Fujiki, Director
Building Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: EISPN for the Waipio Peninsula Sports Complex, Oahu

Thank you for the opportunity to review the subject document. We have the following comments.

1. The DEIS should describe whether any rare or migratory wildlife overfly the project site and determine whether the animals would be disturbed or disoriented by any bright outdoor lights from the stadium or parking lot. If appropriate, mitigation measures to reduce any impact should be proposed.

2. The project is located next to the West Loch of Pearl Harbor. Please describe whether the project will impact the Wildlife Refuge at West Loch or any endangered species in the area.

3. A portion of the proposed site is located on lands previously used for disposal of waste from the Waipahu mill and incinerator. The site potentially includes toxic and hazardous materials including but not limited to volatile organics, semi-volatile organics, and dioxin. Please analyze the soils to determine environmental and health risks associated with the potentially toxic and hazardous materials and decide if cleanup is necessary.

4. It is well known that turf grass is difficult to grow at the nearby Ted Makalena Golf Course. We suspect that playfield turf will receive more stress than golf fairways. Please assess the agronomical conditions of the site, including soil types, agricultural uses, soil ratings, climatic conditions, and availability of water to determine the viability of growing and maintaining turf grass for soccer use at this location.

If you have any questions, please call Jeyan Thirugnanam at 586-4185. Thank you.

Sincerely,

Gary Gill
Director

c: Stringer Tusher Architects, Inc.

Stringer Tusher Architects Incorporated AIA

July 31, 1998

Mr. Gary Gill, Director
Office of Environmental Control
State of Hawaii
236 South Beretania Street, Suite 702
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Soccer Park Draft Environmental Impact Statement**

Dear Mr. Gill:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be addressed in the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

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February 6, 1998
98EP-019

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STRINGER TUSHER & ASSOC.

Mr. Ralston Nagata
State Parks Division
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Nagata:

Environmental Impact Statement Preparation Notice for Waipio Peninsula Sports Complex

The City and County of Honolulu is proposing to develop a sports complex with an emphasis on soccer fields on approximately 200 acres at Waipio Peninsula in Waipahu. The City and County Building Department has determined that the proposed project and possible future related but separate projects may have significant environmental effects. For this reason, it was determined that an Environmental Impact Statement, prepared in compliance with the requirements of Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200 Hawaii Administrative Rules, will be required. In accordance with these rules, an Environmental Impact Statement Preparation Notice (EISPN) was prepared and published in the *Environmental Notice* on November 23, 1997.

Enclosed is a copy of the EISPN for your review. Written comments are being accepted through March 8, 1998, 30 days after the date of this letter. Please address comments to:

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813
(808) 531-5967

Sincerely yours,

BELT COLLINS HAWAII LTD.

Lesley Matsumoto
Environmental Scientist

No comments.

RALSTON NAGATA, State Parks Administrator

Date: 2/18/98

LM:lf

Enclosure

680 ALA MOANA BOULEVARD, FIRST FLOOR, HONOLULU, HAWAII 96813-5406 U.S.A., TEL: 808 521-5361 FAX: 808 538-7819

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Ralston Nagata, Administrator
State Parks Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, HI 96813

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Nagata:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ANTHONY J. LOPEZ, JR
FIRE CHIEF

ATTILIO K. LEONARDI
FIRE DEPUTY CHIEF

February 10, 1998

RECEIVED
FEB 16 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Environmental Impact Statement Preparation Notice for
Waipio Peninsula Sports Complex
HFD Internal No. 98-053

In response to correspondence dated February 6, 1998, received from Lesley Matsumoto of Belt Collins Hawaii Ltd., we have no comments to offer on the Environmental Impact Statement Preparation Notice for the subject property.

Should you have any questions, please call Battalion Chief Charles Wassman of our Fire Prevention Bureau at 831-7778.

Sincerely,

ANTHONY J. LOPEZ, JR.
Fire Chief

AJL:mpn

Route to:	
	09
cc	tt
cc	Chron
File:	
File #:	
Return to:	

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Anthony J. Lopez, Jr., Fire Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, HI 96819-1869

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Lopez:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

PHONE (808) 594-1888 FAX (808) 594-1865

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

RECEIVED
FEB 16 1998
STRINGER TUSHER & ASSOC.

February 12, 1998

David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, HI 96813

DOC NO: EIS-147

Subject: Environmental Impact Statement Preparation Notice for the Waipio Peninsula Sports Complex.

Dear Mr. Ayer:

Thank you very much for giving us the opportunity to review the Environmental Impact Statement Preparation Notice (EISPN) for the above-referenced project. The City and County of Honolulu proposes to develop a sports complex with an emphasis on soccer fields on approximately 200 acres at Waipio Peninsula in Waipahu.

The Office of Hawaiian Affairs' (OHA's) main areas of concern for developments triggering an Environmental Impact Statement include, but are not limited to, loss of agricultural lands, potential adverse impacts to cultural and archaeological resources, ecosystems and associated wildlife habitats, air and water quality, and public health and safety.

At this time OHA has no objections to the EISPN. However, OHA intends to thoroughly review the Draft Environmental Impact Statement when it becomes available for public review.

Please contact Colin Kippen, Land and Natural Resources Division Officer, or Richard Stook, EIS Planner at 594-1755, should you have any questions regarding this matter.

Sincerely yours,

Randall Ogata
Administrator

Colin Kippen, Division Officer
Land and Natural Resources

cc: Board of Trustees

Route to:	
	Oa
cc	TT
cc	Chron

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Randall Ogata, Administrator
Mr. Colin Kippen, Division Officer
Land and Natural Resources
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Ogata and Mr. Kippen:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

JG — File Bd: 941.1000

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111

JEREMY HARRIS
MAYOR

RECEIVED
FEB 19 1998
STRINGER TUSHER & ASSOC.

	DO
cc	TT
cc	Chron
File:	
File #:	
Return to:	

LEE D. DONOHUE
ACTING CHIEF

WILLIAM B. CLARK
DEPUTY CHIEF

OUR REFERENCE BS-DL

February 17, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Thank you for the opportunity to reply to the EIS Preparation Notice for the Waipio Peninsula Sports Complex. We have several concerns about the project, as we noted in a letter one year ago to the City Planning Department.

Noise

The Honolulu Police Department's Training Academy generates a significant amount of noise both day and night. The squealing of tires, blaring of sirens, and other vehicle noise is associated with recruit training. Police dogs housed at the Academy bark sporadically.

Traffic

Waipahu Depot Road is poorly maintained, pot-holed, and without sidewalks. Residents are forced to walk in the narrow roadway and there have been many near-misses. Businesses often park large trucks, trailers, and other heavy equipment along this short stretch of road for weeks at a time. Access to the Convenience Station is dangerous, as vehicles turn across two lanes of opposing traffic to enter. Waipahu Depot Road frequently floods to a depth of two feet of standing water. Major improvements to the road would be needed if it is to be used in any way for access to the peninsula.

Academy Grounds

City planners have indicated an interest in taking a portion of the Training Academy grounds for a soccer stadium. We are strongly opposed to this.

Firing Range

It is likely that an indoor firing range will eventually be built on the Training Academy grounds. Bullets and noise should be contained in a properly constructed range.

Should you have any further inquiries, please call Major William Gulledge of the Training Division at 677-1474.

Sincerely,

LEE D. DONOHUE
Acting Chief of Police

By JAMES FEMIA, Assistant Chief
Administrative Bureau

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. James Femia, Assistant Chief
Administrative Bureau
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Femia:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

Federal Communications Commission
Compliance and Information Bureau
Washington, D.C. 20554
February 26, 1998

RECEIVED
1998 MAR -4 P 1:19
BELT COLLINS HAWAII

Lesley Matsumoto
Belt Collins Hawaii LTD.
680 Ala Moana Boulevard
First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Matsumoto:

This is in reply to your February 6, 1998 letter addressed to the Federal Communications Commission's (FCC) radio monitoring facility in Waipahu, Hawaii. Our facility in Hawaii has forwarded your letter to us, the Federal Communications Commission, Compliance and Information Bureau, Technology Division, Washington, D.C. 20554. Please address any future correspondence directly to us at this address.

The FCC maintains an operational radio direction-finding and monitoring station on FCC-owned U.S. Government property adjoining (along some of the Eastern portion of the North boundary) the approximate 200 acre site you show proposed for a sports complex. Although our property is shown (i.e., property with two antenna fields) on the site maps you've enclosed, your November 1997 Environmental Impact Statement Preparation Notice, item 3, AGENCIES CONSULTED, does not include listing the FCC.

Your letter, including its enclosure, does not provide specific information concerning the extent or details of proposed constructions on the property. Some types and locations of constructions may have no detrimental impact on the monitoring station's operations, while others may be extremely detrimental. Therefore we request that the FCC be included in your list of U.S. Government Agencies and that you provide specific information concerning any proposed constructions on, over, and under, the property. Without this information we are unable to specifically provide the comments you request.

The FCC performs its radio monitoring duties from this monitoring station on the Waipio Peninsula in Waipahu, Hawaii in association with our other radio monitoring stations throughout the country. The duties of our monitoring stations include essential operations related to protection of life and property. By international treaty, International Telecommunications Union (ITU) radio monitoring stations are constructed and maintained to technical standards recommended by the International Radio Consultative Committee (CCIR).

Radio monitoring stations require protection from strong radio signals and radio frequency interference. Radio signal levels impinging on a monitoring station at a level of 10 mV/m, or stronger, are subject to FCC review and possible restriction. Interference can also be produced by non-radio sources, for example, electrical power lines and lighting systems.

For the lower power types of radio transmitters the area of concern is usually within a radius of 3 miles. For the site you propose adjoining the FCC's monitoring station property, this could restrict radio communication transmissions used for things such as radio and TV links to broadcast stations, security and maintenance operations requiring use of radio, and perhaps in areas near the FCC's property, restricting the use of cell telephones and other similar devices.

Radio monitoring and direction-finding stations must also be protected from nearby physical obstructions, both above and below ground, and surface terrain irregularities, that could disrupt the uniformity of a radio signal's traveling wave propagation. For example, electrically conducting structures (including a non-conductive structure with electrical wiring) must not exceed a height that's greater than 2° above horizontal as viewed from the center of the FCC's high frequency radio direction-finding antennas located at 21° 22' 45" N. Latitude by 157° 59' 54 W. Longitude (NAD 27). Fencing or other constructions located within several hundred feet of this location, even if below the 2° limit, may not be tolerable. It's necessary for long fencing in the area to be height limited to just a few feet and for it to be made of non-conductive materials.

The items mentioned in this letter are just samples of concerns that would need to be reviewed in specific detail before the FCC could suitably comment on the technical aspects of the possible disruptions the construction of a sports center may cause. We are also concerned about protection of our property from trespass.

Lacking specific construction details provided to us for our detailed review for technical concerns, the Federal Communications Commission must object to the constructions and land alterations proposed. If you provide detailed design plans, we'd be able to provide more definitive comments. We'll also review and comment on preliminary design plans or sketches you may have. These problems may be resolved by adequate spacing from our property, or may have other technical solutions.

If you would like to informally discuss this matter, or have questions, you may contact Jeff Anderson, or me, at (202) 418-1210.

Sincerely,

Kenneth R. Nichols

Kenneth R. Nichols
Chief, Technology Division

cc: XD-6/HL
Ryan Hagihara/HL
Serge Marti-Volkoff

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Kenneth R. Nichols
Chief, Technology Division
Compliance and Information Bureau
Federal Communications Commission
Washington, DC 20554

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Nichols:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

U.S. Department of Transportation
Federal Aviation Administration

Western-Pacific Region

Box 50109
Honolulu, HI 96850-4983

February 17, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

By letter from Ms. Lesley Matsumoto of Belt Collins Hawaii Limited of February 6, 1998, the City and County of Honolulu requested comments on its Environmental Impact Statement Preparation Notice (EISPN) for its proposed Waipio Peninsula Sports Complex.

The Federal Aviation Administration has no comments regarding the EISPN or the subject project.

We appreciate this opportunity to review this project. If there are any questions, please contact me at 541-1236.

Sincerely,

Darice B. N. Young

Darice B. N. Young
Realty Contracting Officer, AHNL-54B1

RECEIVED
FEB 19 98
STRINGER TUSHER & ASSOC.

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Ms. Darice B. N. Young
Realty Contracting Officer, AHNL-54B1
Federal Aviation Administration
U.S. Department of Transportation
Box 50109
Honolulu, HI 96850-4983

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Ms. Young:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BENJAMIN J. CAYETANO
GOVERNOR

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

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
STP 8.8414

February 19, 1998

RECEIVED
FEB 23 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayers:

Subject: Environmental Impact Statement Preparation Notice for Waipio Peninsula Sports Complex

Thank you for the transmittal of February 6, 1998, requesting our comments on the subject document.

The proposed project will significantly affect our State highway facilities. A Traffic Impact Analysis Report (TIAR) and a contingency Traffic Control Plan (TCP) should be prepared and submitted for our review and comment. These documents should be based upon the entire sports complex.

The TIAR should quantify anticipated traffic impacts at the routine and event level. It should discuss roadway improvements and other traffic mitigation measures needed for routine operations including local events at the proposed sports complex. Additionally, the TIAR should also specify improvements needed to facilitate implementation of the TCP during major events, such as national and international events, which may pose unusual demands on the existing transportation infrastructure. The TCP should identify measures to handle traffic flow to and from the sports complex during major events that would minimize inconvenience to the general public.

Any improvements to State facilities must be provided without cost to the State Department of Transportation.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

c: Lesley Matsumoto, Belt Collins Hawaii, LTD.

	IDA
cc	TT
cc	Chron

Stringer Tusher Architects
Incorporated AIA

March 25, 1998

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

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Hayashida:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

RECEIVED
FEB 24 1998
STRINGER TUSHER & ASSOC.

MICHAEL D. WILSON
CHAIRPERSON

ROBERT G. GIRALD
DAVID A. NOBRIGA
LAWRENCE H. MIIKE
RICHARD H. COX
HERBERT M. RICHARDS, JR.

EDWIN T. SAKODA
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

February 20, 1998

DA
cc TT
cc Chm

File:
File #:
Return to:

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, HI 96813

Dear Mr. Ayer:

SUBJECT: Environmental Impact Statement Preparation Notice for Waipio Peninsula Sports Complex

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

[x] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[x] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[x] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows which may require an instream flow standard amendment.

Mr. David Ayer
Page 2
February 20, 1998

[ ] We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.

[x] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[x] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[x] OTHER:

Section 7.7 of the report states irrigation and potable water service for the project will require development to the site. The project is located within the boundaries of the Waipahu-Waiawa Aquifer System, which has been designated a water management area. As such, a water use permit from the Commission on Water Resource Management (Commission) would be required prior to any use of groundwater at the site, unless the required water is to be provided from the Board of Water Supply's municipal water system. We recommend that section 8.2 be revised to indicate the requirement for a water use permit, if the preferred or alternative plans include additional well water development.

The sustainable yield of the Waipahu-Waiawa Aquifer System is expected to decrease due to the cessation of sugarcane return irrigation recharge. We are in the process of re-evaluating the sustainable yield and will be proposing a new reduced estimate for adoption by the Commission. The Commission is deferring action on all applications for water use permits and water reservations in Waipahu-Waiawa pending the staff's review of the aquifer's sustainable yield. Pending completed applications, which may be in competition for available ground water, total over 9 million gallons per day.

In general, the Commission strongly encourages the use of nonpotable water for irrigation where no adverse impacts to water resources will result. The underlying geology is comprised of low permeability caprock and higher permeability basalt. The basal aquifer underlying Waipio Peninsula is nonpotable from a drinking-water point-of-view. Caprock ground water, which is derived from the basaltic aquifer is also nonpotable, which suggests that this site may be a good candidate for wastewater reuse.

If there are any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

Edwin T. Sakoda
EDWIN T. SAKODA
Acting Deputy Director

LN:ss

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Edwin T. Sakoda, Acting Deputy Director
Commission of Water Resource Managment
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, HI 96809

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Sakoda:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4341 • FAX: (808) 527-5857

JEREMY HARRIS
MAYOR

JONATHAN K. SHIMADA, PhD
DIRECTOR AND CHIEF ENGINEER

RECEIVED
FEB 20 1998
STRINGER TUSHER & ASSOC.
ENV 98-050

Route to:	
cc	TT
cc	Chron
File:	
Return to:	

February 20, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc., AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Environmental Impact Statement Preparation Notice (EISPN), Waipio Peninsula Sports Complex
TMK: Various

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

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

2. The draft environmental impact statement (DEIS) should identify portions of the project site previously used for disposal of mill waste wash water and sediments, and sites of potential ash deposits from the Waipahu Incinerator. The DEIS should also address potential impacts including disposal or capping, if applicable.

Should you have any questions, please contact Mr. Alex Ho, Environmental Engineer, at 523-4150.

Very truly yours,

JONATHAN K. SHIMADA, PhD
Director and Chief Engineer

cc: Belt Collins Hawaii (Lesley Matsumoto)

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Jonathan K. Shimada, Ph.D.
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, HI 96813

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Shimada:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

RECEIVED
MAR -2 1998
STRINGER TUSHER & ASSOC.

98-01008(ST)
'98 EA Comments Zone 9

February 27, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Environmental Impact Statement Preparation Notice (EISPN):
Waipio Peninsula Sports Complex
Waipio, Ewa, Oahu
Tax Map Keys: 9-3 various

We have reviewed the EISPN for the above-referenced project transmitted by your letter dated February 6, 1988, and provide the following comments:

- Section 5.3 Project Description - The Draft Environmental Impact Statement (EIS) should include an exhibit illustrating the proposed project site relative to existing property boundaries (i.e., Tax Map Keys). We note that the Project Site Map (Figure 2) indicates that mangrove, fishpond and harbor areas are included in the project site.

- Section 8.2 Required Permits and Approvals - We confirm that a Major Special Management Area Use Permit would be required for this project.

  However, the Draft EIS should disclose that if most of the project site remains designated within the State Agricultural Land Use District (i.e., no reclassification is sought), a State Special Use Permit (SUP) would be required pursuant to Chapter 205, Hawaii Revised Statutes. Furthermore, insofar as the proposed complex is greater than 15 acres (approximately 200 acres), the SUP would be subject to approval by the State Land Use Commission (LUC).

Lastly, there are portions of project site, indicated in Figure 2, which are located within the State Land Use Conservation District. As such, development of those areas would necessitate the approval of a Conservation District Use Application (CDUA) by the State Department of Land and Natural Resources.

To clarify any SUP and/or CDUA requirements, we suggest that the LUC be consulted on the Land Use Districts Boundaries relative to the actual project site.

Thank you for the opportunity to comment on this matter. We look forward to reviewing the Draft EIS when it is completed.

Should you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

JAN NAOE SULLIVAN
Director of Land Utilization

JNS:am

cc: Building Department

g:\ppd\eispnwa3.sht

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Ms. Jan Naoe Sullivan, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Ms. Sullivan:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

March 2, 1998

98-030/epo

RECEIVED
MAR - 6 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

subject: Environmental Impact Statement Preparation Notice
Proposed Waipio Peninsula Sports Complex
Waipio Peninsula, Oahu

Thank you for allowing us to review and comment on the subject document. We do not have any comments to offer at this time. However, we would very much like to receive a copy of the Draft Environmental Impact Statement.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Bruce S. Anderson, Ph.D.
Deputy Director, Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, HI 96801

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Dr. Anderson:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

OFFICE OF PLANNING
235 South Beretania Street, 6th Flr., Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Tel.: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-7230

March 2, 1998

RECEIVED
MAR - 9 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc., AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Waipio Peninsula Sports Complex, Oahu

This is in response to your environmental impact statement preparation notice (EISPN) for the sports complex at the Waipio Peninsula.

According to the EISPN, the proposed sports complex will be situated between West and Middle Lochs in Pearl Harbor. Given the proximity to the shore, there are questions about whether coastal water quality will be degraded by polluted runoff and whether appropriate mitigation measures can be implemented. A primary objective of the Coastal Zone Management (CZM) law, Chapter 205A, Hawaii Revised Statutes, is to protect coastal ecosystems and minimize adverse impacts to water quality. Therefore, we recommend that a thorough discussion of this issue and the project's conformance with the CZM objectives and policies be incorporated into the EIS.

If there are any questions, please contact Charles Carole of our CZM Program at 587-2804.

Sincerely,

Rick Egged
Director
Office of Planning

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Rick Egged, Director
Office of Planning
Department of Business, Economic Development
and Tourism
State of Hawaii
P. O. Box 2359
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Egged:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

RECEIVED
1998 MAR -9 P 1:33

LM
JG
DR

Bell, J.	
Hirota, P.	
Vieira, J.	
Agena, L.	
Wallrabenstein, P.	
Billingsley, W.	
Goodyear, B.	
... R.	
... A.	
Kondo, C.	
Lee, L.	
Miyashiro, E.	
Onishi, T.	
Palesh, C.	
PB-98-135	
Tyau, C.	
Yokota, A.	
Uehara, D.	
Yonamine, T.	
Yoshinaga, J.	
Job No.	

974110

March 4, 1998

Commander, Pacific Division
Naval Facilities Engineering Command
Pearl Harbor, Hawaii 96860-7300

Attn: Ms. Cheryl Connett, Code 24

Dear Ms. Connett:

Subject: <u>Proposed City and County of Honolulu Waipio Peninsula Sports Complex</u>

We have forwarded for your review under separate cover, planning documentation for an environmental baseline study at the Waipio site. We would like to meet with you to discuss any comments you may have on this documentation and to begin the environmental assessment (EA) process for leasing Federal land.

It is our understanding that the proposed action of the EA is the use of Navy land and that the alternatives are no action, leasing for the proposed sports complex, leasing for agricultural activities, and possibly other uses. The purpose and need for the action is to make beneficial use of land encumbered by ESQD constraints that is consistent and compatible with Navy ordnance operations. With regard to preparing the EA, we would also like to discuss project scheduling, including timing of reviews and informational content of the EA.

If possible, we would appreciate meeting with you on March 9 or 10, 1998. The meeting would be attended by representatives of our office as well as representatives of our consultant team. We believe that our joint agreement on these matters early in the process will make the process more efficient and responsive to your requirements.

Thank you for your help and cooperation. Please advise Clay Ching, at 527-6358, if one of the above meeting dates is agreeable.

Very truly yours,

for RANDALL K. FUJIKI
Director and Building Superintendent

CC:li
cc: Stringer Tusher Architects (David Ayer)
Belt Collins Hawaii (Paul Wallrabenstein)

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Randall Fujiki
Director and Building Superintendent
Building Department
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Fujiki:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

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

March 5, 1998

RECEIVED
MAR 6 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Environmental Impact Statement (EIS) Preparation Notice for Waipio Peninsula Sports Complex

Please address the following items in the EIS for the proposed project:

1. Need for the project; anticipated recreation capacity and service area; anticipated frequency and levels of use; by whom; turf durability.

2. Alternative sites available and current levels of use; other facilities being planned.

3. Facility layout plan and potential hazards from ash landfill or cane wash discharge.

4. Relationship of planned 3,000 parking spaces to soccer activities.

5. Cost of capital improvements and means of financing.

6. Proposed management and estimated costs for operations, maintenance and repairs.

7. Risks, if any, of location within explosive safety buffer zones; emergency plans.

8. Other possible future related projects that may contribute to cumulative environmental impacts. Any plans for adjusting land uses on the Ted Makalena Golf Course site?

Thank you for the opportunity to review and comment. If you have any questions, call Joe Chu of our Planning Office at 586-3836.

Aloha,

Kali Watson

KALI WATSON, Chairman
Hawaiian Homes Commission

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Kali Watson, Chairman
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, HI 96805

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Watson:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

Dave Ayer

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

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

IN REPLY REFER TO:
5090.1F
Ser N42(23)/ 4473
March 5, 1998

RECEIVED
MAR - 9 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subj: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN) FOR WAIPIO PENINSULA SPORTS COMPLEX

Thank you for providing us with the opportunity to review and comment on the subject EISPN. The Navy's review comments are provided as enclosure (1) for your use in preparing the Environmental Impact Statement (EIS).

I am the Navy's point of contact and can be reached at 474-0439 or by facsimile transmission at 474-2328. Any future correspondence on this subject may be sent to me at Commander, Naval Base Pearl Harbor, Attn: N40, Box 110, Pearl Harbor, HI 96860-5020.

Sincerely,

STANFORD H. C. YUEN, P.E.
Deputy Engineer
By direction of
Commander, Naval Base, Pearl Harbor

Encl: 1. Review Comments

Copy to:
Mr. Warren Sato
City and County of Honolulu
Building Department
650 South King Street, Second Floor
Honolulu, HI 96813

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
FOR WAIPIO PENINSULA SPORTS COMPLEX
Review Comments from U.S. Navy
February 24, 1998
Page 1 of 3

No.	Section	Comment
1	3, Agencies Consulted	Attached is a list of agencies to be consulted during the preparation of the Federal EA. The list was previously provided to the City and County of Honolulu, Building Department in the Navy's letter 5090.1F Ser N40(23)/4440 of February 6, 1998. The revised list is forwarded for your use. The Navy recommends using the list to supplement the agency listing identified in the EISPN.
2	4, Related Documents	Include a "Municipal Solid Waste Landfill (MSWLF) Closure Plan" if project will be located on the former ash landfill. Also, if the project is adjacent to the former ash landfill, recommend a MSWLF Closure Plan if pathways from the former ash landfill are identified as possible human health risk factors in the Risk Assessment.
3	5.3, Project Description	The federal reservation is being used by the Federal Communications Commission (FCC) vice Federal Aviation Administration (FAA).
4	5.3, Project Description	Add item "11. Landfill closure and post closure requirements to include a MSWLF Closure Plan in accordance with 40 CFR 258 and State Administrative Rule (HAR) 11-58.1-17" if project will be located on the former ash landfill, or if the project is adjacent to the former ash landfill and pathways from the former ash landfill are identified as possible human health risk factors in the Risk Assessment.
5	5.3, Project Description	This section states that separate, but related projects, may include closure of an ash landfill formerly used by the closed City and County Waipahu incinerator. If the former ash landfill will be an integral part of the sports complex as indicated in Figure 2, proper closure of the landfill should be addressed in the EIS as part of the proposed action and not as a separate project.
6	7, Summary Description of the Affected Environment	This section should include cumulative impacts from other proposed developments on Waipio Point Access Road on traffic, drainage, and infrastructure requirements.
7	7.1, Geology, Soils, and Physiography	1st paragraph. Please clarify the sentence which states that a portion of the proposed action site would be located on potential ash deposits from the Waipahu Incinerator. Does this sentence mean to say that the site may potentially include the ash landfill or does it mean to say that there are latent ash deposits on Waipio Peninsula?
8	7.2, Biological Environment	Third sentence. Spelling for "within."
9	7.4, Noise Quality	The Navy activity referred to is Naval Inactive Ship Maintenance Facility (NISMF) vice Inactive Ship Detachment facility.

Enclosure (1)

FOR WAIPIO PENINSULA SPORTS COMPLEX
Review Comments from U.S. Navy
February 24, 1998

No.	Section	Comment
10	8.2, Required Permits and Approvals	Under Direct Project Specific Permits and Approvals for Federal, add the following: - Environmental Baseline Survey (EBS) to include a Risk Assessment and Finding of Suitability to Lease (FOSL) - MSWLF Closure Plan (if project will be located on the former ash landfill)
11	9, Summary of Anticipated Environmental Effects	The EIS should include a discussion of the following: 1) Impact to drainage/storm water runoff 2) Impact to water quality from the proposed use of pesticides and fertilizers 3) Impact to security of the rest of Waipio Peninsula.
12	9.2, Operational Phase	Biological Impacts. The EIS should also study potential impacts on endangered waterbirds living in the adjacent wetlands.
13	9.2, Operational Phase	Noise Impacts. Cheering and associated noise generated during sporting activities would be ongoing, although intermittent, but not temporary.

WAIPIO SOCCER PARK FEDERAL ENVIRONMENTAL ASSESSMENT
LIST OF AGENCIES TO BE CONSULTED
(Revised February 24, 1998)

FEDERAL AGENCIES

U.S. Fish & Wildlife Service (USFWS)
Federal Highways Administration (FHWA)
Federal Communications Commission (FCC)
Federal Aviation Administration (FAA)
Army Corps of Engineer (COE)

STATE AGENCIES

Department of Land and Natural Resources (DLNR)
State Historic Preservation Officer (SHPO)
Division of Forestry and Wildlife (DOFA)
Department of Transportation (DOT)
Department of Health (DOH)
Department of Education (DOE)
Department of Business and Economic Development (DBED)
Leeward Community College

DEPARTMENT OF THE NAVY

Naval Base (COMNAVBASE) Pearl Harbor

OTHERS
Waipahu Neighborhood Board
Proposed Residential Development behind Waipahu High School (Kauhale Kai Limited Partnership)

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Stanford B. C. Yuen, P.E.
Deputy Engineer
Commander, Naval Base Pearl Harbor
Box 110
Pearl Harbor, HI 96860-5020

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Yuen:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

DEPARTMENT OF WASTEWATER MANAGEMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 527-6663 • FAX: (808) 527-6675

JEREMY HARRIS
MAYOR

RECEIVED
1998 MAR 10 A 11: 11
BELT COLLINS HAWAII

KENNETH E. SPRAGUE, P.E., PH.D.
DIRECTOR

CHERYL K. OKUMA-SEPE, ESQ.
DEPUTY DIRECTOR

In reply refer to:
WCC 98-55

March 6, 1998

Ms. Lesley Matsumoto, Environmental Scientist
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Matsumoto:

Subject: **Environmental Impact Statement Preparation Notice for Waipio Peninsula Sports Complex**
TMK: 9-2-3: 1&14

The municipal wastewater system is available and adequate to accommodate the proposed project. Connection may be made directly to the Waipahu Wastewater Pump. Connection to an existing sewer line, such as the 8-inch sewer line on Awamoku Street, may be considered. Capacity of the system is dependent upon flow distribution and relief of existing sewer lines may be required. The Waipio Peninsula Sports Complex, totaling approximately 200 acres, will include 24 regulation size soccer fields, a soccer stadium, lockers, restrooms, maintenance support facilities and office space for the sports complex.

This statement shall not be construed as confirmation of sewage capacity reservation. Sewage capacity reservation is contingent on submittal and approval of a "Sewer Connection Application" form. This project is liable for payment of a Wastewater System Facility Charge.

If you have any questions, please contact Ms. Tessa Ching of the Service Control Branch at 523-4956.

Sincerely,

Cheryl K. Okuma-Sepe
for KENNETH E. SPRAGUE
Director

BELT COLLINS

July 31, 1998
98EP-156/9741.1000

Mr. Kenneth E. Sprague
Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Mr. Sprague:

Proposed City and County of Honolulu
Waipio Peninsula Sports Complex

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Environmental Scientist

LAM:lf

cc: David Ayer

BELT COLLINS HAWAII LTD. • 680 ALA MOANA BOULEVARD, FIRST FLOOR, HONOLULU, HAWAII 96813-5406 U.S.A.
TEL: 808 521-5361 FAX: 808 538-7819 EMAIL: honolulu@beltcollins.com WEB: www.beltcollins.com

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PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 8TH FLOOR • HONOLULU, HAWAII 96813-3017
PHONE: (808) 523-4533 • FAX: (808) 523-4950

JEREMY HARRIS
MAYOR

RECEIVED
MAR 10 1998
STRINGER TUSHER & ASSOC.

PATRICK T. ONISHI
CHIEF PLANNING OFFICER

DONA L. HANAIKE
DEPUTY CHIEF PLANNING OFFICER

LW 2/98-0250

March 9, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Environmental Impact Statement Preparation Notice (EISPN) for
Waipio Peninsula Sports Complex, 98EP-019

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

The EISPN noted that the subject site is designated on the Central Oahu Development Plan Public Facilities Map (DPPFM) as park/golf course, solid waste modification, and sewer improvements. In addition to the above designations, Ordinance No. 97-27 was adopted on June 12, 1997 to reflect the City's intent to develop a full-service soccer complex on the subject site. Pursuant to Ordinance 97-27, the subject site is also designated as Park, except for the State-owned portion of the ash field and the triangular portion at the northeast corner of the site (bounded on the north by the Federal Communications Commission site, on the south by the 100 percent ESQD line, and on the east by Waipio Point Access Road). To support the proposed project, the Central Oahu DPPFM also designates Waipio Point Access Road and Waipahu Depot Road for transportation improvements. Attached is copy of the ordinance.

If you have any questions, please contact Lin Wong of our staff at 523-4485.

Yours very truly,

PATRICK T. ONISHI
Chief Planning Officer

PTO:ft
Attachment

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

ORDINANCE 97-27
BILL 34 (1997), CD2

A BILL FOR AN ORDINANCE

TO AMEND PORTION OF THE DEVELOPMENT PLAN PUBLIC FACILITIES MAP FOR CENTRAL OAHU TO ADD A PUBLICLY FUNDED PARK SYMBOL, SITE DETERMINED, WITHIN SIX YEARS; A PUBLICLY FUNDED TRANSPORTATION SYSTEM SYMBOL FOR IMPROVEMENTS WITHIN EXISTING RIGHT-OF-WAY, WITHIN SIX YEARS; AND A PUBLICLY FUNDED TRANSPORTATION SYMBOL FOR ADDITIONAL RIGHT-OF-WAY AND NEW STREETS, WITHIN SIX YEARS, OAHU, HAWAII.

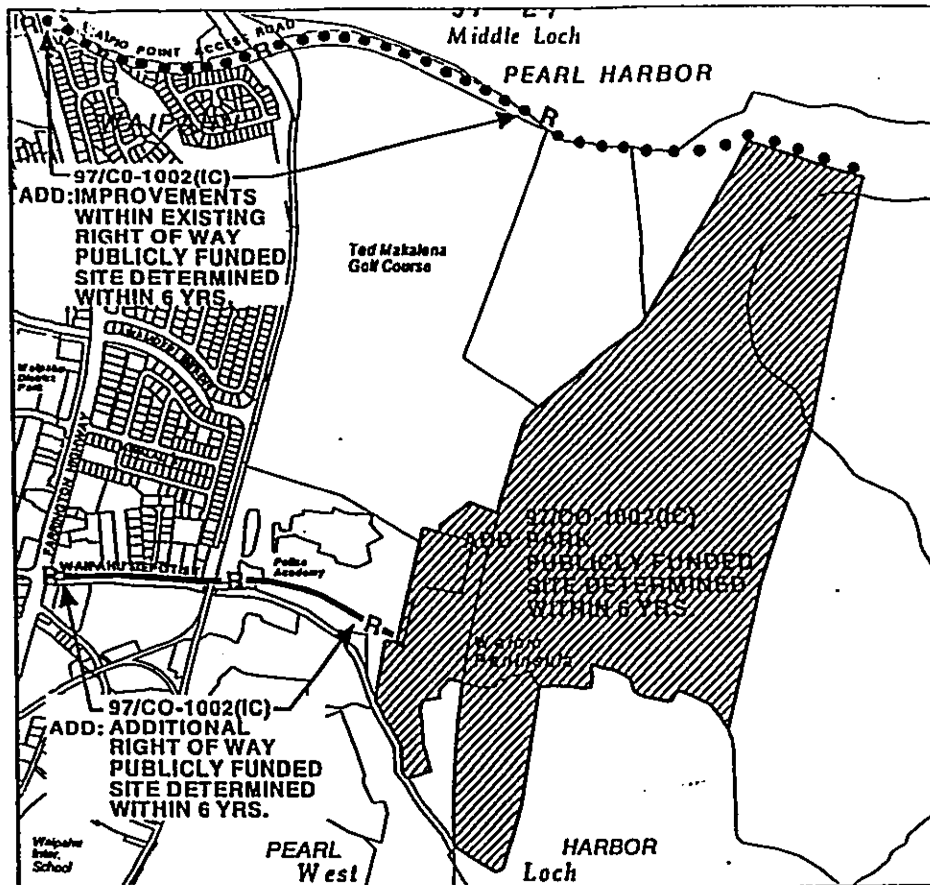
BE IT ORDAINED by the People of the City and County of Honolulu:

SECTION I. Portion of the Development Plan Public Facilities Map for Central Oahu is hereby amended by adding a publicly funded park symbol, site determined, within six years; a publicly funded transportation system symbol for improvements within existing right-of-way, within six years; and a publicly funded transportation system symbol for additional right-of-way and new streets, within six years, as shown on the map attached hereto, marked Exhibit A-2, and by reference made a part hereof.

SECTION II. These public facilities map symbols shall be deleted from the Public Facilities Map by administrative procedure once completion of the facilities has been certified in writing by the applicant/agency to the Planning Department and the City Council.

OCS00446.B97

97-27



AMENDMENT TO
DEVELOPMENT PLAN PUBLIC FACILITIES MAP
CENTRAL OAHU

PROJECT NAME: WAIPIO PENINSULA RECREATION COMPLEX
APPLICANT: BUILDING DEPARTMENT
FOLDER NO.: 97/CO-1002(IC)
TAX MAP KEY: 9-3-2: 2 & pors. 1, 9 & 28
PREPARED FOR: PLANNING DEPARTMENT
PREPARED BY: DEPARTMENT OF LAND UTILIZATION CITY AND COUNTY OF HONOLULU

0 500 1000
Scale in Feet

PUBLIC HEARING: PLANNING COMMISSION 2/26/97 CITY COUNCIL 5/7/97

ORD. NO. 97-27

97/PF-1

EFF. DATE: 6/12/97

EXHIBIT A-2

BILL 34 (1997), CD2

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Patrick T. Onishi -
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, HI 96813-3017

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Onishi:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX: (808) 523-4054

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

MICHAEL T. AMII
DEPUTY DIRECTOR

March 10, 1998

RECEIVED
MAR 13 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc., AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Environmental Impact Statement (EIS) Preparation Notice for Waipio Peninsula Sports Complex

We have reviewed the document referenced above. The proposed scope of the EIS appears to be adequate. We look forward to reviewing the draft EIS in the near future.

Please contact Mr. Terry Hildebrand, planner in our Advance Planning Branch, at 523-4246 if you have any questions or need further information.

Sincerely,

WILLIAM D. BALFOUR, JR.
Director

WDB:ei

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. William Balfour, Jr.
Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street, 10th Floor
Honolulu, HI 96813

Re: Proposed City and County of Honolulu Waipio Peninsula Sports Complex

Dear Mr. Balfour:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

RECEIVED
MAR 11 1998
STRINGER TUSHER & ASSOC.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services - Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 3-122
P.O. Box 50088
Honolulu, Hawaii 96850
Phone: (808) 541-3441
FAX: (808) 541-3470

MAR 10 1998

In Reply Refer To: EAS

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Re: Environmental Impact Statement Preparation Notice for the Proposed Waipio Peninsula Sports Complex, Waipio Peninsula, Central Oahu, Hawaii.

Dear Mr Ayer;

The U.S. Fish and Wildlife Service (Service) has reviewed the above referenced notice. The proposed project sponsor is the City and County of Honolulu. The proposed development entails building approximately 24 regulation size soccer fields, widening and constructing roadways, constructing a soccer stadium, constructing approximately 3,000 parking spaces, and constructing support facilities. The Service recommends that the following issues be addressed in the Draft Environmental Impact Statement (DEIS).

In order for the Service to fully evaluate the impact of the proposed development project on natural resources, we recommend that the DEIS adequately: 1) describe the proposed project and it's alternatives; 2) identify the resources in the environment that will be affected by the proposed project; 3) evaluate the anticipated impacts to those resources for each alternative; and 4) include appropriate mitigation for the anticipated impacts by avoiding unnecessary impacts, minimizing the necessary impacts, and compensating for unavoidable significant impacts. Enough detail should be provided on each of these topics for the Service to fully understand the effects and impacts of the proposed project on natural resources.

A primary concern of the Service is the possible project-related resuspension and exposure of contaminants to marine and terrestrial resources. We recommend that this possibility be thoroughly evaluated and discussed in the DEIS. Measures to contain sedimentation resulting from the proposed project and the impacts of additional lighting in the area on seabirds and waterbirds should also be evaluated in the DEIS.

The Service is also concerned that the proposed project site is located between the Waiawa and Honouliuli units of the Pearl Harbor National Wildlife Refuge. Historically, the wetlands within the proposed project site have been used extensively by endangered waterbirds. These wetland areas may also have been used by waterbirds as a connection/stopover between the two refuge units. Therefore, along with the wetland determination that will be conducted for this project, the Service recommends that the project area be evaluated for waterbird use.

Another issue that the Service recommends be evaluated in the DEIS is the impact that the potential project may have on Pouhala Marsh. Currently, a large cooperative restoration project is being conducted at Pouhala Marsh. This project has been undertaken through a partnership between Ducks Unlimited, Inc., the State of Hawaii, the City and County of Honolulu, and the Service to restore 70 acres of wetlands in Pearl Harbor's West Loch, which are very close to the proposed Sports Complex site (see enclosure).

The Service agrees with your intent to conduct a botanical survey and wetland delineation of the proposed action site, and we suggest that the results of these surveys and the additional surveys/evaluations that we have suggested above be included as appendices in the DEIS.

Thank you for the opportunity to review the DEIS Preparation Notice and provide our comments at such an early point in the develvopment of this project. Our office would appreciate the opportunity to conduct a site visit in order to provide you with more input. We look forward to reviewing the DEIS and offer our assistance in working with you to formulate adequate mitigation for this project. If you have any questions regarding our concerns, please feel free to contact Fish and Wildlife Biologist Elizabeth Sharpe at 808/541-3441.

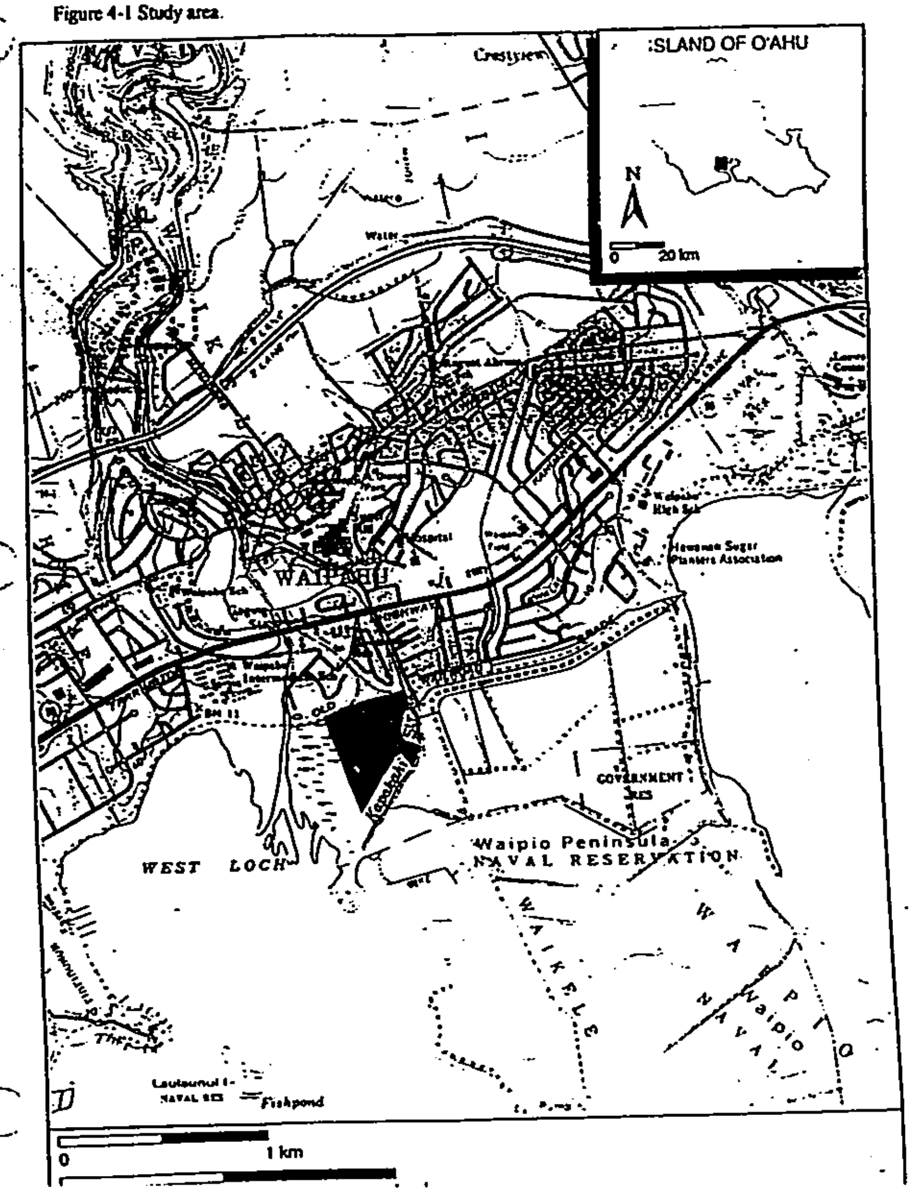
Sincerely,

Brooks Harper

Brooks Harper
Field Supervisor
Ecological Services

cc: USEPA, Honolulu
NMFS-PAO, Honolulu
DAR, Hawaii
DOFAW, Hawaii
CZMP, Hawaii
CWB, Hawaii

Figure 4-1 Study area.



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII
CERTIFICATE

ORDINANCE 97-27

BILL 34 (1997)

INTRODUCTION DATE: MARCH 6, 1997
INTRODUCED BY: MUFI HANNEMANN

		AYE	NO	A/E
1ST READING DATE: 3/12/97 REMARKS: Felix/Holmes - Bill passed 1st rdng. & ref'd. to EDPT. - 9.	BAINUM	X		
	FELIX	X		
	HANNEMANN	X		
	HOLMES	X		
	KIM	X		
	MANSHO	X		
	MIRIKITANI	X		
	YOSHIMURA	X		
	DeSOTO	X		
	TOTAL	[illegible]	[illegible]	[illegible]
2ND READING DATE: 5/7/97 PUBLICATION DATE: 5/17/97 DRAFT: CD1 COMMITTEE REPORT: EDPTCR-234 PUBLIC HEARING DATE: 5/7/97 PUBLICATION DATE: 4/26/97 REMARKS: Hannemann/Felix - Bill passed 2nd reading, as amended. - 7. Excused: Kim, Yoshimura. - 1. Public hearing held concurrently, closed and referred to EDPT.	BAINUM	X		
	FELIX	X		
	HANNEMANN	X		
	HOLMES	X		
	KIM			E
	MANSHO	X		
	MIRIKITANI	X		
	YOSHIMURA			E
	DeSOTO	X		
	TOTAL	[illegible]	[illegible]	[illegible]
3RD READING DATE: 5/28/97 DRAFT: CD2 COMMITTEE REPORT: EDPTCR-290 REMARKS: Hannemann/Felix - Bill passed 3rd rdng., as amended, & Findings of Fact approved. - 9.	BAINUM	X		
	FELIX	X		
	HANNEMANN	X		
	HOLMES	X		
	KIM	X		
	MANSHO	X		
	MIRIKITANI	X		
	YOSHIMURA	X		
	DeSOTO	X		
	TOTAL	[illegible]	[illegible]	[illegible]
ORDINANCE PUBLICATION DATE:				

Referred to: EDPT
Reference: D-196, 1997

I hereby certify that the above is a true record of action by the Council of the City and County of Honolulu on this BILL.

Genevieve G. Wong

GENEVIEVE G. WONG, CITY CLERK

JOHN DeSOTO, CHAIR AND PRESIDING OFFICER

97-27

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Brooks Harper
Field Supervisor
Ecological Services
Fish and Wildlife Services
U.S. Department of the Interior
300 Ala Moana Blvd., Room 3-122
P. O. Box 50088
Honolulu, HI 96850

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Harper:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

March 16, 1998

RECEIVED
MAR 20 1998
STRINGER TUSHER & ASSOC.

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

Dear Mr. Ayer:

Subject: Your Transmittal of February 6, 1998 on the Environmental Impact Statement Preparation Notice for the Waipio Peninsula Sports Complex, Waipio Point, Oahu, TMK: 9-3-02

Thank you for the opportunity to review the environmental document for the proposed sports complex.

We have the following comments to offer:

1. The Board of Water Supply will provide domestic water for the project. The availability of water will be determined when the Building Permit Applications are submitted for our review and approval. If water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

2. Water main extensions and/or improvements may be necessary to provide adequate fire protection.

3. The Waipio peninsula is located in the "Pass Zone" where the application of low quality irrigation water will not affect our potable water sources. We reserve further comment on the use of nonpotable water including reclaimed and brackish water for irrigation purposes until the submittal of the Draft Environmental Impact Statement which should address all impacts. We are currently working with the Building Department on the source for the nonpotable water for the sports complex.

4. The landscape plans should incorporate xeriscape or water efficient principles. This would include not only selecting drought tolerant/low water use plants, but also choosing an efficient irrigation system, such as a drip system. The irrigation system should also incorporate moisture sensors to prevent unnecessary irrigation.

5. There is an existing 8-inch water meter serving the project site.

6. If additional 3-inch or larger water meters are required, the construction drawings showing the installation of the meters should be submitted for our review and approval.

7. A Board of Water Supply approved Reduced Pressure Principle Backflow Prevention Assembly is required to be installed immediately after each water meter serving the project site.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

FOR RAYMOND ~~H. SATO~~
Manager and Chief Engineer

cc: Belt Collins & Associates

Stringer Tusher Architects Incorporated AIA

March 25, 1998

Mr. Raymond Sato
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Sports Complex**

Dear Mr. Sato:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be incorporated into the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

RECEIVED
JUN - 1 1998
STRINGER TUSHER & ASSOC.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND DIVISION
STATE PARKS
WATER AND LAND DEVELOPMENT

May 22, 1998

Mr. David Ayer
Stringer Tusher Architects, Inc. AIA
1100 Alakea Street, Suite 200
Honolulu, Hawaii 96813

LOG NO: 21552 ✓
DOC NO: 9805EJ14

Dear Mr. Ayer:

SUBJECT: **Chapter 6E-8 Historic Preservation Review: Environmental Impact Statement Preparation Notice: Waipio Peninsula Sports Complex**
Waipio, 'Ewa, O'ahu
TMK:9-3

Thank you for the opportunity to review the EISPN for this project. We apologize for the delay in our response. A review of our records shows that there are several historic sites in the project area including buried Hawaiian fishponds. The EISPN states that archaeological inventory survey will be conducted as part of the EIS process. We look forward to reviewing the archaeological report in order to determine the effect this project may have on historic sites.

Should you have any questions, please feel free to call Elaine Jourdane at 587-0014.

Aloha,

Don Hibbard, Administrator
Historic Preservation Division

EJ:jk

c: Lesley Matsumoto, Environmental Scientist, Belt Collins Hawaii, 680 Ala Moana Boulevard, 1st Floor, Honolulu, Hawaii 96813-5406

Stringer Tusher Architects Incorporated AIA

July 31, 1998

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, HI 96813

Re: **Proposed City and County of Honolulu Waipio Peninsula Soccer Park**
Draft Environmental Impact Statement

Dear Mr. Hibbard:

Thank you for your letter in response to the EISPN for the subject property. Your concerns and comments will be addressed in the Draft Environmental Impact Statement (EIS). A copy of the Draft EIS will be provided to you at the time of publication.

Please contact our office should you have any further questions or comments regarding this project.

Sincerely,

Stringer Tusher Architects, AIA, Inc.

David C. Ayer, AIA

cc: P. Wallrabenstein/Belt Collins Hawaii
file Waipio 1.6EIS

CHAPTER 7
COMMENTS ON THE DEIS

The DEIS was distributed to 114 interested parties, including government agencies, community organizations, and public libraries. The following is a list of agencies which responded to the request for comments on the DEIS. Copies of comment and response letters are presented in this chapter.

U.S. Government

U.S. Department of Agriculture, Natural Resources Conservation Division
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Geological Survey
Department of the Navy, Commander, Naval Base Pearl Harbor

State of Hawaii

Department of Accounting and General Services
Department of Business, Economic Development and Tourism
- Hawaii Community Development Authority
- Housing and Community Development Corporation of Hawaii
- *Office of Planning*

Department of Defense, Office of the Director Civil Defense
Department of Education
Department of Health
Department of Land and Natural Resources
- Commission on Water Resource Management
- Historic Preservation Division

Department of Transportation
Office of Environmental Quality Control

City and County of Honolulu

Board of Water Supply
Department of Environmental Services
Fire Department
Department of Parks and Recreation
Department of Planning and Permitting
Planning Department
Police Department

Others

Hawaiian Electric Company, Inc.

USDA

United States Department of Agriculture

Natural Resources Conservation Service

P.O. Box 50004
Honolulu, HI
96850

Our People...Our Islands...In Harmony

'98 SEP 14 A 9:50

September 11, 199.

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City & County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Impact Statement (DEIS) - Waipio Peninsula Soccer Park, Waipio Peninsula, O'ahu, Hawaii

We have reviewed the above-mentioned document and offer the following comment:

The site is on Prime Agricultural Lands and is zoned for agriculture. This area should remain in agriculture. The soccer park should be moved to an area with no Prime Agricultural Lands.

Thank you for allowing us to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. Gary Gill, Director, Office of Environmental Quality Control, 235 South Beretania Street, Room 702, Honolulu, Hawaii 96813-2437
Ms. Anne Mapes, Belt Collins Hawaii, 680 Ala Moana Boulevard, Suite 100, Honolulu, Hawaii 96813

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-211

October 9, 1998

Mr. Kenneth M. Kaneshiro, State Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
P.O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kaneshiro:

Subject: Review Comments on the Draft Environmental Impact Statement <u>for the Waipio Peninsula Soccer Park Conceptual Master Plan</u>

Thank you for your letter of September 11, 1998, regarding the Draft Environmental Impact Statement for the above referenced project.

In response to your comment about the use of prime agricultural land, Figure 2-5 in the DEIS shows that prime agricultural land on the site is classified as B16i and B77i. The soil has a "B" master productivity rating *if irrigated*. The Navy land south of the soccer park site has similar soils, also requiring irrigation to be productive. As explained in the DEIS, the irrigation system to be developed as part of the proposed soccer park project would provide water not only to the park but to the retained U.S. Navy parcels to the south, intended for diversified agricultural activities. Without the soccer park project, it is doubtful that any of the land on the peninsula would be suitable for such agricultural use in the absence of irrigation. Hence, the project enables agricultural use of a portion of the Navy's Waipio land which would otherwise lie fallow.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

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

REPLY TO ATTENTION OF

August 19, 1998

DEPT OF DESIGN & CONSTR C & C OF HONOLULU '98 AUG 24 PM 3 32

Civil Works Branch

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Waipio Peninsula Soccer Park Project, Oahu (TMKs 9-3-2, 30, 31, 33, 34 and por. 1, 9, 28, 32; por. 9-4-8; 9-4-11: por. 3, 46, 104; and, 9-4-10: por. 08, 27, 57). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. The Botanical Survey indicates that small areas are vegetated with facultative wetland species. A site visit should be conducted to determine if wetlands exist within the project area. A wetland delineation may be required to identify existing coastal wetlands. For further information, please contact Ms. Lolly Silva of our Regulatory Section at 438-9258 and refer to file number 980000284.

b. The flood hazard information provided on page 3-11 of the DEIS is correct.

Sincerely,

Paul Mizue, P.E.
Chief, Civil Works Branch

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-226

October 9, 1998

Mr. Paul Mizue, Chief
Civil Works Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 19, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project.

A representative from our subconsultant, Belt Collins Hawaii, will contact your office within the next month to schedule a site visit to confirm our determination regarding possible wetlands in the project area. As stated in section 3.6 of the DEIS, we have concluded that the three potential wetland areas identified on or next to the soccer park site in the February 1998 botanical survey do not meet the hydric soils criteria in the Corps' *Wetland Delineation Manual*. The purpose of the site visit would be to confirm this finding.

These areas are located on the periphery of the Phase 2 portion of the site. A wetland delineation would be premature since Phase 2 may not occur until 2010 or later and is neither programmed nor funded at this time. Therefore, it would be more appropriate to conduct a delineation during the planning of Phase 2.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

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

REPLY TO ATTENTION OF

August 19, 1998

DEPT OF DESIGN & CONSTR
C & C OF HONOLULU
'98 AUG 24 PM 3 32

Civil Works Branch

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Waipio Peninsula Soccer Park Project, Oahu (TMKs 9-3-2, 30, 31, 33, 34 and por. 1, 9, 28, 32; por. 9-4-8; 9-4-11: por. 3, 46, 104; and, 9-4-10: por. 08, 27, 57). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. The Botanical Survey indicates that small areas are vegetated with facultative wetland species. A site visit should be conducted to determine if wetlands exist within the project area. A wetland delineation may be required to identify existing coastal wetlands. For further information, please contact Ms. Lolly Silva of our Regulatory Section at 438-9258 and refer to file number 980000284.

b. The flood hazard information provided on page 3-11 of the DEIS is correct.

Sincerely,

Paul Mizue, P.E.
Chief, Civil Works Branch

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-226

October 9, 1998

Mr. Paul Mizue, Chief
Civil Works Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Review Comments on the Draft Environmental Impact Statement <u>for the Waipio Peninsula Soccer Park Conceptual Master Plan</u>

Thank you for your letter of August 19, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project.

A representative from our subconsultant, Belt Collins Hawaii, will contact your office within the next month to schedule a site visit to confirm our determination regarding possible wetlands in the project area. As stated in section 3.6 of the DEIS, we have concluded that the three potential wetland areas identified on or next to the soccer park site in the February 1998 botanical survey do not meet the hydric soils criteria in the Corps' *Wetland Delineation Manual*. The purpose of the site visit would be to confirm this finding.

These areas are located on the periphery of the Phase 2 portion of the site. A wetland delineation would be premature since Phase 2 may not occur until 2010 or later and is neither programmed nor funded at this time. Therefore, it would be more appropriate to conduct a delineation during the planning of Phase 2.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Rm 3-122
Box 50088
Honolulu, HI 96850

'98 SEP 28 AM 8 38
DEPT. OF DESIGN & CONSTR
C & C OF HONOLULU

In Reply Refer To: EAS

SEP 23 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
Honolulu Municipal Building
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Re: Draft Environmental Impact Statement for Waipio Peninsula Soccer Park Conceptual Master Plan

Dear Mr Fujiki:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan (DEIS). The sponsor for the proposed project is the City and County of Honolulu, which intends to lease some of the land for the proposed project site from the U.S. Navy. The Service responded to the DEIS Preparation Notice on March 10, 1998. The following comments are provided for your consideration.

As stated in our March 10, 1998 comments, a primary concern is the possible project-related resuspension and exposure of contaminants to waterbirds and their habitats at the Pearl Harbor National Wildlife Refuge (PHNWR) and Pouhala Marsh and to marine resources in Pearl Harbor. We are especially concerned because the portion of the project area located directly adjacent to Pouhala Marsh contains former incinerator and landfill sites, which have the highest potential for containing contaminants. Although the DEIS states that the incinerator and landfill sites have not yet been tested for contamination, a discussion of what will be done if tests show that contaminant exposure is too high to allow the use of these lands is not included. The Final EIS (FEIS) should address the possible impacts of contaminant exposure to the existing resources at the PHNWR, Pouhala Marsh, and the surrounding marine environment and discuss the possible use of only the former sugar cane lands or other reasonable alternatives in the event that part of the proposed project site is too contaminated to use.

According to the DEIS, drainage and runoff will be directed away from Pouhala Marsh and toward the Middle Loch of Pearl Harbor where it will be held in permanent detention/sedimentation basins. Because this proposed project site is located between two units of the PHNWR and next to Pouhala Marsh and has historically been used by endangered waterbirds, these birds may become attracted to the detention basins. This situation may become hazardous if these basins contain any contaminated water. Furthermore, the Service is concerned that the detention basins may be inadequate to sufficiently reduce the impacts of petroleum substances and other contaminants that may not settle well and be washed into the surrounding marine environment. The FEIS should discuss the potential for the basins to attract waterbirds and to adequately contain contaminants as well as identify the mitigative precautions that will be taken to prevent adverse impacts to waterbirds.

The DEIS addresses siltation during the construction of the project and to a lesser degree during the life of the project, but does not address the impacts on surrounding natural resources of continued chemical use (fertilizer and pesticides) during the life of the project. Also, the DEIS does not address the impacts of parking lot runoff such as oil and gasoline on natural resources. We suggest these issues be addressed in the FEIS. The FEIS should address the potential impacts to contamination and siltation during the construction and during the life of the project.

The DEIS states that 4.6 MGD will be taken from Waikele Stream (which will also impact Kapakahi Stream, a tributary of Waikele Stream). According to the DEIS figures, this water will be diverted directly above Pouhala Marsh. The Service is very concerned that this diversion may result in adverse changes in salinity, turbidity, and other water quality parameters that affect the habitat value of Pouhala Marsh. The FEIS should discuss these impacts and possible mitigation.

The DEIS states that to avoid downing Newell's shearwaters, lights will be shielded to the extent possible. The Service suggests that the FEIS also state that the lights will be oriented away from the ocean.

According to the DEIS, this proposed project will be bring in thousands of people (and their vehicles) who will be cheering and making a considerable amount of noise. However, the DEIS contains no discussion on the impacts of noise, additional garbage, lighting, etc. on the surrounding natural resources. The Service is especially concerned that the additional noise may have an adverse effect on the waterbirds at Pouhala Marsh during nesting season. The DEIS states that a mangrove barrier on the southeast side of the soccer park site will not be disturbed. However, evidence to support that the mangroves will provide a sufficient barrier to prevent noise from adversely impacting endangered waterbirds is lacking. These potential impacts and the adequacy of proposed mitigation should be discussed in the FEIS.

Finally, if the Navy leases property for development of the proposed project, the Navy will need to ensure that by leasing the property they are not contributing to the degradation of coral-reef ecosystems in accordance with Executive Order 13089 for the protection of coral reefs (EO). The EO applies to all coral reefs under jurisdiction of the United States and directs all Federal agencies to: 1) utilize their programs and authorities to protect and enhance coral reef ecosystems, and 2) to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade those ecosystems. The Navy has initiated consultation with the Service under section 7 of the Endangered Species Act regarding impacts of the proposed action to Federally listed species.

The Service appreciates the opportunity to review the DEIS. We would be happy to meet with you to discuss or clarify any of the issues brought up in our comments, and we offer our assistance in working with you to formulate any additional mitigation for this project. If you have any questions regarding our concerns, please feel free to contact Fish and Wildlife Biologist Elizabeth Sharpe at 808/541-3441.

Sincerely,

Barbara A. Maxfield, acting

for Robert P. Smith
Pacific Islands Manager

cc: USEPA, Honolulu
NMFS-PAO, Honolulu
DAR, Hawaii
DOFAW, Hawaii
CZMP, Hawaii
CWB, Hawaii
U.S.NAVY, Hawaii

RECEIVED TIME OCT. 7. 10:33AM PRINT TIME OCT. 7. 10:38AM

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-224

October 9, 1998

Mr. Robert P. Smith, Pacific Islands Manager
Pacific Islands Ecoregion
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

Dear Mr. Smith:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 23, 1998 (EAS) commenting on the above project. You raised a number of points to which we would like to respond.

1. Exposure of Waterbirds and Waterbird Habitats to Possible Contaminants

Any future development of the former incinerator and landfill sites would be contingent upon implementation of a remediation program in the case of the incinerator site and a landfill closure program in the case of the landfill. No development of these sites can occur without the developer first being able to demonstrate that unacceptable levels of human and ecological exposure to chemical contaminants would not occur. Thus, these facilities can be developed for alternate uses only if it can be demonstrated to the satisfaction of the appropriate regulatory agencies that there is no longer a potential for chemical contamination.

A preliminary evaluation of potential risks created by the project to wildlife species (primarily waterfowl) has been made. At this stage of the analysis, we do not perceive any potentially significant impacts to the wetlands, shoreline, or sanctuaries, or species contained therein, from development of the proposed soccer park, for the following reasons:

a. During construction, direct contact of birds with soil containing residual chemicals on the project site is unlikely, as this site is not preferred habitat for foraging, nesting, or resting for these species.

b. Any contaminants which may be present in shoreline waters near the Navy lease property result from *past* land use and are not expected to increase in concentration or number as a result of the soccer park development. Grading will occur only in accordance with best management practices minimizing sediment runoff, especially near the shoreline or wetlands.

c. Mitigation measures will be employed to minimize the impacts of windblown soil during construction. Thus, exposure of waterfowl to residual chemicals carried off-site will be minimized. Based on soil sampling and analysis, the existing soils in the lease area do not pose an ecological risk to waterbirds.

d. Shoreline water sampling performed by the City in 1995 (in association with planned closure of the nearby landfill) found that the landfill is generally not affecting nearby ocean water quality (GMP Associates, Inc., 1996).

e. Agricultural chemicals used in the past at the lease property generally consist of very large molecules specifically designed to prefer (partition to) soil rather than water. Therefore, these chemicals are not expected (or intended) to be easily mobilized by rain/irrigation water and leached to underlying groundwater. Irrigation of the proposed soccer park is intended to be conservative of water supplies and of fertilizers, and will be designed to avoid excess leaching of irrigation water to groundwater.

f. Many of the agricultural chemicals possibly used at the lease property have relatively short half-lives and would not survive many months or years in the open environment.

g. Sampling and analysis of 38 soil samples from the lease property indicate that analyte concentrations were well below action levels protective of human health (i.e., preliminary remediation goals [PRGs] for residential soils) for organic chemicals and heavy metals. It is likely that these low levels would also be protective of the health of the wildlife of the area. Slightly elevated concentrations of arsenic and chromium are characteristic of Hawaiian soils.

2. Impact of Detention Basins on Waterbirds

The phrase "permanent detention/sedimentation basin" was used in the Draft EIS to indicate that the mitigation of runoff is not short-term or temporary. While the basin infrastructure will be a permanent part of the overall soccer park, it is not intended to create a permanent surface water feature. By their very design, detention basins are intended to function as temporary holding areas for surface runoff so that peak flow can be controlled, thereby minimizing negative impacts to receiving waters. The basins don't prevent surface runoff from entering the receiving waters; they merely slow it down, giving suspended soil a chance to settle in the basin while the water drains into the harbor. Thus, it is not anticipated that they will become a habitat for waterbirds.

With regard to the potential impacts of siltation, soil runoff is anticipated to be minimal once the soccer park's turf has established itself and landscaping has been completed. Based on soil sampling and analysis, the existing soils at the project area do not pose an ecological risk to waterbirds.

Regarding petroleum contamination, the only source of potential petroleum contamination associated with the proposed soccer park is runoff from parking lots, which will comprise a very minor component of drainage flow.

3. Impact of Fertilizers and Pesticides

Turf management at the soccer park will include a computerized irrigation system to monitor the volume of water used to irrigate the soccer parks. Such a system is an important component of an overall integrated turf management program which will be implemented to minimize the application of fertilizers and pesticides on the soccer fields.

4. Impact of Stream Diversion

We respectfully point out that Kapakahi Stream is not a tributary of nor is it connected to Waikele Stream. Kapakahi Stream originates from a spring just mauka of Farrington Highway. Thus the withdrawal from Waikele Stream will not affect Kapakahi Stream. It is Kapakahi Stream that feeds into Pou-hala Marsh. Therefore, no adverse effects on salinity, turbidity, or water quality are expected to occur in Pou-hala Marsh as a result of the withdrawal at Waikele Stream.

The issue of the potential impact of the stream diversion has been very carefully evaluated as part of the environmental assessment process. The changes in the stream flow resulting from the diversion are not anticipated to be significant: on the order of 2 percent at the surface in the upper estuary. Within the stream and presumably the adjacent marsh, salinity is stratified and varies with depth. The thickness of the low-salinity layer varies daily and from day to day as influenced by the tide as well as amounts of fresh water inflow. Therefore, we do not anticipate that there will be significant changes in salinity, turbidity or other water quality parameters of the stream or the estuary.

5. Impact of Night Lighting on Newell's Shearwaters

The lights at the soccer fields will be oriented downward toward the playing fields to minimize glare toward the ocean.

6. Noise and Other Impacts on Waterbirds

Noise from cheering crowds emanating from the sports complex will be short-term in duration and only occurring intermittently. This noise will originate a half-mile away from the habitat, and the existing vegetative buffer should help in baffling and masking noise. The adaptive abilities of birds with regard to noise impacts has been widely studied and documented. In many instances, birds have been observed to successfully breed and rear young in close proximity to sources of loud noise, such as airport runways (for example, Kanaha Pond adjacent to Kahului Airport on Maui). Thus it is expected that noise impacts on birds utilizing areas near the project site will be minimal.

In accordance with State and City and County standards for parks and similar public facilities, receptacles will be provided on the site for the disposal of trash. Groundskeepers will regularly clean the site of refuse that is not properly disposed of by the public.

7. Impact on Coral Reefs

There are no living coral reefs in the vicinity of the project area or in Pearl Harbor.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

August 20, 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Impact Statement for
Waipio Peninsula Soccer Park
Waipio Peninsula O'ahu, Hawaii

The staff of the U.S. Geological Survey, Water Resources Division, Hawaii District, has reviewed the Draft Environmental Impact Statement, and we have no comments to offer at this time.

Thank you for allowing us to review the report. We are returning it for your future use.

Sincerely,

William Meyer
District Chief

Enc.

cc: Mr. Gary Gill, Director, Office of Environmental Quality Control
Ms. Anne Mapes, Belt Collins Hawaii

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-213

October 9, 1998

Mr. William Meyer, District Chief
Water Resources Division
U.S. Geological Survey
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Subject: Review Comments on the Draft Environmental Impact Statement
for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 20, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

DEPARTMENT OF THE NAVY

COMMANDER
NAVAL BASE PEARL HARBOR
517 RUSSELL AVENUE
PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO:
5090.1F
Ser N42(23)/4694
September 23, 1998

98 SEP 24 PM 1 24

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
Honolulu Municipal Building
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR WAIPIO PENINSULA SOCCER PARK, WAIPIO PENINSULA, OAHU, HAWAII

Thank you for providing us with the opportunity to review and comment on the subject DEIS. The Navy's review comments are provided as enclosure (1) for your use in preparing the Final EIS.

The Navy's point of contact is Mr. Clyde Yokota and he can be reached at 474-0292 or by facsimile transmission at 474-2328.

Sincerely,

STANFORD B. C. YUEN, P.E.
Deputy Engineer
By direction of the
Commander, Naval Base, Pearl Harbor

Enclosure: 1. Review Comments

Copy to: (See page 2)

5090.1F
Ser N42(23)/4694
September 23, 1998

Copy to:
Mr. Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Room 702
Honolulu, HI 96813-2437

Ms. Anne Mapes
Belt Collins Hawaii
680 Ala Moana Boulevard, Suite 100
Honolulu, HI 96813

5090.1F
Ser N42(23)/4694
September 23, 1998

Blind copy to:
NAVMAG Lualualei (Code 44)
NAVSTA Pearl Harbor (Code 23)
NAVSEA DET NISMF Pearl Harbor (Code 02)
PWC Pearl Harbor (Code 09SC)
COMNAVBASE Pearl Harbor (N42)
CINCPACFLT (N465)
PACNAVFACENGCOM (23, 203, 241CC, 09CE, 181, 1821RE, 1823JS)

21 September 1998

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
1.	General		Ensure that comments provided by the Navy on the Second Working Copy EA (August 1998) are incorporated in the Final EIS. Actions taken must be annotated with corresponding page and paragraph number.	
2.	General		The DEIS did not identify plans to build a condominium north of Middle Loch and the impact of the soccer park on the proposed condominium project.	
3.	1-1 1-3 1-7 2-8 2-14	1.1.2 2nd para. Man-Made Hazards Top of pg. Figure 2-8	1.1.2 states that "The proposed soccer park will be situated immediately south of and adjacent to the Waipahu Incinerator..." However, Figure 2-8 and Conceptual Master Plan, Appendix A, shows playing fields on the Municipal/Ash Landfill and text indicate that the incinerator site may be used as a training center. The description of the project oscillates from only describing Phase I and in various other locations in text describes the complete master plan. This EIS is for the proposed master plan and should describe the soccer park using the land under the Municipal/Ash Landfill and Waipahu Incinerator.	
4.	1-2 1-3 2-8 2-14 2-15 2-15 2-16	3rd para. 11th bullet 3rd para. Figure 2-8 3rd bullet item 2. Item 5.	Figure 2-8 and Conceptual Master Plan, Appendix A, shows the Waipahu Depot Street on the Municipal/Ash Landfill. These sections should state that construction of this roadway is subject to the requirements of the closure of the landfill.	
5.	1-2	1.1.2	Waipio Point Access Road, 3rd line should read "eastern edge" of Waipio Peninsula vs "western edge." Same for p. 2-8.	
6.	1-3	1st bullet	Figure 2-8 shows three lighted playing fields vs seven.	
7.	1-3 2-16 1-8 5-2	3rd bullet item 2. 1.5 5.4 (7th bullet)	Conversion of the existing facilities at the Waipahu Incinerator into a training center needs to address if there is contamination from past operations. Section 1.5 & 5.4 indicates this as an unresolved issue. When will this be resolved? How will it be resolved? What happens if this issue cannot be resolved? What are the impacts to the master plan/project?	
8.	1-3	4th bullet	The two indoor soccer arenas were not shown in Figure 2-8.	
9.	1-5	Top of pg.	States "...there are wetlands along the shorelines of both Middle and West Loch of Pearl Harbor. These areas will be unaffected by the proposed project."	

ENCLOSURE(1)

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
	1-8 5-2	1.5 5.4 (5th bullet)	Dioxins and other contaminants have been identified in the biota and sediments adjacent to the Municipal/Ash Landfill, as well as other areas in Pearl Harbor. The Municipal/Ash Landfill has not been investigated and a closure plan has not been approved whereby a determination as to whether the proposed project would affect these areas can be made at this time. Sections 1.5 & 5.4 indicate this as an unresolved issue. When will this be resolved? How will it be resolved? What happens if this issue cannot be resolved? What are the impacts to the master plan/project? See comment #7.	
10.	1-5 2-21 3-19	2nd para. 2.5 3.7 Appendix D	The terrestrial vertebrate reconnaissance survey states, "The site encompasses approximately 200 acres...but not including the coastal strip on the shore of Middle Loch." Page 2.3, indicates the soccer park is on approximately 300 acres at Waipio Peninsula. What areas were not covered by this survey and why not? Is a more complete survey to be done in conjunction with some of the unresolved issues? Page 1-5, states "There are no candidate or listed endangered or threatened faunal species found on the site" but it does not appear a complete survey has been done for this determination.	
11.	1-5 2-21	3rd para 2nd para	States, "New landscaping, in addition to use of native plants to the extent practical, would serve as wildlife habitat." If this means that endangered and threatened faunal species may use this area as a wildlife habitat upon completion, then due to the contamination found at the Phase I site, the effects of the contamination on the environment should be addressed.	
12.	1-6	Noise Quality, 2nd para	As stated in Section 2.5 (p. 2-21) and Section 5.4 (p. 5-2), need to state here that the severity of potential noise impacts during special events is an unresolved issue.	
13.	1-7	2nd-3rd paras	Full text of narrative describing the ESQD hazard must be included. This condensed version is misleading and should be expanded.	
14.	2-3	2nd bullet	State the type of facilities to be provided by the East Kapolei Sport Complex.	

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
15.	2-9	1st full para	Need to insert a section title; suggest "land use"	
16.	2-9	2nd full para	Need to insert a section title; suggest "man made hazards"	
17.	2-13	3rd full paragraph	Need to insert a section title; suggest "conceptual master plan'	
18.	2-14	Figure 2-8	The site plan should identify all the elements described on p. 2-13, including training center and indoor soccer arenas.	
19.	2-14	Figure 2-8	This figure still shows about half a lighted soccer field inside the ESQD arc. The lighted fields must be completely outside the arcs. This figure should be changed to the one in the EA, Figure 1-5, which has been corrected.	
20.	2-15	Phase 1	Should also include beach soccer fields.	
21.	2-16	2nd bullet	NISMF requires 50 perpendicular parking spaces vs 30 as stated.	
22.	2-16	Build-out	Description of the indoor soccer arenas is missing.	
23.	2-16	3rd & 4th bullets	DDESB has neither reviewed nor approved the plan to build an 18,000-seat stadium (that is nearly double what was approved) nor the plan to expand parking to 5,000 cars inside the arc. The EIS must be reorganized accordingly.	
24.	2-17		Need to add that special events will be coordinated with NAVMAG Lualualei to assure that the special event will not unreasonably interfere with station operations	
25.	2-17	2nd para	Discussion on the 11 lighted fields is inconsistent with the 3 lighted fields shown in Figure 2-8. Ensure consistency throughout the document.	
26.	3-1	3.1	The Navy lands are fully utilized for program purposes. Change "unused" to "are currently fallow."	
27.	3-6	Top of pg.	States, "None of the samples had concentrations exceeding these target concentrations except metals..." The TEQs for the 2,3,7,8 TCDD did exceed the PRG levels, whereby a risk assessment was being done to determine if the risk was within range of 10^{4} - 10^{4}.	
28.	3-6	2nd para	States, "Residual petroleum products or hazardous materials could conceivably be contained in the junk and could be released to the project area during removal activities or could be improperly disposed of offsite." Do you mean "properly disposed of offsite"? Or do you mean it was "improperly disposed of onsite"? This sentence is confusing, please restate.	
29.	3-6	3rd para	States, "Therefore, these soils will have to be tested prior to excavation work taking place." Should state	

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
			when these tests will take place. Will testing be part of closure requirements?	
30.	3-6	3.2.3, 2nd para	States, " No impacts are expected from regrading of the landfill after planned future closure and capping, as long as the cap is not disturbed, and no mitigation is required." Without investigations of the landfill and the determination of the requirements for the cap, the statement "no mitigation is required" may not be definite, please restate.	
31.	3-6	3.2.3	Recommend language be inserted to address preventive measures prohibiting cross-contamination between State MWS incinerator site and Navy lands; and between Phase 1 and Phase II build-out.	
32.	3-7	1st para	States "...known or reasonably-assumed unknown risk of exposure to dioxins..." This statement is contrary to other statements made in this document and draft EA that "no human health risk to construction workers or park users from residual chemicals in soils on former cane lands is expected". Please clarify statement(s).	
33.	3-7	1st para	States, "If no sampling is performed, workers may need to wear more protective PPE, such as half-face air purifying respirators with filter cartridges..." Please check with safety manager and/or certified industrial hygienist on PPE requirements based on suspected contaminants. PPE may also include tyvek suit, gloves, boots, etc. Also, check if decontamination station is required.	
34.	3-7	3.2.3, last para	This last para doesn't make sense. Are we trying to say that the problem with in situ soil conditions could be addressed by simply following standard engineering practices?	
35.	3-9	3.4.2.2, 2nd para	Last sentence states "Air quality factors associated with build-out condition would be re-examined at the time construction is scheduled to begin." Does that mean the air quality during construction at build-out is an unresolved issue? If so, should be listed under Section 5.4 on p. 5-2.	
36.	3-12	Figure 3-3	Figure 3-3 and Section 3.5.2.2 does not address or indicate any detention basins for Areas V, VI and VII. Explain why. It was previously stated in this document and the draft EA that these basins would be constructed to reduce the flow and trap suspended sediments entering the harbor. Since, the Pearl Harbor Sediment Study currently on-going, has preliminary results indicating contamination to the sediments, the DSB is a good mitigation measure to	

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
			reduce the impact to the harbor since contamination of the soil was found at low levels within the project site.	
37.	3-16	3.6.1	1st and 2nd para conflicts on whether native vegetation is found at the site.	
38.	3-19	3.7.1.1	The terrestrial vertebrate species survey only cover a site of 200 acres and not the entire soccer park site.	
39.	3-22	3.7.2.2 and 3.7.3	Should it be "Pou-Hala" or "Pouhala" Marsh. Ensure the correct term is used consistently.	
40.	3-23	3.8.1	The archaeological inventory only covered a 200-acre site and not the entire soccer park site.	
41.	3-25	3.8.2.1	Re-write in accordance with SHPO consultation.	
42.	3-30	3.9.1.2	The wells were drilled by Oahu Sugar long before it was acquired by Amfac	
43.	3-30	3.9.2.2	The conclusion is that the park cannot be operated without a risk to public safety because ESQD restrictions do not permit the parking areas to be lit by overhead lighting. The proposed mitigation section concludes that the mitigation will only "partly" assuage these safety concerns. Moreover, directing the field lights towards the parking areas could leave the fields with inadequate lighting and may also be inconsistent with the mitigation proposed to protect the Newell's Shearwaters overflying the area. This is a significant impact that has not been adequately addressed. With respect to mitigation WRT golf and police, it is inadequate to say that the concerns regarding impacts "could be addressed" by working with police and golf course officials. Both impacts and mitigation of the impacts must be addressed in the EIS.	
44.	3-45 and 46	Table3-9	The LOS at Awalai and Waipio Point Access Road would degrade to LOS E from LOS B. As a general rule, this would be considered a significant impact. How is it that this degradation in service does not warrant mitigative actions? Need to fully explain how writer arrived at this conclusion.	
45.	3-55	3.10.4, 1st bullet	How will widening of Waipio Point Access Road affect parking for the NISMF?	
46.	3-55	3.10.4	Consider adding a left turn lane, both ways on Waipio Point Access Road where it intersects Awalai Street and the entrance to Waipahu High School. Waipio Point Access Road will be congested during large athletic events and the extra lanes will improve traffic flow.	
47.	3-59	3.11.2.2	Revise last sentence as follows: "The demand for irrigation water for the Navy agricultural lands south of the soccer park is based on a projected agricultural requirement of 3,500 gallons per acre per day.	

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
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No.	Page	Section/ Para. No.	Comment	Action
48.	3-60	3.11.2.2	Delete "Navy" and replace with "Agricultural" in synopsis of irrigation water demand estimates.	
49.	3-60	Figure 3-9	Irrigation line is crossing over the existing fuel line. What are the precautionary measures taken to assure the existing line will not be disturbed?	
50.	3-63	2nd para	End sentence after "source." No need for a legal conclusion in this context.	
51.	3-64	Bullets	Delete first two bullets	
52.	3-69	3.11.5.3	Paragraph on use of fiberglass light poles does not belong in the discussion of potential impacts on electrical power sources. Move to discussion on adjacent land uses.	
53.	3-69	3.11.5.4	Delete reference to FCC. Move to discussion on mitigation WRT adjacent land uses.	
54.	3-70	3.12.1.3	Cannot rely on insurance carriers to determine when mitigation is required. Must establish a threshold for when an ambulance must be located on-site and state who is responsible for assuring that the mitigation is carried out.	
55.	3-72	3.12.2.3	This is wholly inconsistent with the discussion in Section 3.9.2 concluding that as many as 5 additional officers could be needed - in addition to officers called on duty for special events. Even if event organizers are required to contract with private security firms (leaving it to their discretion is not sufficient) this does not adequately address adverse impacts to HPD resources. FYI: Since the opening of the Pearl Harbor bike path (which ends at Waipio Point Access Road) the Navy has received numerous complaints that the opening of the area to the public has brought additional crime to the neighborhood behind LCC. Notwithstanding the fact that the easement document provides that the city shall be responsible for policing the bike path, Navy requests for additional patrols were rejected due to lack of manpower. The City was able to mitigate the problem by installing bollards along the bike path to prevent vehicular access. If HPD does not have the manpower to patrol the bike path, how can we conclude that adding the soccer park to its area of responsibility will not significantly impact demands on their resources or require mitigation?	
56.	3-74	3.13.4	Other sections of the document suggest some of the special events would include concerts. What facts were considered to come to the conclusion that concerts would not be expected to adversely affect the	

Reviewer: COMNAVBASE/NAVSTA/NAVMAG/NISMF/PWC/PACNAVFACENGCOM
Project Title: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN, August 8, 1998

No.	Page	Section/ Para. No.	Comment	Action
			nearest residential noise sensitive receptors. Are there other "noise sensitive" receptors (for example, waterbirds at Pouhala marsh)? This contradicts the 6th bullet in Section 5.4, which lists special event noise levels as an unresolved issue.	
57.	3-75	3.14.1	Define "action site"	
58.	3-75	3.14.4	This appears inconsistent with Section 3.9.3.	
59.	4-6	After bullets	This is inconsistent with the statement in Section 3.8.1 that there are no significant cultural resources within the soccer park site and conclusions that the soccer park area devoid of significant natural resources.	
60.	4-7	4.2.1	Delete last sentence. This section lacks the required analysis. Suggest balancing the policy to conserve agricultural lands with the policy to promote recreation.	
61.	4-11	Last sentence	End sentence after "facility." Add new sentence indicating the proposed action is consistent with Policy 14 notwithstanding the fact that the land is fully utilized for federal program purposes.	
62.	HHL letter	Point 7	Mr. Watson has requested information on the emergency plan. Has this comment been addressed in the EIS?	
63.	App E	Page iv	The paraphrasing of the explosive safety language is unacceptable. Must use "unlikely to be killed or seriously injured directly by a blast."	

DEPARTMENT OF DESIGN AND CONSTRUCTION
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-221

October 9, 1998

Mr. Stanford B.C. Yuen, Deputy Engineer
Commander Naval Base Pearl Harbor
517 Russell Avenue
Pearl Harbor, Hawaii 96860-5020

Dear Mr. Yuen:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 23, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are listed below.

1. Comments provided by the Navy on the Second Working Copy of the Environmental Assessment (August 1998) are being incorporated into the EIS, as appropriate.

2. The DEIS discloses various impacts on nearby communities, including traffic, air quality, infrastructure and public service demand, socioeconomics, noise, and visual/scenic resources. It is assumed that some of the identified impacts may apply to the proposed condominium project north of Middle Loch. However, there is no reason to single out this particular project in the impact analysis.

3. The text in the EIS (sections 1.1.2 and 2.3) is being revised to clarify that the incinerator and landfill sites are part of the overall soccer park project area. The phasing of the project is provided; the EIS identifies the total project at build-out and then describes Phase 1 and Phase 2.

4. It is stated in Chapter 2 that improvements to Waipahu Depot Street would be in Phase 2, and that development of the ash landfill and incinerator sites would also be in Phase 2. We are revising sections 1.1.2 and 2.3 to indicate that improvements to Waipahu Depot Street are subject to landfill closure requirements.

5. The text on pages 1-2 and 2-8 are being corrected from "western edge" to "eastern edge."

6. There will be a total of seven lighted fields at build-out, including the stadium. Figure 2-8 is being revised to show two lighted fields and one lighted field/stadium, for a total of three in Phase 1. Four others will be added in Phase 2. Specific siting of these fields has not been determined.

7. The incinerator site is in Phase 2 of the project. Implementation of Phase 2 would depend upon the availability of future funding, not yet confirmed. Development is not expected to occur until 2010 or later, and there is no schedule or program for the project. Phase 2 plans currently consist of the general layout shown in the DEIS. If this phase proceeds, additional environmental work may have to be conducted by the City to develop the incinerator site.

   The level of testing and remediation needed would in part depend on the future use of the site.

   Regarding the unresolved issues listed in sections 1.5 and 5.4, most of these are operational rather than environmental issues, and they are being resolved in the planning and design process. Certain operational issues associated with Phase 2 would be addressed in due time, but this phase has yet to be programmed or funded.

8. The indoor soccer arenas will be part of the training center. Sections 1.1.2 and 2.3 are being revised to clarify this.

9. The purpose of this assessment was to assess the potential effect of Phase 1 activities since the implementation and scope of Phase 2, which could include the former landfill area, are yet to be determined. Phase 1 activities will not adversely affect the wetlands and shorelines of Pearl Harbor as demonstrated by EBS soil sampling results and associated screening level human health and ecological risk assessments.

10. It appears that the biologist surveyed the entire project area but underestimated the acreage. In the report of the reconnaissance survey of terrestrial vertebrate species (Appendix D), the general site description correctly describes the boundaries of the site.

11. As stated in item 9 above and disclosed in the DEIS, "contamination" was not found on the Phase 1 site. Soil samples were analyzed for agricultural chemicals, petroleum-related compounds, metals, and dioxins. None of the samples had concentrations exceeding target concentrations established by U.S. EPA to be protective of human health. The exception was metals, which are naturally high in volcanic soils.

12. The assessment of noise impacts indicates that it is not an unresolved environmental issue but an issue that would require monitoring during operations and adoption of appropriate management measures by the City and league/tournament organizers. Section 3.13.3 states that sound levels generated by soccer activities are expected to be less than 50 dBA at the nearest residential noise-sensitive receptors, located about a half-mile away. Although significant adverse effects are not expected, several measures would help minimize noise impacts, including limiting games to no later than 10:00 p.m. and staggering the scheduling of games. (The latter is proposed to help mitigate traffic impacts.) Sections 2.5 and 5.4 are being revised accordingly, to delete noise as an unresolved issue.

13. Although this section is meant to be a summary, the text from section 2.3 is being copied verbatim.

14. This description is being revised to indicate that the East Kapolei Sport Complex will consist of baseball facilities.

15. In response to comments 15, 16, and 17, we are dividing Section 2.3 into subsections as follows: 2.3.1, Principal Elements of the Conceptual Master Plan; 2.3.2, Existing Land Use; 2.3.3, ESQD Constraints; 2.3.4, Project Phases; and 2.3.5, Soccer Park Operations. We believe this makes the section easier to follow.

16. See above.

17. See above.

18. Figure 2-8 is being revised to call out the training center. The indoor soccer arenas will be part of the training center; this is clarified in the text as indicated in item 8 above.

19. Figure 2-8 is being revised to be consistent with Figure 1-5 in the NEPA EA so that all three lighted fields are outside the arc. The "Stadium" is being relabeled as "Lighted Field/ Stadium," since it will be a lighted field in Phase 1 and converted to a stadium in Phase 2.

20. Beach or sand soccer lots have been added to the listing of Phase 1 facilities.

21. The number of parking spaces for NISMF is being changed from 30 to 50 as noted (page 2-16).

22. We have added the indoor soccer arenas to the list of facilities that would be part of the training center (page 2-16).

23. Please note that the proposed stadium and parking in Phase 2 would be outside the inhabited building distance arc.

24. The following paragraph is being added at the end of section 2.3: "The City Department of Parks and Recreation will develop standard operating procedures for the soccer park dealing specifically with coordination with other agencies and nearby facilities prior to major events. Procedures will require coordination with the police academy, NAVMAG Lualualei, Waipahu High School, and others as appropriate. Standard operating procedures will also be developed to provide plans for dealing with emergencies, traffic management, security, and other issues as needed."

25. There will be a total of seven lighted fields at build-out: three in Phase 1 and four in Phase 2, including the tournament field which will be converted to a stadium in Phase 2. The specific siting of the lighted fields in Phase 2 is undetermined, so their location is not shown in Figure 2-8. References to numbers of fields and lighted fields in section 2.3 have been revised accordingly.

26. The sentence at the end of section 3.1 is being revised to state that the soccer park lands "are currently fallow."

27. Region IX EPA does not have a published PRG for TEQ dioxins and only has a PRG for the most toxic congenor 2,3,7,8 TCDD. The National Office of Solid Waste and Emergency Response (OSWER) has issued a directive (OSWER Directive 9200.4-26) that establishes a residential PRG for the TEQ at 1 ppb. Hawaii DOH also recognizes this policy. If compared to Region IX EPA's PRG for 2,3,7,8 TCDD, the OSWER TEQ PRG is within Region IX's stated permissible risk range of 10^{-4} to 10^{-6}. The maximum result of 66.5 parts per trillion is by inspection at the 10^{-5} risk level. Although on-site concentrations are within the EPA's permissible risk range, a risk assessment was completed because of heightened Navy concerns. This risk assessment determined that for actual site use, the risk level from on-site concentrations of dioxin was 10^{-7}.

28. The statement is being clarified by deletion of the phrase "or improperly disposed of offsite." The intent of the statement was to indicate the need for specifications as stated in the mitigation section.

29. Soil testing will be completed prior to the finalization of construction documents. This soil testing is for worker safety reasons and would not be associated with closure requirements for the landfill or the incinerator. Alternatively, if sampling is not completed prior to construction, workers' health and safety will be protected through engineering controls, personal protective equipment, management practices, or other means as determined by a health and safety professional. These measures are described in section 3.2.3.

30. The statement that "no mitigation is required" is definite and based on the criteria stated, that is, "as long as the cap is not disturbed." The following sentence will be added at the end of the last paragraph in section 3.2.2.2: "Future detailed planning and engineering will be conducted with the understanding that the cap would not be disturbed."

31. To address this issue, the following text is being added to section 3.2.3: "Soil from the landfill and incinerator properties will not be transported to Navy lands by grading or other means unless determined to be uncontaminated and approved by the Navy."

32. Based on the results of sampling on the Phase 1 lease property, no human health risk to construction workers or park users is expected. The referenced statement specifically refers to the incinerator property where no sampling has been conducted. The statement is simply intended to emphasize the need for appropriate health and safety practices.

33. A health and safety professional will finalize construction health and safety requirements.

34. Yes. The statement recognizes that *in situ* soil conditions require special consideration for stated facilities. However, standard engineering practices and best management practices will be able to address areas of concern. The last paragraph of section 3.2.2 is being replaced with the following text: "Although *in situ* soil conditions may contribute to engineering design constraints, standard engineering practices and Best Management Practices will adequately address areas of concern."

35. This sentence regarding construction-related air quality impacts (section 3.4.2.2) is being deleted. The issue of air quality during construction is addressed through regulatory requirements --- for example, requiring the contractor to water the site and to properly maintain equipment. Hence, it is not an unresolved issue.

36. Detention basins are provided for about 72 percent of the site. Areas II and VII are narrow shoreline areas where sheet runoff is directly to the shoreline as shown in the figure. Although not currently proposed, detention basins may be added at the time of construction of Areas V and VI in Phase 2. The entire parcel proposed to be leased from the Navy, except for Area II, will drain through detention basins.

Please note that the soil sampling and analysis did not identify "contamination." Soil samples were analyzed for agricultural chemicals, petroleum-related compounds, metals, and dioxins. None of the samples had concentration exceeding target concentrations established by U.S. EPA to be protective of human health. The exception was metals, which are naturally high in volcanic soils.

37. The second paragraph in section 3.6.1 has been revised to clarify that "no *original* vegetation is found at the site" due to decades of disturbance. There is native vegetation, as described in the first paragraph.

38. See item 10 above.

39. It is spelled "Pou-hala" in the dictionary of Hawaiian place names. This is being corrected in the document (pages 3-22 and 3-23).

40. The archaeological inventory survey covered the entire site, as illustrated in Figure 1 (Location of Project Area) in Appendix F. The number of acres quoted in the report is not correct.

41. The following text has been added to Section 3.8.2.2 to describe State Historic Preservation Division concurrence, pending revision of the inventory survey report: "The State Historic

Preservation Division concurs that the proposed soccer park and offsite improvements would have no effect on the precontact fishponds, deeply buried precontact sites, sugar cane irrigation system, and wall section of probable historic age. In addition, the Division concurs that there would be no adverse effect on the OR&L spur." The revised report has been submitted to the Division for final approval.

42. "Amfac" is being replaced by "Oahu Sugar" in the last paragraph of section 3.9.1.2.

43. Section 3.9.3 is being revised to delete references to directing the field lights toward the parking area and to reiterate the establishment of standard operating procedures. The paragraph now reads as follows: "Lighting will be low but the area will be well lit. The park will be secured at night after hours. Additional police patrol may be needed, with a consequent increase in personnel for each watch, for a total of five new positions.
As stated in Chapter 2, the Department of Parks and Recreation will develop standard operating procedures for the soccer park to deal specifically with coordination with other agencies and nearby facilities prior to major events, as well as plans for emergencies, traffic management, security, and other operational issues as needed."

44. The sentence, "However, the traffic volumes and delay would not warrant mitigative actions.," is being deleted, and mitigation is being added to section 3.10.4 for Phase 2 (see response to comment 46 below).

45. The following sentence is being added to the first bullet: "During design, parking for NISMF would be provided for in the roadway widening layout."

46. This is a good idea and will be considered for implementation at full build-out. A fourth bullet is being added to section 3.10.4, page 3-55: "Add a left turn lane both ways on Waipio Point Access Road where it intersects Awalai Street and the entrance to Waipahu High School. This would help to alleviate congestion during large athletic events."

47. Your proposed text is replacing the last sentence in the second paragraph of section 3.11.2.2.

48. In the list of irrigation water demand estimates, "Navy Requirements" is being changed to "Agricultural Requirements" (section 3.11.2.2).

49. The location of the fuel line will be included in the construction plans. It is above surrounding grade within an earthen embankment.

50. The sentence now reads: "The use of the Waikele Stream diversion alternative is a revival of the former Oahu Sugar Company irrigation water source."

51. In the last paragraph of section 3.11.2.2, the first two bullets are being deleted.

52. The last paragraph regarding the FCC in section 3.11.5.3 is being deleted. The following sentence is being added to the end of section 1.1.2: "The project is being designed so as not to conflict with or adversely affect the operations of the adjacent Federal Communications Commission (FCC) operations."

53. The first sentence in section 3.11.5.4 is being revised to delete reference to the FCC.

54. Section 3.12.1.3 is being revised to read as follows: "In general, because of the lack of expected adverse effects on health care facilities serving the soccer park, specific mitigation measures are not warranted. Standard operating procedures to be established by the Department of Parks and Recreation will require league and tournament organizers to have plans for handling emergencies."

55. The first sentence in section 3.12.2.3 is being revised to read as follows: "In addition to the possible requirement for five additional police officers for patrol purposes, it is likely that event organizers and sponsors will contract with private security firms to provide traffic control and other security measures." The last sentence of the paragraph is being deleted: "Other mitigation measures are not proposed or warranted."

56. The following sentence is being added to the end of section 3.13.4, Proposed Mitigation Measures: "The noise situation will be monitored and appropriate management measures adopted, as needed, to address the issue of noise from special events." This language is also being added to section 2.5. It is acknowledged that the City and County Department of Parks and Recreation will have to develop standard operating procedures for special events at the park (as stated in new text added at the end of section 2.3) to define how noise, traffic, and other issues will be handled.

    Regarding noise impacts on waterbirds, there is no evidence that noise originating approximately one-half mile away would influence their behavior. Monitoring at Kanaha Pond on Maui, a refuge located adjacent to Kahului International Airport, has not identified adverse impacts of jet aircraft noise on resident Hawaiian stilt and other waterbirds. Please note that the mangrove areas would be retained to serve as a buffer between bird habitat and the soccer park.

57. This sentence is being revised to read: "The proposed soccer park site is uninhabited former sugar cane fields and a sugar mill wastewater disposal area."

58. The last sentence in this section is being revised to read as follows: "Similarly, the lighting would be directed so as not to over-illuminate areas outside the soccer park site."

59. The second sentence in this paragraph is being deleted.

60. The last sentence is being deleted.

61. The last sentence now ends with the word "facility," and the suggested text is being added to state that "the proposed action is consistent with Policy 14, notwithstanding the fact that the land is fully utilized for federal program purposes."

62. Issues such as emergency preparedness, traffic management, and noise mitigation will be addressed in standard operating procedures to be developed by the Department of Parks and Recreation specifically for the soccer park. Text is being added at the end of section 2.3 to this effect.

63. The proposed revision is being made to Appendix E.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

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SEIJI F. NAYA
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BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

Ref. No. P-7708

September 24, 1998

Mr. Randall K. Fujiki
Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Impact Statement (EIS) for Waipio Peninsula Soccer Park, Waipio Peninsula, Oahu, Hawaii

We have reviewed the draft EIS for the proposed soccer park on approximately 300 acres of land. We have the following comments.

The development of four soccer fields will be on an incinerator landfill. However, apparently no test samples of the incinerator landfill soils were conducted. On page 3-6, the EIS states "It is not known whether soils in the vicinity of the incinerator contain dioxins or metals at concentrations hazardous to human health." In addition, the proposed EIS mitigation measures do not include testing the incinerator landfill soils. It is important to test the soils before excavation.

Runoff from the incinerator landfill soils will continue to drain toward the ocean. During construction of the soccer fields, temporary sedimentation basins and silt fences will trap soil runoff and be removed upon completion of the project. There is concern that the sheet runoff may contain pesticides from the soccer fields that would directly enter the ocean. Therefore, filtering the runoff through such means as settling ponds appear necessary.

The existing wetland habitats and the restoration of wetlands just mauka of the incinerator landfill support and protect the habitat for four endemic waterbirds. A two-and-a-half day bird and mammal survey done for the EIS in April of 1998 did not detect the presence of endangered or threatened avian species within the proposed soccer park. However, our GIS Nature Conservancy field observation data show the presence of the Hawaiian Coot and Hawaiian Stilt in 1986, and a 1971 observation showed the presence of the Hawaiian Gallinule. We note that the EIS mitigation measure would retain the existing mangrove barrier instead of developing a strip of wetland adjacent to the shoreline to act as a filter as well as encourage waterbird habitat. This should be explained in more detail to better determine its merit.

Lastly, the EIS proposes trenching of the OR&L Railroad for the non-potable irrigation water transmission line. However, plans prepared by the City and County and the Waipahu Community recommend an extension of the OR&L Railroad from Renton Road in Ewa Beach to

the Waipahu Cultural Garden Park. Presently OR&L Railroad runs a line from Renton Road to the Ko Olina Resorts. We recommend locating the non-potable irrigation water transmission line elsewhere so that the OR&L Railroad right-of-way will be kept open in the event that the track can be restored and extended in the future.

If there are any questions, please contact Christina Meller of our Coastal Zone Management Program at 587-2845.

Sincerely,

Bradley J. Mossman

Bradley J. Mossman
Director
Office of Planning

cc: Gary Gill, OEQC
✓Belt Collins Hawaii

DEPARTMENT OF DESIGN AND CONSTRUCTION
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-228

October 9, 1998

Mr. Bradley J. Mossman, Director
Office of Planning
Department of Business, Economic Development & Tourism
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mossman:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 24, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are presented below.

- Incinerator Site. The incinerator site is in Phase 2 of the project. Implementation of Phase 2 would depend upon the availability of future funding, not yet confirmed. Development is not expected to occur until 2010 or later, and there is no schedule or program for the project. Phase 2 plans currently consist of the general layout shown in the DEIS. If this phase proceeds, additional environmental work may have to be conducted by the City to develop the incinerator site. The level of testing and remediation needed would in part depend on the future use of the site. It is noted that occupancy of the site by a building on slab, compared to using it for playing fields, would result in lesser or no exposure to soils.

- Pesticides. The potential for sheet runoff containing pesticides discharging into the ocean would be minimal. The turfgrasses being specified are pest resistant, and the types of pesticides used today are quickly taken up by the plant with little or no residue. Furthermore, to assure the efficacy of turf chemicals, their application is timed so as not to occur during periods of heavy rainfall.

- Fauna. The field observations cited in your letter were made 12 and 17 years ago when the site was in sugar cane cultivation. Different vegetation now covers the site, which lies fallow, and open water no longer exists to provide habitat for the birds noted. (See section 3.7.2.2 in the DEIS for a discussion of the significant changes that have occurred since cessation of sugar cane cultivation in 1994.)

- Mangrove Wetlands. We wish to clarify that the mitigation specified in section 3.7.3 is to retain the mangrove barrier "as is" to avoid disturbances to Hawaiian stilts and other waterbirds using Pou-Hala Marsh. There is no intention to develop another wetland area. This may be a worthy wetland enhancement effort, but it is beyond the scope of and unrelated to the soccer park project.

- OR&L Railroad. The proposed water transmission line would be located within the right-of-way of an OR&L Railroad spur and main line which are being used as utility corridors.

  Located beneath the spur are multiple sewer and water lines and a Navy fuel line. In addition, utility poles (electrical and telephone) are located in the right-of-way. The main line for the railroad serves as a primary utility corridor. It contains multiple sewer and water lines, fuel and oil lines, a gas line, cables, and utility poles. Therefore, installation of the transmission line would be consistent with use of the rights-of-way for utility purposes. The segments of the railroad rights-of-way which we propose to use cannot be "kept open" since they are already heavily used as utility corridors.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

SEP 15 1998

(P)1579.8

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Waipio Peninsula Soccer Park
Draft Environmental Impact Statement (EIS)
TMK 9-3-02, 30, 31, 33, 34 & Pors. 1, 9, 28 & 32;
Pors. TMK 9-4-08;
TMK 9-4-11:Pors. 3, 46 & 104; and
TMK 9-4-10:Pors. 08, 27 & 57

Thank you for the opportunity to review the subject draft EIS which we received with your memorandum dated August 5,1998.

Our comments follow:

1. A major concern is that the project will invariably increase traffic congestion in the area of the planned soccer park, along Farrington Highway in particular, which serves as a major access road to and from various State facilities, including the Waipahu Civic center and Waipahu High, Intermediate and Elementary Schools (see Attachment A).

2. Therefore, street and traffic improvements to alleviate traffic flow in the vicinity should be included as part of the overall project and should be completed prior to completion of Phase 1.

3. As a result of the anticipated traffic congestion, the Department of Education should be contacted to inform them of potential impacts.

If you should have any questions, please contact Mr. Ronald Ching of the Planning Branch at 586-0490.

Sincerely,

Gordon Matsuoka

GORDON MATSUOKA
Public Works Administrator

RC/ET:jy
c: OEQC
Ms. Anne Mapes, Belt Collins Hawaii

DEPARTMENT OF DESIGN AND CONSTRUCTION
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-210

October 9, 1998

Mr. Gordon Matsuoka, Public Works Administrator
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Matsuoka:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 15, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project.

The DEIS discloses traffic impacts and measures to mitigate those impacts. Proposed roadway improvements will be constructed as part of the project and completed in phases concurrently with park development. The roadway improvements intended to mitigate traffic associated with full buildout would be included in Phase 2.

A copy of the DEIS was transmitted to the Department of Education for comment. We received a letter from Alfred Suga, Interim Superintendent, dated August 25, 1998, expressing support for the project as it would expand recreational opportunities for area schools.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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Ref. No. P-7708

September 24, 1998

Mr. Randall K. Fujiki
Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Impact Statement (EIS) for Waipio Peninsula Soccer Park, Waipio Peninsula, Oahu, Hawaii

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If there are any questions, please contact Christina Meller of our Coastal Zone Management Program at 587-2845.

Sincerely,

Bradley J. Mossman

Bradley J. Mossman
Director
Office of Planning

cc: Gary Gill, OEQC
✓Belt Collins Hawaii

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ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-228

October 9, 1998

Mr. Bradley J. Mossman, Director
Office of Planning
Department of Business, Economic Development & Tourism
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mossman:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 24, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are presented below.

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If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

HAWAII COMMUNITY DEVELOPMENT AUTHORITY
KAKAAKO

Benjamin J. Cayetano
Governor

Lynne Waters
Chair

Jan S. Yokota
Executive Director

Ref. No.: GF COUN 5.15

August 7, 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
Second Floor
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Re: Draft Environmental Impact Statement ("EIS") for the Waipio Peninsula Soccer Park

The Hawaii Community Development Authority has reviewed the Draft EIS for the Waipio Peninsula Soccer Park and has no comments to offer as the project will not adversely impact the Kakaako Community Development District.

Thank you for the opportunity to comment on the subject document.

Sincerely,

Alex Achimore
Director of Planning and Development

AA/SJT:gst
c: Mr. Gary Gill, Office of Environmental Quality Control
✓Belt Collins Hawaii

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96813

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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-219

October 9, 1998

Mr. Alex Achimore
Director of Planning and Development
Hawaii Community Development Authority
State of Hawaii
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Achimore:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 7, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
HOUSING AND COMMUNITY DEVELOPMENT CORPORATION OF HAWAII
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DONALD K.W. LAU
EXECUTIVE DIRECTOR

SHARYN L. MIYASHIRO
EXECUTIVE ASSISTANT

98:PEO/660

August 17, 1998

DEPT OF DESIGN & CONSTR
C & C O HONOLULU
'98 AUG 19 PM 1 19

The Honorable Randall K. Fujiki
Director
Department of Design and Construction
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Re: Draft Environmental Impact Statement (EIS) for Waipio Peninsula Soccer Park

Thank you for the opportunity to review the subject draft EIS.

We have no housing-related comments to offer.

Sincerely,

DONALD K.W. LAU
Executive Director

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-212

October 9, 1998

Mr. Donald K. W. Lau, Executive Director
Housing and Community Development Corporation of Hawaii
Department of Business, Economic Development & Tourism
State of Hawaii
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Dear Mr. Lau:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 17, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD V. RICHARDSON
DIRECTOR OF CIVIL DEFENSE

ROY C. PRICE, SR.
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

'98 AUG 27 PM 2 18

August 26, 1998

TO: Department of Design and Construction
City and County of Honolulu
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813

ATTN: Mr. Randall K. Fujiki

FROM: Roy C. Price, Sr.
Vice Director of Civil Defense

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK

We appreciate this opportunity to comment on the Department of Design and Construction, City and County of Honolulu, Draft Environmental Impact Statement (DEIS), Waipio Peninsula, Central Oahu, Hawaii, Tax Map Key; 9-3-02, 30, 31, 33, 34 and Pors. 1, 9, 28, and 32; Por. 9-4-08; 9-4-11: Pors. 3, 46 and 104; and 9-4-10: Pors. 08, 27 & 57.

Although it seems that the project site is not in the 100-year floodplain as delineated in the Federal Emergency Management Agency's Flood Insurance Map, Panel 150001 0110D, September 30, 1995, we recommend that you consult with the State Department of Land and Natural Resources (Land Division) to clearly ascertain that the project is Zone D. The northwest portion of the site could be in question because the map lines depicting the floodplain and the project site are not clearly defined.

While we do not have any negative comments specifically directed at this DEIS, State Civil Defense (SCD) proposes that the "Developer" install one (1) 121dB omni-directional, solar-powered siren. The approximate position of the siren is annotated in red on the enclosed Figure 2.8. A "Yagi" antenna, antenna coax and receiver "Pre-selector" installation instruction must be provided to the contractor to avoid any problems of interference with the Federal Communications Commission monitoring station.

Our SCD planners and technicians are available to discuss this further if there is a requirement. Please have your staff call Mr. Norman Ogasawara of my staff at 733-4300.

We appreciate your consideration and such expressions of interest you may have on this matter.

Enc.

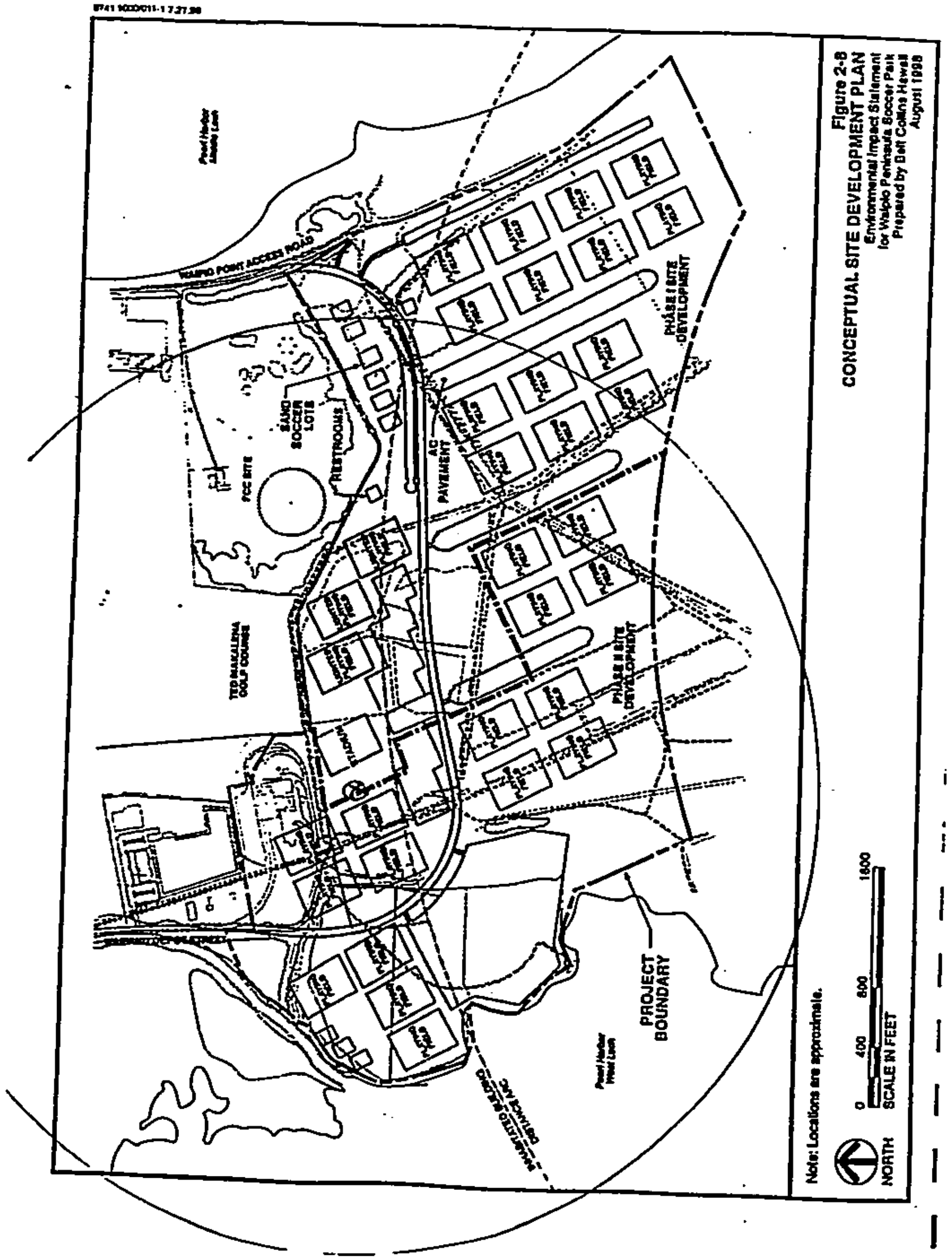

Figure 2-8
CONCEPTUAL SITE DEVELOPMENT PLAN
Environmental Impact Statement
for Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
August 1998

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-222

October 9, 1998

Mr. Roy Price, Sr., Vice Director
Office of the Director of Civil Defense
Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Mr. Price:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 26, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project.

Regarding the floodplain, we have received a letter from Paul Mizue of the U.S. Army Corps of Engineers confirming that the flood hazard information provided in the DEIS is correct (i.e., that the soccer park site is located in flood zone D).

Regrettably, project funding constraints for the first phase of this project preclude installation of an omni-directional, solar-powered siren at this time. Plans will be made to include your proposal in the next phase of the project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR

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

C & C ... '98 SEP 2 AM 11 32

Alfred K. Suga
Interim Superintendent

OFFICE OF THE SUPERINTENDENT

August 25, 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft EIS for Waipio Peninsula Soccer Park

The Department of Education supports development of the proposed soccer complex as it will expand the recreational opportunities for area schools.

We have no other comment to offer at this time.

Thank you for the opportunity to respond.

Sincerely,

Alfred K. Suga
Interim Superintendent

AKS:hy

cc: OBS
W. Staszkow, LDO
G. Gill, OEQC
A. Mapes, Belt Collins Hawaii

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-214

October 9, 1998

Mr. Alfred K. Suga
Department of Education
State of Hawaii
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Suga:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of August 25, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

In reply, please refer to:

October 5, 1998

98-030A/epo

'98 OCT 11 PM 7 41
DEPT OF DESIGN & CONSTR
C & C OF HONOLULU

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
Honolulu Municipal Building
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Impact Statement (DEIS)
Waipio Peninsula Soccer Park
Waipio Peninsula, Central Oahu
TMK: 9-3-02 and various others

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer:

Solid Waste Management

The Integrated Solid Waste Management Act of 1991 set a 50% waste reduction goal by the year 2000 for the state. The Department of Health's Office of Solid Waste Management (OSWM) therefore encourages the developers of the project to consider all waste reduction and recycling opportunities in the design, construction and operation of the proposed project. Examples include:

1. Greenwaste from clearing and grubbing activities may be sent to a permitted composting facility instead of a landfill.

2. Providing for recycling facilities during project design to facilitate recycling activities during project use.

3. Use of recycled-content building materials in project construction. An example of this is dimensional lumber containing recycled plastic. Furthermore, state statutes require the use of crushed glass aggregate in the basecourse and subbase in state or county paving projects.

Please contact Mr. Lane Otsu of the OSWM at 586-4240 with any questions concerning these comments.

Noise, Radiation and Indoor Air Quality Branch

Noise Concerns

1. Activities associated with the construction phase of the project must comply with the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

   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 as stated in section 11-46-6(a).

   b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in section 11-46-6(b)(1)(A).

   c. The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in section 11-46-7(d)(4).

Asbestos

We would recommend that during the design and construction phase of the proposed project, that the applicant prohibit asbestos containing materials in plan specifications and construction.

Should there be any questions on noise concerns, please contact Mr. Daryn Yamada, Supervisor, Noise Section at 586-4700, and for asbestos questions, please contact Mr. Robert Lopes, Supervisor, Indoor Air Quality Section at 586-5800.

Water Pollution

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. If a federal permit is required, then a Section 401 Water Quality Certification is required from the State Department of Health, Clean Water Branch.

2. A National Pollutant Discharge Elimination System (NPDES) general permit is required for the following discharges to waters of the State:

   a. Storm water discharges relating to construction activities, such as clearing, grading, and excavation, for projects equal to or greater than five acres;

   b. Storm water discharges from industrial activities;

   c. Construction dewatering activities;

   d. Noncontact cooling water discharges less than one million gallons per day;

   e. Treated groundwater from underground storage tank remedial activities;

   f. Hydrotesting water;

   g. Treated effluent from petroleum bulk stations and terminals; and

   h. Treated effluent from well drilling activities.

   Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 30 days prior to commencement of any discharge to waters of the State.

3. After construction of the proposed facility is completed, an NPDES individual permit will be required if the operation of the facility involves any wastewater discharge into State waters.

Any questions regarding these comments should be directed to Mr. Denis Lau, Branch Chief, Clean Water Branch at 586-4309.

Polluted Runoff Control

The State has developed *Hawaii's Coastal Nonpoint Pollution Control Program Management Plan*. This management plan addresses proper planning, design, and use of Best Management Practices to substantially reduce polluted runoff (nonpoint source pollution). Please refer to the management plan (pages III-101 to III-162) for management measures. The management plan can be obtained from the Coastal Zone Management Program

(587-2877) in the Planning Office, Department of Business, Economic Development and Tourism.

The following are suggested management measures to consider:

1. Develop and implement grading and site preparation plans to:

   a) Design and install a combination of management and physical practices to settle solids and associated pollutants in runoff from heavy rains and/or wind;

   b) Prevent erosion and retain sediment, to the extent practicable, on-site during and after construction;

   c) Protect areas that provide important water quality benefits and/or are environmentally sensitive ecosystems;

   d) Avoid construction, to the extent practicable, in areas that are susceptible to erosion and sediment loss; and

   e) Protect the natural integrity of water bodies and natural drainage systems by establishing streamside buffers.

2. Develop nutrient management guidelines appropriate to Hawaii for qualified personnel to implement so that nutrients are applied at rates necessary to establish and maintain vegetation without causing leaching into ground and surface waters.

3. Develop and implement an integrated pest management plan. Follow Environmental Protection Agency (EPA) guidelines for the proper storage and disposal of pesticides.

4. Develop and implement irrigation management practices to match the water needs of the turf.

Any questions on these matters should be directed to the Polluted Runoff Control Program in the Clean Water Branch at 586-4309.

Vector Control

The property may be harboring rodents which will be dispersed to the surrounding areas when the site is cleared. The applicant is required by Chapter 11-26, "Vector Control," 98-030A/epo

Hawaii Administrative Rules to eradicate any rodents prior to clearing the site and to notify the Department of Health by submitting Form VC-12 to the local Vector Control Branch when such action is taken.

The Vector Control Branch phone numbers are as follows:

Oahu: 831-6767
Kauai: 241-3306
Hawaii--Hilo: 974-4238, Kona: 322-7011
Maui (includes Molokai and Lanai): 873-3560

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

c: OSWM
CWB
VCB

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-231

October 9, 1998

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

Dear Mr. Anderson:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of October 5, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are listed below.

1. Solid Waste Management. The City will consider waste reduction and recycling opportunities in the project. Green waste will be managed in accordance with Department of Parks and Recreation policies to comply with the landfill ban on the acceptance of green waste. Green wastes may be stored on site and used for mulch or provided to a commercial compost business for processing and reuse. Section 3.11.4.3 has been revised to add this information.

2. Noise. Construction activities will comply with DOH noise regulations.

3. Asbestos. No asbestos containing materials will be included in the construction plans and specifications.

4. Water Pollution. The City is coordinating with the Corps of Engineers on federal permit requirements. A Notice of Intent will be filed with the DOH Clean Water Branch to obtain an NPDES Storm Water Discharge Permit for Construction Exceeding Five Acres.

5. Polluted Runoff Control. We will refer to the State's management plan for nonpoint pollution control. Management measures are being incorporated into the construction plans and specifications to minimize erosion during construction. These will include silt basins and silt fences in drainage swales, phased construction to minimize exposure of soils, and hydromulching and seeding after finished grading. Soil runoff will be minimal once the turf and landscaping are established. Turf management during operations will include a computerized irrigation system to monitor the volume of water used on the soccer park. Such a system is an important component of an overall integrated turf management program to minimize the application of fertilizers and pesticides on the soccer fields.

6. Vector Control. The contractor will be required to comply with the applicable Hawaii Administrative Rules.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

^{for}RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

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SEP 28 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
Honolulu Municipal Building
650 South King Street, Second Floor
Honolulu, HI 96813

Dear Mr. Fujiki:

Draft Environmental Impact Statement for Waipio Peninsula Soccer Park, Waipio Peninsula, Oahu, Hawaii

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

[X] We recommend coordination with the county government to incorporate this project into the county's 20-year Water Use and Development Plan, which is subject to regular updates.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the 20-year State Water Projects Plan, which is subject to regular updates.

[X] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[X] A Well Construction Permit and/or a Pump Installation Permit from the CWRM would be required before ground water is developed as a source of supply for the project.

[X] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWRM would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows. This may require an instream flow standard amendment.

[X] If the proposed project diverts additional water from streams & if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and petition to amend the interim instream flow standard for the affected stream(s).

[X] If the proposed project performs any work within the bed and banks of a stream channel, the project may need to obtain a stream channel alteration permit and a petition to amend the interim instream flow standard for the affected stream(s).

[X] OTHER:

We offer the following comments regarding the use of ground water.

a. The report indicates that potable water will be supplied through the Board of Water Supply (BWS) system. Should additional allocation from the Commission be necessary, the BWS has a bulk allocation in the Waipahu-Waiawa Aquifer that may be assigned to municipal wells.

b. With regard to the nonpotable water demand, it is the policy of the Commission on Water Resource Management to promote the viable and appropriate reuse of reclaimed water in so far as it does not compromise beneficial uses of existing water resources. Because this proposed project (as well as the Ted Makalena Golf Course and the Navy agricultural lands) overlies the Ewa Caprock, which is a brackish nonpotable aquifer, and is located at the makai boundary of the basal aquifer, the Commission encourages the use of reclaimed water to meet nonpotable needs.

c. With regard to the alternative irrigation water source development scheme to purchase water from existing privately owned wells near the former Waipahu Sugar Mill (WP 7), a change in use from agriculture to park irrigation and golf course irrigation requires approval of an application to modify the existing water use permit pursuant to §174C-57 HRS.

We offer the following comments regarding non-potable surface water for irrigation.

a. Permits and Approvals. Page 1-9 discuss the approvals by the Commission on Water Resource Management. This discussion should be more specific to disclose the following:

1. The interim instream flow standard must be amended by the Commission for new and expanded stream diversions after the date of adoption of the interim instream flow standard (Hawaii Administrative Rules §13-169-49).

2. Stream channel alteration permits are required from the Commission whenever the bed or banks of streams are altered (Hawaii Revised Statutes §174C-71).

3. Stream diversion works permits are required for new diversions or when existing diversion works are modified (Hawaii Revised Statutes §174C-93).

b. Diversion from Waikele Stream. Page 3-60 discusses the proposal to use 4.6 mgd of water from Waikele Stream. The document should relate this amount to diverted amounts when interim instream standards were set on December 10, 1988. The document should describe the percentage of flow that will be diverted during the dryer months such as August and September. These figures should also mention the fact that some of the historical flows of Waikele Stream included effluent discharges from the Mililani Wastewater Treatment Plant.

c. Environmental Benefits Of Waikele Stream Water Flow Into Pearl Harbor Estuary. Page 3-64 indicates "However, diverting the Waikele Stream water using the existing stream diversion is the more desirable alternative because stream water is used that would otherwise flow into the ocean". The authors of the DEIS should consider possible environmental benefits of streamflow into estuaries.

d. Possible Health Risk Of Using Stream Water For Irrigation. This DEIS should disclose whether there are health risks associated with the use of untreated stream water for irrigation on soccer fields. Stream water may contain pathogens and which might pose a health risk if the public is exposed to such pathogens. If water treatment processes are to be used to minimize the risk of exposure to pathogens, what would be the

SEP 28 1998

cost to treat the irrigation water and how effective is the treatment? The Department of Health should be consulted on this matter.

e. <u>Costs of Irrigation Water Alternatives.</u> Page 3-63 indicates it would cost $7.4 million for transmission of irrigation water from the Honouliuli Wastewater Treatment Plant. What would be the cost of infrastructure development for the use of reclaimed water if the soccer complex were to be developed at Kapolei or Barber's Point? What would be the benefit of not using 4.7 mgd Central Oahu ground water and the restoration of stream flow in "d" above assuming that reuse water from the Honouliuli Wastewater Treatment Plant were to be used for the soccer field irrigation?

f. <u>Other Alternative Sources Of Irrigation Water.</u> The DEIS considered diversions from Waikele and Kapakahi Streams. However, no analysis is presented for possible diversions at Wailani Stream and Waiawa Springs. The relative merits of these possible sources should be presented in subsequent documents.

g. <u>Metering.</u> Report should describe diversion flow measurement as these quantities will need to be recorded and reported to the Commission on a monthly basis.

h. <u>Minimum Low-Flow.</u> Proposed minimum low-flow in the stream should be described.

If there are any questions, please contact Lenore Nakama at 587-0218 for ground water concerns and David Higa at 587-0249 for surface water concerns.

Sincerely,

Timothy E. Johns

TIMOTHY E. JOHNS
Deputy Director

DH:fc

c. Office of Environmental Quality Control
Dept. of Land and Natural Resources, Division of Aquatic Resources

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-225

October 9, 1998

Mr. Timothy E. Johns, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

Subject: Review Comments on the Draft Environmental Impact Statement <u>for the Waipio Peninsula Soccer Park Conceptual Master Plan</u>

Thank you for your letter of September 28, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to specific comments are provided below.

- Water Use and Development Plan. The project will be incorporated into the City & County's 20-year Water Use and Development Plan.

- Water Quality. All regulatory requirements will be met relative to water quality to avoid ground or surface water degradation or contamination.

- Permits and Approvals. All required permits and approvals will be obtained.

- Stream Diversion/Alteration. The project reactivates an existing stream diversion and will consist of maintenance to an existing structure. Coordination is ongoing with Commission staff regarding instream flow requirements. No stream alteration is planned. Rather than revise section 1.9 in the EIS, which is meant to be a summary, we are adding information on CWRM approvals to Chapter 4 (new section 4.9).

- Groundwater. Your comments are acknowledged.

- Diversion from Waikele Stream. The following text is being added to section 3.11.2.2: "Flow records indicate that between 1951 and 1989, when withdrawals were occurring from OSCO pumps WP-18 and WP-8, 30-day minimum stream flow of 5 mgd occurred 99 percent of the time. Once pumping ceased, the corresponding 30-day minimum flow increased to about 11 mgd. If the entire 4.6 mgd proposed for irrigation withdrawal were withdrawn from Waikele Stream alone, not as supplemented by the proposed well, a 30-day minimum flow of about 6.3 mgd or more would occur 99 percent of the time."

- Environmental Benefits of Waikele Stream Water Flow into Pearl Harbor Estuary. Impacts of the diversion on the estuary were evaluated and found to be not significant. Section 3.11.2.2 is being revised to reflect this finding.

- Possible Health Risk of Using Stream Water for Irrigation. The following text is being added to section 3.11.2.2:
"No significant health risk from the use of untreated stream water for irrigation on soccer fields is anticipated. Pathogens that may be present in stream water have rapid die-off rates upon application to dry land and are unlikely to represent a health risk (Memorandum for the Record, Roger Fujioka, Director, Water Resources Research Center, University of Hawaii, September 1998). This includes leptosporosis, which has not been specifically identified in Waikele Stream but is common in Hawaii. Leptosporosis is very susceptible to sunlight and drying (Memorandum for the Record, David Sasaki, Epidemiologist, Department of Health, State of Hawaii, September 1998)."

- Alternatives. The alternatives mentioned in items (e) and (f) in your letter were not evaluated.

- Metering. Diversion flow measurements will be reported separately.

- Minimum Low-Flow. See above.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

COPY

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

RECEIVED
'98 SEP 17 A 11:25

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

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

September 8, 1998

LOG NO:22181
DOC NO:9808SC16

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

SUBJECT: Chapter 6E-8 Historic Preservation Review of a Draft Environmental Impact Statement (DEIS) for the Waipio Peninsula Soccer Park
Waipio and Waikele, 'Ewa District, O'ahu
TMK: 9-3-002, 030, 031, 033, 034 & Pors 001, 009, 028 & 032; Portion TMK 9-4-008; TMK 9-4-011: Pors. 003, 046 &104; and TMK: 9-4-010: Pors. 008, 027, 057

Thank you for the opportunity to comment on the DEIS prepared for the proposed Waipio Peninsula Soccer Park. The project includes the planned construction of a 300-acre soccer park on Waipio Peninsula, improvement of two existing roadways (Waipio Point Access Road and Waipahu Depot Street), and the installation of a non-potable irrigation water transmission line. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject parcel although staff members Sara Collins and Elaine Jourdane have visited the nearby Pouhala Marsh area.

We just completed a review of the report which documents the results of an archaeological inventory survey of the proposed soccer park area. We have asked for some minor revisions and clarifications to be made to the report before accepting it as final and concurring with its recommendations (see attached copy of DOC NO: 9808SC15). Nonetheless, we have sufficient information with which to evaluate the subject DEIS, and our comments follow.

At least five historic sites are known to be within or immediately adjacent to the project area. Several of the Pearl Harbor fishponds -- Loko Eo (50-80-09-123), Loko Ulumoku (50-80-09-126), and Loko Hanaloa (50-80-13-125) -- underlie or are immediately adjacent to portions of the project area; all of these fishpond sites are significant under one or more criteria. Additionally, it is likely that precontact-early 1800s irrigated taro fields and houses also underlie part of the project area, and these archaeological ruins may be significant. All of the fishponds and any precontact taro fields and house sites lie under very deep, recently deposited fill soils; the proposed soccer park construction will take place entirely within the modern fill.

Only a few historic sites were found on the surface or in the fill areas to be disturbed by this project. Site 50-80-13-5597, a historic sugar cane irrigation complex of three features, was located within the project area. Site-5597 has been deemed significant under more than one criteria, but the inventory survey work has rendered the site "no longer significant," and it has not been recommended for preservation. We will likely concur with these findings once we receive the revised report. Additionally, a rock wall of probable historic age was recorded in the project area during the survey; we await additional clarification on its historic status. A portion of Site 50-80-12-9714, the Oahu Railway and Land (OR & L) Company railroad right-of-way, is outside the project area but may be adversely affected by the construction of a planned irrigation transmission line. While the OR & L right-of-way is on the National Register of Historic Places (NRHP), the portion affected by the subject project is a spur of the rail line, and is not a NRHP property. The inventory survey report deemed the OR & L spur as significant and recommended that the "adverse effects" of constructing the irrigation transmission line be mitigated in the form of monitoring and recordation. We anticipate concurring with these findings once we receive the requested revisions to the documentation of this site.

In view of these findings, we believe that the proposed soccer part and off-site improvements will have "no effect" on the precontact fishponds (sites-123, -126, -125) or any deeply buried precontact irrigated fields and habitation sites, or on the historic sugar cane irrigation system (SIHP No. 50-80-13-5597), and the wall section of probable historic age. If the monitoring and recordation of the OR & L Spur (SIHP No. 50-80-12-9714) are carried out according to an acceptable archaeological monitoring plan, reviewed and approved by our office, then the proposed soccer park will have "no adverse effect" on Site -9714.

Should you have any questions, please feel free to call Sara Collins at 587-0013.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:je

c: Mr. Gary Gill, OEQC
Ms. Anne Mapes, Belt Collins Hawaii, 680 Ala Moana Boulevard Suite 100, Honolulu, Hawaii 96813

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-209

October 9, 1998

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter dated September 8,1998, commenting on the Draft Environmental Impact Statement for the above referenced project. We also reference your letter to Anne Mapes of Belt Collins Hawaii, dated September 8, 1998, reviewing the archaeological inventory survey conducted for the project.

The minor revisions and clarifications to the inventory survey report requested in your letter to Ms. Mapes have been made, and a revised report has been submitted to your office for final acceptance. Assuming that the revisions are satisfactory, Section 3.8 of the DEIS is being updated to reflect your concurrence that the proposed soccer park and offsite improvements would have "no effect" on the precontact fishponds, any deeply buried precontact sites, the historic sugar cane irrigation system, and the wall section of probable historic age, and "no adverse effect" on the OR&L spur.

Should there be any questions, please have your staff call Clay Ching at telephone 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RFK:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR

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

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
STP 8.8848

October 2, 1998

DEPT OF DESIGN & CONSTR
C & C OF HONOLULU
'98 OCT 6 AM 7 28

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Waipio Peninsula Soccer Park
Draft Environmental Impact Statement (EIS)
Waipio Peninsula, O'ahu, Hawaii

Thank you for your letter of August 5, 1998, requesting our review of the subject report.

The proposed project will significantly affect our State highway facilities. Our comments are as follows:

1. The applicant should be responsible for the roadway improvements identified in Chapter 3.10.4, Proposed Mitigation Measures of the subject report, at no expense to the State.

2. We agree that Traffic Management Plans should be prepared and developed for implementation during special events.

3. The Draft EA should address the possibility of having joint use of the park facilities for the ferry terminal being proposed in Middle Loch.

We appreciate the opportunity to provide comments.

Very truly yours,

Kazu Hayashida
KAZU HAYASHIDA
Director of Transportation

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-223

October 9, 1998

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

Dear Mr. Hayashida:

Subject: Review Comments on the Draft Environmental Impact Statement <u>for the Waipio Peninsula Soccer Park Conceptual Master Plan</u>

Thank you for your letter of October 2, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are listed below:

1. We acknowledge that the City will be responsible for roadway improvements identified in the EIS at no expense to the State.

2. No response required.

3. Joint use of park facilities for a ferry terminal being proposed in Middle Loch is not feasible for several reasons. First, the park site does not extend to the water's edge at Middle Loch. Second, the site is within the Explosive Safety Quantity Distance (ESQD) arc, and specific approval was obtained from the Department of Defense for soccer use. No vertical construction will be permitted within the area encompassed by the inhabited building distance arc which encumbers most of the site. Third, as required in the proposed lease with the Navy, the City must comply with the National Environmental Policy Act before consideration will be given by the Navy for any "changed use."

Should there be any questions, please have your staff call Clay Ching at telephone 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GARY GILL
DIRECTOR

'98 SEP 23 PM 1 03

September 22, 1998

Mr. Randall K. Fujiki, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft EIS for the Waipio Peninsula Soccer Park, Oahu

Thank you for the opportunity to review the subject document. We have the following comments.

1. The final phase of this project involves the use of state lands. According to chapter 343, HRS, if there is any use of state lands, the Governor is responsible for accepting the EIS. Please explain why the Governor is not the accepting authority for this EIS.

2. It is well known that turf grass is difficult to grow at the nearby Ted Makalena Golf Course. We suspect that soccer fields will receive more stress than golf fairways. Please assess the viability of growing and maintaining turf grass for soccer use at this location.

3. The DEIS list 10 items as unresolved at this time. Please discuss how each item will be resolved or give the overriding reasons for proceeding before resolving the issues.

4. Please present a summary of the lab results done of the various soils samples taken from the site. In particular, please highlight the areas where metal concentrations exceed EPA's target levels. What is the basis for not taking remediation action to clean the soils?

5. To minimize the disturbance or disorientation of birds caused by any bright outdoor lights from the stadium or parking lot please design the lighting using DLNR's guidelines entitled "The Newell's Shearwater Light Attraction Problem, A Guide for Architects, Planners, and Resort Managers."

If you have any questions, please call Jeyan Thirugnanam at 586-4185. Thank you.

Sincerely,

Gary Gill
Director

c: Belt Collins

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-227

October 9, 1998

Mr. Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Review Comments on the Draft Environmental Impact Statement for the Waipio Peninsula Soccer Park Conceptual Master Plan

Thank you for your letter of September 22, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are as follows:

1. We recall that you raised the question of appropriate approval authority for this EIS when the DEIS was submitted to your office. In response to your request that the issue be discussed with the State, representatives of our department met with Mr. Gary Martin, acting Land Agent Supervisor in the Department of Land and Natural Resources. Mr. Martin indicated that his office would defer approval of the EIS to the City in view of the following circumstances: (a) the State parcel encumbered by the soccer park master plan is currently leased to the City for use as an ash landfill through the year 2029; (b) the vast majority of the site consists of Navy and City lands; and (c) no State funds are being used for the project.

2. Two kinds of turfgrass have been specified. Tifway 419, a hybrid bermudagrass, will be planted on the main field, and common bermudagrass will be used on the remainder of the fields. Both have deep root systems, resist wear, and are suitable for athletic fields in warm climates. Furthermore, they have low moisture requirements and are salt tolerant. In terms of traffic and wear, Tifway 419 provides the best recuperative rates of all warm season turf grasses.

3. Section 1.5, Summary of Unresolved Issues, and section 5.4, Unresolved Issues, are being revised. These are operational rather than environmental issues, and they are being resolved in the planning and design process. Certain operational issues associated with Phase 2 would be addressed in due time, but this phase has yet to be programmed or funded.

4. There is no basis for remediation since the metal concentrations in soils are less than EPA preliminary remediation goals (PRGs), or in the case of arsenic and chromium, within documented background concentrations typical of Hawaii soils. Concentrations of these metals in Hawaii soils are highly variable. Arsenic in Hawaii soils naturally range from 5 parts per million (ppm). to 30 to 50 ppm. On-site concentrations of arsenic had a mean of 18 ppm. Chromium concentrations in Hawaii soils range from 300 ppm to 900 ppm. On-site concentrations of chromium had a mean of 221 ppm. The metals were found throughout the site. The attached map and tables show these results.

   Also, a site-specific action level (AL) was developed based on EPA's human health risk-based models adjusted for actual site exposure conditions. The ALs were calculated based on achieving a one in a million excess cancer risk, which is equivalent to the risk level EPA uses to establish PRGs. These site-specific ALs are greater than on-site concentrations for the metals of concern.

5. DLNR's guidelines will be taken into consideration in the design of outdoor lighting. In Phase 1, only three of the 19 fields will be lighted for night use.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
Attach.
cc: Stringer Tusher Architects
Belt Collins Hawaii

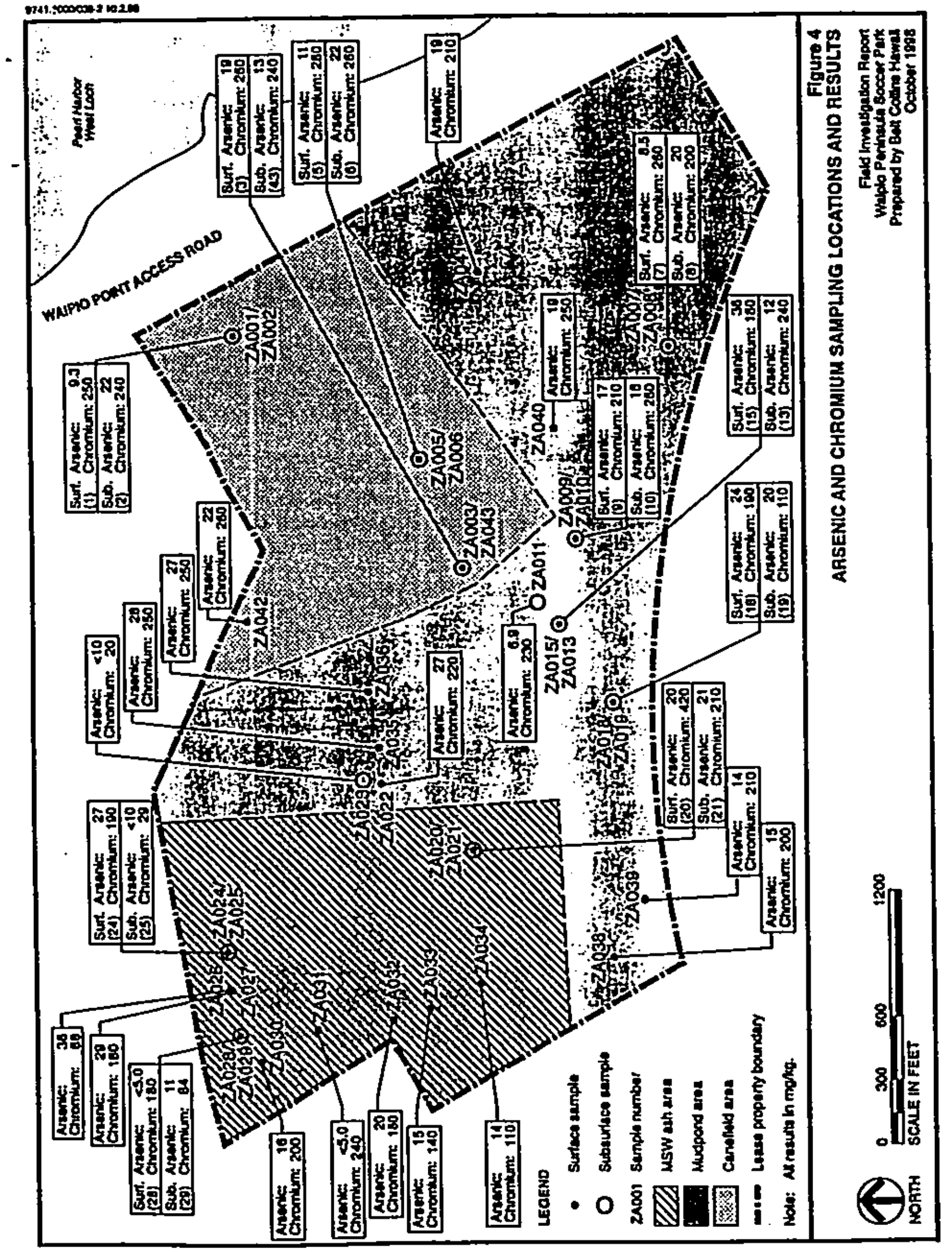


Figure 4
ARSENIC AND CHROMIUM SAMPLING LOCATIONS AND RESULTS
Field Investigation Report
Waipio Peninsula Soccer Park
Prepared by Belt Collins Hawaii
October 1998

PROPOSED WAIPIO SOCCER COMPLEX: FIELD INVESTIGATION SUMMARY OF SOIL ANALYTICAL RESULTS

Table 1: Summary of Results for Detected Organic Compounds[1,2]

CATEGORY	ANALYTE	FREQUENCY OF DETECTION (%)	MAXIMUM (PPB)	MEAN (PPB)	95% UCL (PPB)	RESIDENTIAL PRG (PPB)	SITE ACTION LEVEL (PPB)
Chlorinated herbicides (8081A)	2,4-D	2.7	9.7	44.06	68.63	640000	640000
	2,4-DB	2.7	9.7	38.88	68.63	440000	440000
	2,4,5-T	2.7	9.7	38.88	68.63	440000	440000
Chlorinated pesticides (8151A)	4,4-DDD	22.6	47	38.88	10.33	2400	2400
	4,4-DDE	48.7	250	38.88	59.23	1700	1700
	4,4-DDT	48.7	240	38.88	59.23	1700	1700
	Dieldrin	5.4	6.2	2.62	3.33	28	28
Dioxins	2,3,7,8-TCDO	64.9	0.0031	0.00070	0.00091	0.0038	0.0038
	TEQ	100	0.184	0.05013	0.06652	1	1

Notes:
1. Does not include duplicate samples; that data provided separately in Section 4.2.
2. One-half the detection limit was used for non-detect results for all calculations.

Table 2: Summary of Detected Inorganic (Metals) Results[1,2]

ANALYTE	FREQUENCY OF DETECTION (%)	MAXIMUM (MG/KG)	MEAN (MG/KG)	95% UCL (MG/KG)	RESIDENTIAL SOIL PRG (MG/KG)	SITE SPECIFIC ACTION LEVEL[3] (MG/KG)
Arsenic	89.2	36[4]	18.02	20.62	0.38 (ca)[5] 21 (nc)	21
Chromium	100	420	203.5	228.37	210	1493
Lead	89.2	57	18.15	19.81	400	400
Mercury	89.2	0.39	0.15	0.18	220	220
Nickel	94.6	600	252.41	296.8	15000	15000
Zinc	94.6	1300	168.76	234.6	2.2×10^7	22,000

Notes:
1. Does not include duplicate samples; that data provided separately in Section 4.2.
2. One-half the detection limit was used for non-detect results for all calculations.
3. In accordance with the Planning Document, site-specific action level is residential soil PRG or Tier IB (modified Tier II) human health risk assessment, calculated AL.
4. Bold indicates concentration exceeds published residential PRG.
5. Ca = cancer PRG; nc = non-cancer PRG

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

September 11, 1998

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF AUGUST 5, 1998 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK

'98 SEP 15 8 07

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Waipio Peninsula Soccer Park.

We have the following comments to offer:

1. The existing water system is presently adequate to accommodate the potable water requirements of the proposed Waipio Peninsula Soccer Park.

2. We understand the proposed irrigation requirements and on-site fire protection will be provided by a nonpotable water (NPW) system. We note that the NPW system will not have elevated storage to provide adequate flow and pressure in the event of a power outage. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

3. The availability of water will be confirmed when the building permit applications are submitted for our review and approval. When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

4. If a three-inch or larger meter is required, construction drawings showing the installation of the meter should be submitted for our review and approval.

5. Board of Water Supply (BWS) approved reduced pressure principle backflow prevention assemblies (RP's) are required after all domestic water meters. The relief port of the RP must be at least one foot above the regulatory flood elevation.

6. BWS is funding the construction cost of the off-site nonpotable water source and transmission main for the Waipio Peninsula Soccer Park, the Ted Makalena Golf Course, and Navy lands.

7. We understand a Water Use Permit will not be required for the development of surface water from the existing Waikele Stream diversion (WP-18). A stream channel alteration permit may be needed from the Commission on Water Resource Management if the WP-18 diversion structure needs major repairs or modifications.

8. The new 12-inch main replacement project along Waipahu Depot Road from Fire Hydrant L-295 to the Waipahu Incinerator Compound Meter is currently under design and is tentatively scheduled for award for construction in fiscal year 1998-99 (see figure 2 of attachment). We have no scheduled future Research and Facilities Improvement Program projects to replace the existing 8-inch main along Waipahu Depot Road from Farrington Highway to Fire Hydrant L-295.

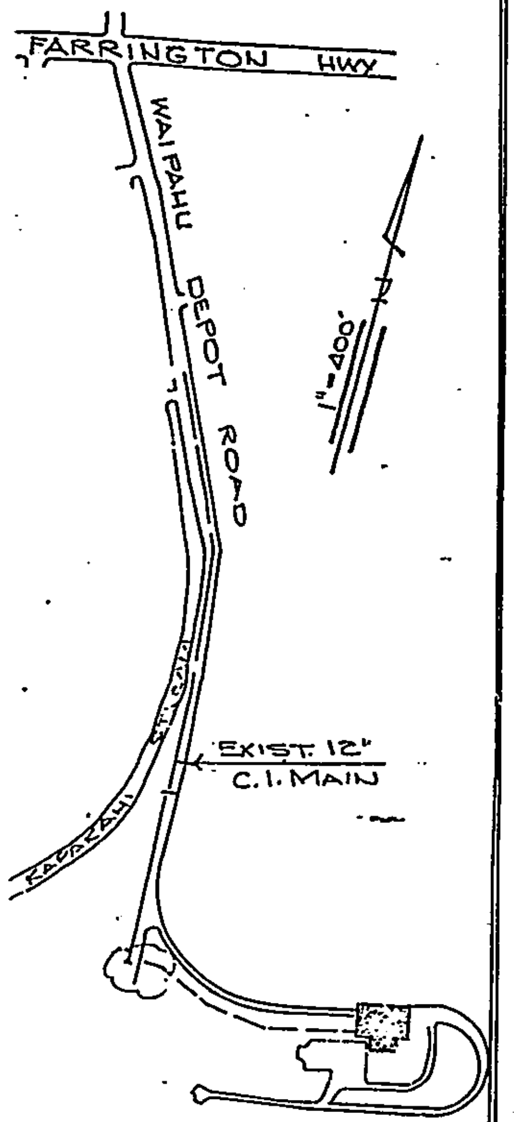
9. The project should utilize drought and chloride tolerant landscaping to minimize the irrigation water demand. Moisture and rain sensor systems should be incorporated into the irrigation systems.

10. The peninsula is located in the Pass-Zone where the application of lower quality irrigation water will have no effect on potable water supplies.

11. The DEIS should provide information on the storage capacity of the soccer and golf lakes and evaluate additional lakes to provide storage for peak irrigation demands, on-site fire protection and to minimize the need to withdraw stream flows during low flow conditions in Waikele Stream. If R-1 reclaimed water becomes available in the future, the peninsula should convert to reclaimed water, and use the Waikele source for standby purposes.

If you have any questions, please contact Barry Usagawa at 527-5235.

Attachments



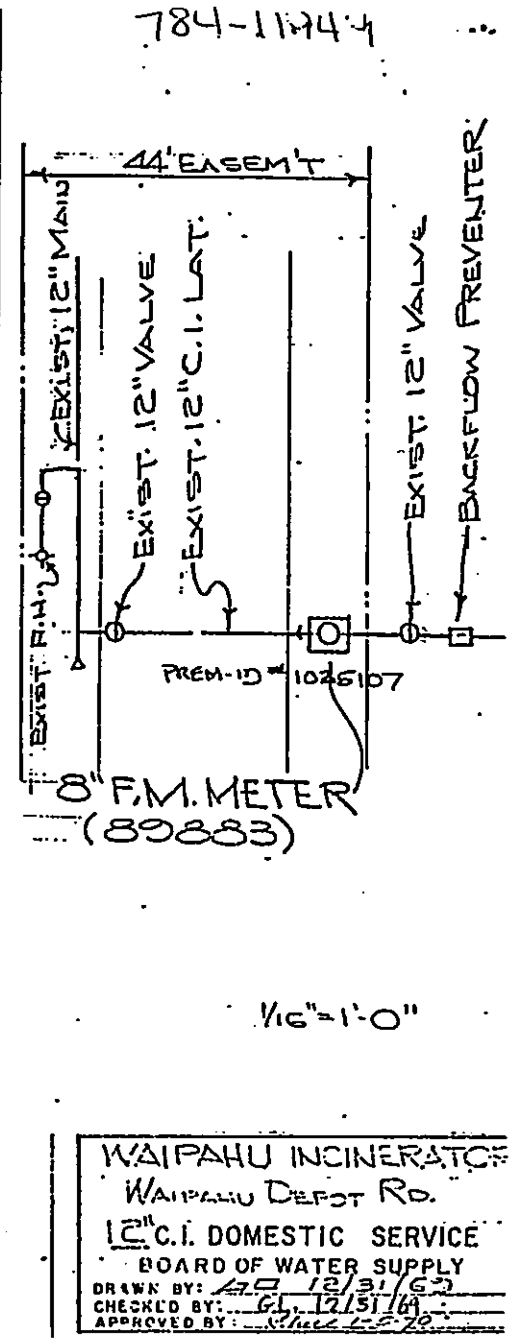


FIGURE 1

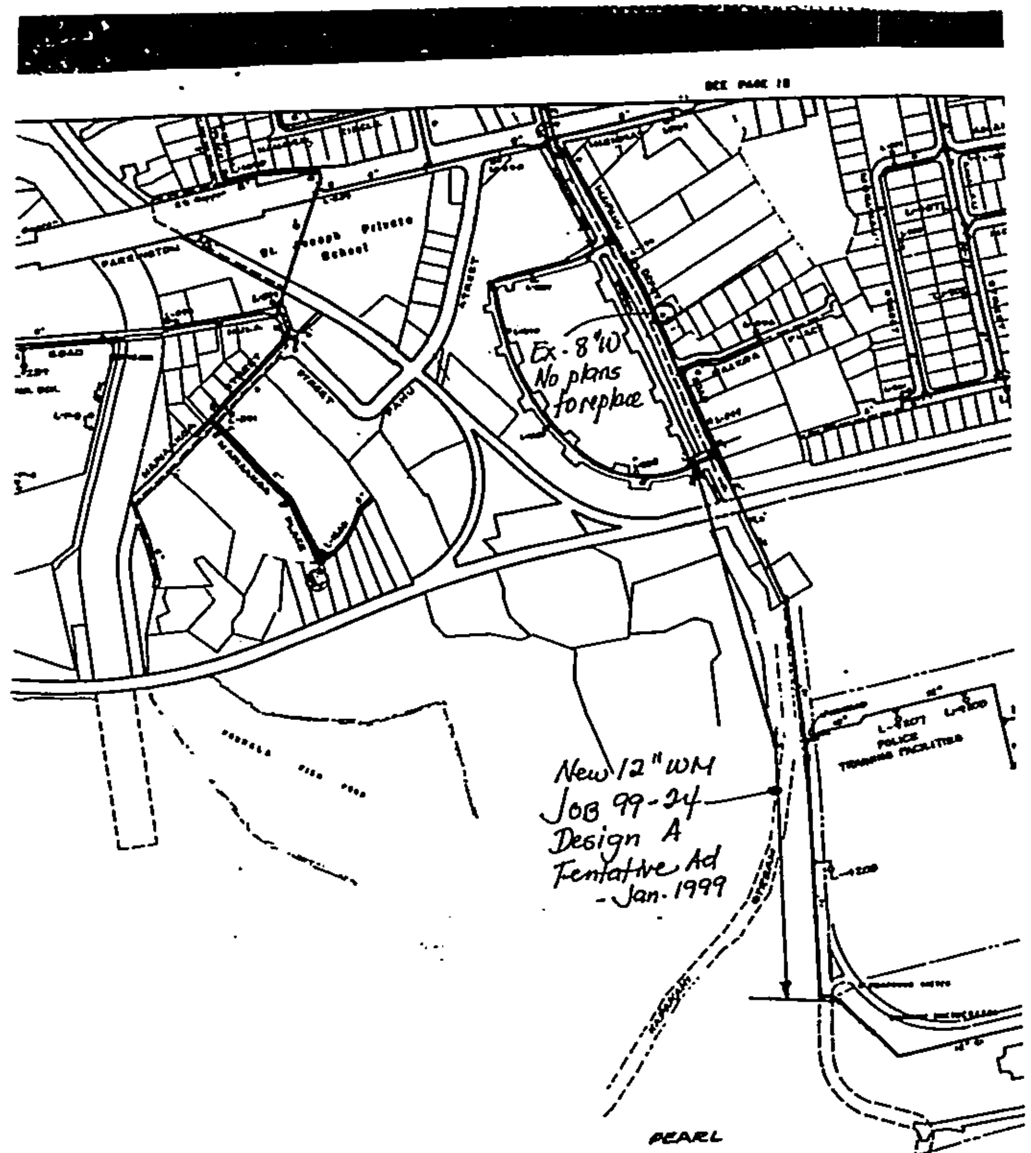


FIGURE 2

ATTACHMENT

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-207

October 9, 1998

MEMO TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letter of September 11, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. The following are responses to specific comments of your letter, keyed to the order in which they were presented:

1. No response required.
2. As requested, onsite fire protection requirements will be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.
3. We acknowledge that Water System Facilities Charges will have to be paid for resource development, transmission, and daily storage.
4. Construction drawings for meters larger than three inches will be submitted for review and approval.
5. The project will comply with BWS requirements regarding reduced pressure principle backflow prevention assemblies (RP's).
6. No response required.
7. We understand that a stream channel alteration permit may be required from the Commission on Water Resource Management.

8. No response required.
9. Drought and salt tolerant turf and landscape species are being specified in the landscape plan. The plan includes the installation of moisture and rain sensor systems.
10. The reservoir in the Ted Makalena golf course will provide sufficient capacity to supply the peak irrigation demand of the golf course and the first phase of the soccer park plus the soccer park first phase fire flow with approximately a one and one-half day reserve supply. A second reservoir may be constructed in the golf course when the soccer park is expanded. This information is being added to section 3.11.2.2. It is not economically feasible to provide additional storage of any significant quantity. Since low stream flows are likely to be for longer periods than several days, it is not practical or possible to supply more than several days from the reservoir or reservoirs in the golf course. A well or wells will be needed to provide water during low steam flow conditions.

    If reclaimed water is made available at costs that would allow the City and County to continue to economically irrigate the soccer park and the golf course and to sell water to the Navy at presently negotiated rates suitable to agricultural users, the City and County would be agreeable to the use of R-1 reclaimed water.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU HI 96813

RECEIVED
1998 SEP 21 A 11:23

JEREMY HARRIS
Mayor

KENNETH E. SPRAGUE
Director

CHERYL K. OKUMA-SEPE, ESQ.
Deputy Director

ENV 98-178

September 18, 1998

MEMORANDUM

TO: MR. RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: KENNETH E. SPRAGUE, DIRECTOR CHERYL K. OKUMA-SEPE
DEPARTMENT OF ENVIRONMENTAL SERVICES

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
WAIPIO PENINSULA SOCCER PARK
TMK: VARIOUS

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

1. We can provide refuse collection service if requested, though the type of equipment for collection cannot be determined at this time.

2. Recycling of solid waste is referred in this DEIS as a mitigative measure. We encourage the implementation of programs to recycle solid waste generated by this development.

If you have any questions, please contact Alex Ho, Environmental Engineer, at 523-4150.

cc: OEQC ✓
Belt Collins Hawaii (Ann Mapes)

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-216

October 9, 1998

MEMO TO: KENNETH E. SPRAGUE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letter of September 18, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

August 24, 1998

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR
WAIPIO PENINSULA SOCCER PARK
WAIPIO PENINSULA, O'AHU, HAWAII

We received correspondence dated August 5, 1998 from your department, regarding the subject property's Draft Environmental Impact Statement. We will not require any additional improvements other than those mentioned in our correspondence to your office dated June 2, 1998, HFD Internal No. OL 98-211. In addition, we request that a full set of plans be routed to the respective agencies prior to actual construction.

Should you need additional information, please call Battalion Chief Charles Wassman of our Fire Prevention Bureau at 831-7778.

Attilio K Leonardi
ATTILIO K. LEONARDI
Fire Chief

AKL/CW:bh

'98 AUG 25 PM 47
C & C OF HONOLULU

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-218

October 9, 1998

MEMO TO: ATTILIO K. LEONARDI, FIRE CHIEF
HONOLULU FIRE DEPARTMENT

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letter of August 24, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

As requested, a full set of plans will be routed to applicable agencies prior to actual construction.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX: (808) 523-4054

'98 SEP 22 A11:23

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

MICHAEL T. AMII
DEPUTY DIRECTOR

September 18, 1998

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK
WAIPIO PENINSULA, OAHU, HAWAII

We have reviewed the above-referenced document and have no comments to offer at this time.

Thank you for the opportunity to review the draft environmental impact statement.

If you have any questions, please contact Mr. John Eveland, Executive Assistant, at 527-6038.

Michael Amii

FOR WILLIAM D. BALFOUR, JR.
Director

WDB:cu
(98-1885GT)

cc: Office of Environmental Quality Control
√Belt Collins Hawaii

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-217

October 9, 1998

MEMO TO: WILLIAM D. BALFOUR, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: FOR RANDALL K. FUJIKI

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK
CONCEPTUAL MASTER PLAN

Thank you for your letter of September 18, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
PHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

98-05989(ST)
'98 EA Comments Zone 9

September 22, 1998

'98 SEP 23 AM 8 05
DEPT. OF DESIGN & CONSTR
C & C OF HONOLULU

MEMORANDUM

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

ATTN: CLAY CHING

FROM: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN
TAX MAP KEYS: 9-3-2: 30, 31, 33, 34 AND PORS. 1, 9, 28, 32; 9-4-10: PORS. 8, 27, 57; 9-4-11: PORS. 3, 46 AND 104

We have reviewed the Draft EIS for above-referenced project received on August 7, 1998, and have the following comments:

SECTION 1.3 - SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Topography, Geology, and Soils: This section of the final EIS should be revised to indicate that it has not yet been determined whether soil mitigation will be required before the development of Phase II's Training Center (the abandoned Waipahu Incinerator) or the western soccer fields which are sited on the former ash landfill.

SECTION 3.2 TOPOGRAPHY, GEOLOGY, AND SOILS

Similarly, Subsection 3.2.3 Proposed Mitigation Measures, should be expanded to discuss the soil remediation that would be required if contaminated soils are found at the Train Center site. Also, inasmuch as the development of a portion of Phase II's western soccer fields appear to be dependant on the closure and capping of the landfill (page 3-6), the final EIS should be revised to elaborate on this activity (i.e., its anticipated timing and possible contingencies).

SECTION 3.11.3 Wastewater Collection, Treatment and Disposal

We note that although a sewer connection may be made directly to the Waipahu Wastewater Pump Station, this facility is nearing capacity. Therefore, a capacity reservation should be made immediately.

Relative to Potential Impacts, our calculations of peak flow are significantly greater than the estimated 46,000 gallons per day (gpd) indicated in the Draft EIS. The final EIS should provide calculations indicating how this figure was arrived at for the full build out of this facility. The final EIS should also include flow estimates for the support facilities such as locker rooms, food services and training facilities.

Please note that this EIS cannot be construed as a confirmation of sewer capacity reservation. Such a reservation is contingent on the submittal and approval of a "Sewer Connection Application" form. We also note that this project is liable for payment of a Wastewater System Facility Charge.

SECTION 3.5 Hydrology, Drainage, and Floodplains

The final EIS should include an exhibit illustrating the proposed project area relative to the Flood Insurance Rate Map (FIRM) flood boundaries. Since most of the proposed project area is designated within Zone D, areas in which flood hazards are undetermined, a complete drainage report will be required prior to the start of construction.

CHAPTER 4 Consistency with Land Use Plans, Policies, and Controls

The Draft EIS fails to indicate that the proposed project is located with the Special Management Area (SMA) established pursuant to Chapter 25, Revised Ordinances of Honolulu (ROH).

Insofar as the EIS is intended to disclose all relevant issues and regulations, this portion of the final EIS should be revised to indicate that the proposed project and off-site improvements (i.e., waterline, access roads, etc.) are located within the SMA. An exhibit should also be added which illustrates the SMA boundary relative to the project area. This chapter should also be expanded to include a discussion on why the approval of a SMA Use Permit will not be required for the development of the Soccer Park and associated off-site improvements.

We have no other comments to offer at this time. Should you have any questions, please contact Steve Tagawa of our Coastal Lands Branch at 523-4817.

for JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: James Bell, Belt Collins Hawaii
Gary Gill, Office of Environmental
Quality Control

g:zd\9805989.sht

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JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

'98 EA Comments Zone 9(ST)

September 25, 1998

MEMORANDUM

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

ATTN: CLAY CHING

FROM: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR
WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN
TAX MAP KEYS: 9-3-2: 30, 31, 33, 34 AND PORS. 1, 9, 28, 32;
9-4-10: PORS. 8, 27, 57; 9-4-11: PORS. 3, 46 AND 104

The following are our additional comments on the Draft EIS for the above-referenced project which were not included in our previous letter dated September 22, 1998.

SECTION 3.10 - ROADWAYS AND TRAFFIC

The jurisdiction of roadways within and servicing the proposed park should be specified and a plan showing the limits of each should be provided. It appears that the roadway internal to the park would function as a park road and would, therefore, be maintained by the Department of Parks and Recreation. Roads external to the park would appear to fall under the Department of Transportation Services and Farrington Highway would continue to function as a State Department of Transportation facility.

A roadway master plan for this project should be provided during the early stages of the development and should include roadway cross-sections for Waipio Point Access Road and Waipahu Depot Road. The cross-sections should show lane width, sidewalk/shoulder areas and bikeway facilities. Schematic intersection designs should also be included and should show required lengths of turning lanes.

Traffic signal warrants should be conducted at street intersections to determine whether traffic signals or underground conduits would need to be installed at the time the roadways servicing the site are widened and improved.

We have no other comments to offer at this time. Should you have any questions, please contact Steve Tagawa of our Coastal Lands Branch at 523-4817.

JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: James Bell, Belt Collins Hawaii
Gary Gill, Office of Environmental Quality Control

glzd\9805909z.aht

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JEREMY HARRIS
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RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-229

October 9, 1998

MEMO TO: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letters of September 22 and September 25, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are as follows:

1. Sections 1.3 and 3.2, Topography, Geology, and Soils. Section 1.3 is being revised to summarize findings of the soils tests and indicate that mitigation of potential environmental contamination in the Phase 2 area, including the incinerator site, has not yet been determined. Implementation of Phase 2 will depend upon the availability of future funding, not yet confirmed. Development is not expected to occur until 2010 or later, and there is no schedule for the project. If this phase proceeds, additional environmental work may have to be conducted by the City to develop the incinerator site. A discussion of soil remediation at this time would be premature without more complete data and more detailed plans on the future use of the site. It is noted that occupancy of the site by a building on slab, compared to using the site for playing fields, would result in lesser or no exposure to soils.

2. Section 3.11.3, Wastewater Collection. We are correcting the DEIS to state that the 46,000 gpd represents peak flow for Phase 1 only. Peak flow at build-out is estimated to be 257,000 gpd, and design average flow at build-out would be approximately 53,700 gpd.

3. Section 3.5, Hydrology, Drainage, and Floodplains. Flood boundaries as shown on the Flood Insurance Rate Map are being added to Figure 3-3. A drainage study is being prepared as part of the engineering design for the project.

4. Chapter 4, Consistency with Land Use Plans, Policies, and Controls. A new section is being added in Chapter 4 (Section 4.8) to discuss the inapplicability of an SMA Use Permit in this case. Figure 2-6 is being revised to show the location of the SMA boundary.

   An SMA Use Permit is not applicable in this particular case as (1) lands owned by the federal government are not subject to state planning and regulatory processes since the same are excluded from the definition of "Coastal Zone" under the Coastal Zone Management Act of 1972; and (2) the federal government's lease of federal property within the Coastal Zone to the City for the development of the project comes within the jurisdiction of the State Office of Planning and is subject to the State's consistency review process. Consistent with the above, a CZM application and addendum have been submitted to the Office of Planning, State Department of Business, Economic Development and Tourism, certifying that the project is consistent with CZM objectives and policies.

5. Section 3.10, Roadways and Traffic. Rather than add another map, text in this section and in section 2.3 is being revised to clarify the various jurisdictions (Department of Parks and Recreation, Department of Transportation Services, and State Department of Transportation). Plans for the roadway improvements will be provided during the early stages of development, including cross-sections for Waipio Point Access Road and schematic intersection designs for Farrington Highway. Traffic signal warrants will also be conducted. However, no improvements are currently planned for Waipahu Depot Street. For Phase 1, a roadway connection would allow access to and from the park via Waipahu Depot Street only during special events. At all other times the Waipahu Depot Street access would be closed. Potential projects for Phase 2 include improvements to Waipahu Depot Street, as well as improvements to its connection with Farrington Highway. Plans for these projects will be provided when Phase 2 is implemented.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

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PATRICK T. ONISHI
CHIEF PLANNING OFFICER

DONA L. HANAIKE
DEPUTY CHIEF PLANNING OFFICER

GW 8/98-1578

September 14, 1998

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: PATRICK T. ONISHI
CHIEF PLANNING OFFICER

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK, WAIPAHU, OAHU, HAWAII

Thank you for providing us a copy of the Draft Environmental Impact Statement (DEIS) for the above-referenced project. The Central Oahu Development Plan Public Facilities Map (DPPFM) shows a park symbol for the proposed soccer park and appropriate symbols for the proposed roadway improvements. We are in receipt of your application to amend the DPPFM to add a symbol for a non-potable water system. Upon adoption of this DPPFM amendment, the proposed project will also be consistent with the Development Plan provisions for Central Oahu.

Section 1.1.1 of the DEIS states "[t]he Department of Design and Construction is the approving agency for the EIS, and the Mayor of the City and County of Honolulu is the accepting authority for the EIS." Mayor's Directive 89-2 assigned responsibility for acceptance of Environmental Impact Statements prepared by City agencies, except the Board of Water Supply, to the Planning Department. Accordingly, the Planning Department will serve as the accepting authority for the Final Environmental Impact Statement (FEIS) for this project.

We offer the following additional comments for your consideration in preparation of the FEIS for this project.

1. Sec. 1.1.2, General Project Description, 8th bullet, pg. 1-3 (and elsewhere throughout the DEIS): The FEIS should recognize that development of the non-potable water irrigation system will involve construction of a line through the Ted Makalena Golf Course as well as construction of reservoir ponds within the golf course.

2. Sec. 1.3, Noise Quality, 1st paragraph, last sentence, pg. 1-6: This sentence should be revised to incorporate the comments of Stanford B.C. Yuen, Deputy Engineer, Naval Base, Pearl Harbor, as set forth at No. 13 in the table of comments accompanying his letter of March 5, 1998, which is included in Chapter 6 of the DEIS.

3. Sec. 1.3, Traffic Impacts, 2nd sentence, pg. 1-7: This sentence should be amended to clarify that Farrington Highway is a State-owned roadway and that City plans for improvements to highway will be coordinated with the State Department of Transportation.

4. Sec. 1.5, Summary of Unresolved Issues, pp. 1-8 & 1-9: Although presented as a summary, this section merely reproduces the list of unresolved issues presented in Section 5.4, which provides no discussion of those issues. The FEIS should discuss each of the unresolved issues to address (1) why they are important to the environmental considerations concerning this project, and (2) why those issues continue to be unresolved.

5. Sec. 1.7, Necessary Approvals and Permits, pg. 1-9: The list of "Direct Project Specific Permits and Approvals" should be revised to include amendment of the DPPFM to add a symbol for the proposed non-potable water system.

6. Sec. 2.2, Project Need, pg. 2-1:
   - (a) The discussion of existing soccer facilities should be augmented to enumerate facilities that may be available at venues that are not under the City's direct purview, including any State (Department of Education), Federal and private venues.
   - (b) The discussion compares the number of soccer teams and participants on Oahu with the number of soccer fields in Central Oahu. To provide clarity, the discussion should be augmented to address the estimated number of soccer teams/participants resident in Central Oahu.

7. Sec. 2.2.2, Future Demand, 1st sentence, pg. 2-2: This sentence cites a rate of 5-7 percent per year growth in the number of soccer players on Oahu; similar growth rates are cited at other instances throughout the DEIS and its appendices, without reference to authoritative factual support. The FEIS should provide a discussion of how this growth rate has been determined.

8. Sec. 2.2.2, Future Demand, 1st bullet, pg. 2-2: The reference to "Waiola Sports Complex" should be revised to "Central Oahu Regional Park."

9. Sec. 2.3. Non-Potable Irrigation Water Transmission Line Alignment, pg. 2-9:
   (a) If alternate alignments are being considered they should be discussed. If no alternate alignments are being considered, the FEIS should explicitly state that.
   (b) The text regarding "City and County Central Oahu Development Plan" should be revised as follows: "City and County Central Oahu Development Plan Land Use Map: Park; Public Facilities; Residential; Preservation; Military."
   (c) The text regarding "City and County Central Oahu Public Facilities Map" should be revised as follows: "City and County Central Oahu Development Plan Public Facilities Map: P[ublicy funded park/golf course; p]ublicly funded solid waste modification, site determined, within six years; publicly funded sewer system, within six years; publicly funded park, site determined, within six years; publicly funded park, site undetermined, beyond six years; publicly funded transportation system, additional right of way and new streets, within six years; publicly funded transportation system, improvements within existing right of way, within six years."

10. Sec. 2.3. Build-out (Phase 2), item 2, pg. 2-16: This description should be amended to include mention of the two indoor soccer stadia that will be developed as part of the incinerator renovation.

11. Sec. 2.3. Build-out (Phase 2) last paragraph on pg. 2-16: The FEIS should clarify if funding of the non-potable water system improvements is included within the cited $12 million authorized and appropriated project funding.

12. Sec. 2.4.2. Alternative Sites, third paragraph, pg. 2-19: This paragraph states that "[s]ites outside the Central Oahu area were evaluated for comparative purposes, even though they do not meet the basic requirement that the soccer park be located in Central Oahu." First, it is unclear why location of the park in Central Oahu is considered a "basic requirement." Second, if the evaluation of alternate sites is based on a presumption that certain of the sites will not be suitable, then the evaluation of those sites cannot be considered supportive of and responsive to the goals of Chapter 343, HRS. The FEIS should (1) clarify why the soccer park must be located in Central Oahu and (2) restrict the evaluation of alternate sites only to sites that can meet the project criteria.

13. Sec. 2.4.2. Alternative Sites, last paragraph, 1st sentence, pg. 2-19: The ranked evaluation should be characterized as "normative" rather than "empirical."

14. Sec. 2.4.6. Public Resource Commitments for Proposed Project, pg. 2-21: The FEIS should clarify if the cost of developing the non-potable water system is to be borne entirely by the soccer park budget or if other funding will be made available.

15. Sec. 3.10.3.3. Projected Traffic With Soccer Park (2001), 5th paragraph, pg. 3-43: The FEIS should provide an empirical basis for the assumption (not "procedure") that two-thirds of the trips generated by the park will originate in the area from Aiea to the Waianae coast.

16. Sec. 3.11.3.3. (Wastewater) Potential Impacts, pg. 3-67:
   (a) We note that the methodology used to determine wastewater flows generated by the park appears to differ from that used by the City in its evaluation of permit applications, e.g., it does not account for flows due to infiltration/inflow. The FEIS should clarify that the calculation method used has been discussed with the appropriate City agencies and has met with their approval.
   (b) The 2nd paragraph notes that a pump station will be used to aid in the conveyance of effluent to the nearest acceptable manhole. The FEIS should clarify if this pump station will be provided as part of this project.

17. Sec. 3.11.4.3. (Solid Waste) Potential Impacts, pg. 3-68: The collection and recycling of green waste implies on-site composting. The FEIS should clarify if on-site composting will be used, the relative volume of material to be composted, where the composting facility will be located and how it will be configured, and if any permits or permit conditions will be involved.

18. Sec. 3.12.1.2. (Health Care) Potential Impacts, pg. 3-71: The assumption that the types of injuries that may be encountered at the park will not constitute "medical emergencies" may not be reasonable. Those injuries may include compound fractures, head and neck trauma, and heat stroke, all of which should be considered and treated as medical emergencies. Preparers of the FEIS should closely examine this assumption.

19. Sec. 3.12.3.1. (Fire Protection) Existing Conditions, pg. 3-72: The FEIS should clarify whether the cited Manana military fire station would respond to fire and medical emergencies at the park.

20. <u>Sec. 3.13.4 (Noise) Proposed Mitigation Measures, 3rd paragraph, pg. 3-74:</u> This paragraph implies that the Police Academy would be expected to schedule its activities around park events. Given the critical public safety role of the Police Academy, the FEIS should indicate that event organizers would be required to coordinate event schedules with the Academy.

21. <u>Sec. 4.2.2, State Conservation Lands Functional Plan, pg. 4-7:</u> Elsewhere the DEIS states that development of the park will entail destruction of some existing habitat used by wildlife species which are not candidates for listing, threatened or endangered. The FEIS should clarify whether the negative impact of such habitat destruction is mitigated by the project's positive impacts and the provision of irrigation ponds as water features for the park and adjoining golf course.

22. <u>Chapter Six:</u> We note that, per OEQC guidelines, a letter of the form used to respond to EISPN commenters will not be considered responsive regarding comments on the DEIS. Also, as noted in Comment 2 above, the comments of at least one EISPN respondent were not appropriately addressed in the DEIS. Preparers of the FEIS should take careful note of all comments received and responses made to assure that all comments are incorporated or otherwise appropriately addressed.

If you should have questions or concerns regarding these comments, please do not hesitate to contact Gordon Wood of the Planning Department staff at 527-6073.

PTO:lh

c: Gary Gill, Director, OEQC
Ann Mapes, Belt Collins Hawaii

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ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-230

October 9, 1998

MEMO TO: PATRICK D. ONISHI, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letter of September 14, 1998, commenting on the Draft Environmental Impact Statement for the above referenced project.

We will revise the document to state that the Planning Department will serve as the accepting authority for the Final EIS. Our responses to your other comments are listed below.

1. Section 1.1.2 and other sections of the document are being revised to clarify that construction of the non-potable water irrigation system will involve construction of a line through the Ted Makalena Golf Course and reconstruction of a reservoir within the golf course.

2. Section 1.3, Noise Quality, is being revised to acknowledge that cheering and other noise from soccer activities would be ongoing, although intermittent, but not temporary.

3. Section 1.3, Traffic Impacts, is being revised to clarify that Farrington Highway is a State-owned roadway and that City plans for improvements will be coordinated with the State Department of Transportation.

4. Section 1.5, Summary of Unresolved Issues, and section 5.4, Unresolved Issues, are being revised. Most of these are design, permitting, or operational rather than environmental issues, and they are being resolved in the planning and design process. Certain issues associated with Phase 2 would be addressed in due time, but this phase has yet to be programmed or funded.

5. Section 1.7, Necessary Approvals and Permits, has been revised to include amendment of the Development Plan Public Facilities Map to add the proposed non-potable water system.

6. (a) The following text is being added to Section 2.2.1: "Other playing fields are located at schools, but these are generally not available for league activities since school programs have priority. Recreation facilities on military bases are generally reserved for use by military personnel and dependents."

   (b) In Central Oahu, AYSO youth enrollment is approximately 7,000, and an additional 1,500 or more participate in HYSA and adult leagues. This data is being added to section 2.2, Project Need. Also being added to this section is information from the City and County soccer task force regarding the limited enrollment of players in Waipahu, Waipio, and Waikele due to a shortage of fields.

7. The five to seven percent annual growth reflects the increase in enrollment experienced by AYSO and HYSA in recent years. This information is being added to footnote 1 in section 2.2.2.

8. The reference to "Waiola Sports Complex" is being changed to "Central Oahu Regional Park."

9. Regarding the non-potable irrigation water transmission line, other alignments were considered in the planning and design process but they were either impractical, significantly more costly, or did not meet the project objectives. The following text is being added to the end of section 2.4.3, Alternative Development Schemes: "During the planning and design process, other options have been considered, including variations to the irrigation transmission line. The selected alignment meets the project objectives (for example, the line must serve the golf course) and is most cost effective."

10. Section 2.3 is being revised to mention development of the two indoor soccer facilities on the incinerator site.

11. A total of $14 million is appropriated for the project: $12 million for the Department of Design and Construction to develop the soccer park and $2 million for the Board of Water Supply to develop the off-site non-potable water system.

12. Section 2.4.2 is being revised to clarify that location of the soccer park in Central Oahu was not a primary criteria or basic requirement in the site evaluation. The sentence at the top of page 2-19 is being deleted. It turned out in the evaluation that suitably large sites located close to urban populations do not exist in districts other than central and west Oahu.

13. Section 2.4.2 is being revised in accordance with your comment ("normative" rather than "empirical").

14. Section 2.4.6 is being revised to clarify funding information (see item 11 above).

15. Section 3.10.3.3 states that this assumption is based on the projected population distribution for Oahu in 2005, as forecast by the City and County of Honolulu. This section goes on to explain that because of the location of the soccer park, most of its users would be residents of the surrounding region, i.e., between Waianae and Aiea. This is a reasonable assumption given the overwhelming experience of the youth soccer and other sports leagues as being community based.

16. (a) The wastewater flows for the project have been revised and are reflected in the Sewer Connection Application submitted to the City Department of Environmental Services. These revised figures account for flows due to infiltration/inflow. Section 3.11.3.3 is being revised accordingly. Estimated peak flow at build-out would be 257,000 gpd; design average flow at build-out would be approximately 53,700 gpd.

    (b) The EIS is being revised to clarify that the pump station will be provided as part of the project.

17. Green waste will be managed in accordance with Department of Parks and Recreation policies to comply with the landfill ban on the acceptance of green waste. No onsite composting is planned. Green wastes may be stored on site and used for mulch or provided to a commercial compost business for processing and reuse. Section 3.11.4.3 is being revised to add this information.

18. The third paragraph in section 3.12.1.2 is being revised in response to your comment; it will read as follows: "Presumably, emergency calls from the soccer park would be mostly for sports injuries, and these response times would be considered adequate."

19. Military and civilian firefighting agencies have mutual assistance agreements, so the Manana military fire station would respond to emergencies at the park upon request.

20. Understanding that police training activities are scheduled well in advance and that rescheduling classes would be inconvenient and disruptive, we are revising the mitigation given in section 3.13.4 of the DEIS. The sentence will now read: "To avoid possible adverse noise effects on the Ke Kula Maka'i Police Academy, event sponsors would be required to coordinate timing of the events with the Academy to avoid or minimize impacts on police training activities."

21. No measures are required to mitigate loss of habitat for unlisted wildlife species which now frequent the site. However, as stated in the EIS, the site was previously inhabited by protected native waterbirds. With cessation of sugar cane cultivation, open water areas dried up and vegetation underwent significant changes. The storage ponds in the golf course may attract waterbirds to the site once again. In addition, the Pacific golden plover is known to frequent turfgrass areas and may be attracted to the playing fields. This information is being added to section 4.2.2.

22. All comments received are being carefully reviewed to assure that they are incorporated or otherwise appropriately addressed. Detailed response letters have been prepared and will be included in the appendix of the FEIS.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
    Belt Collins Hawaii

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

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MICHAEL CARVALHO
DEPUTY CHIEFS

OUR REFERENCE CS-DL

September 16, 1998

TO: RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR WAIPIO PENINSULA SOCCER PARK, WAIPIO PENINSULA, OAHU, HAWAII

We have reviewed the subject document and have the following comments relative to police patrol, as well as activities at Ke Kula Maka'i, the Police Training Academy.

- If the proposed facility is to be used as stated in the document, we anticipate problems with traffic and related calls for service during regular use and more so during special events. There is bound to be added congestion on Farrington Highway which will surely impede the movement of motorists who are not attending events at the soccer fields, as well as motorists whose destination is the soccer park.

- We understand that overhead lights will not be permitted in the parking lot because of Navy regulations and that the lights from the soccer field will be directed towards it. There will be concern relative to safety and criminal activity. In addition, the proposed low-level bollard lighting fixtures are extremely susceptible to vandalism and have presented a problem in other areas.

- Fugitive dust and noise problems during construction of the soccer park may not cause an increase in complaints. However, when Waipio Point Access Road is widened, there may be complaints from nearby residents which will have an impact on calls for police service.

- As stated in section 3.12.2, Police Protection, there could be an increase in calls for police service from nearby residents because of traffic and parking problems. There could be a need for five additional officers for patrol purposes, which would not include the officers needed for special events or traffic control.

- Currently Waipahu Depot Street is unlit and is hardly used by the general public but is heavily used by officers at Ke Kula Maka'i for training and testing. If the street is connected to the proposed soccer park, there will be safety concerns for those who will use the street to travel to and from the soccer park as well as for police officers.

- There is concern that the noise generated from the soccer fields may adversely affect police training exercises. In addition, police training activities can be observed from the berm surrounding the tournament field and from the soccer park training center. As a result, security of training activities could be compromised. However, it should be noted that a solid wall along the fence line to obstruct any view and deflect sounds could prove to be hazardous, if not fatal, to any officer who loses control of a vehicle during tactical drivers' training and drives into the wall.

- Section 3.13.4, Proposed Mitigation Measure, states that to avoid adverse noise effects, event sponsors would be required to inform Ke Kula Maka'i of the timing of events so that the Academy could schedule its activities accordingly. However, police training activities are scheduled well in advance so rescheduling classes could have a domino effect on a number of other classes and events.

- The proposed dormitories will be just south of the planned pistol range. The range will be constructed to minimize sound and bullet penetration. However, the players and their parents may not be too comfortable knowing that a pistol range is in such close proximity to the dormitories.

As a final note, we would like to recommend that the principles of crime prevention through environmental design be incorporated in designing the proposed facility to minimize opportunity for criminal activity. We may have more comments to offer as the project continues to develop and the unresolved issues are addressed.

If there are any questions, please call me at 529-3175, Major Michael Brede of District 3 at 455-9055 or Major Forrest Broome of the Training Division at 677-1474.

Thank you for the opportunity to review and comment.

LEE D. DONOHUE
Chief of Police

By [signature]
JAMES FENTON
Assistant Chief
Administrative Bureau

cc: Mr. Gary Gill, OEQC
Ms. Anne Mapes, Belt Collins Hawaii
Major Michael Brede, District 3
Major Forrest Broome, Training Div.

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CC-208

October 9, 1998

MEMO TO: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

FROM: FOR RANDALL K. FUJIKI, DIRECTOR

SUBJECT: REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE WAIPIO PENINSULA SOCCER PARK CONCEPTUAL MASTER PLAN

Thank you for your letter of September 16, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. Our responses to your comments are as follows:

- Traffic. The DEIS discloses traffic impacts during regular use and special events and proposes specific mitigation, including improvements on Farrington Highway.

- Lighting and Security. We understand the concern about park security. To help address this issue, the park will be closed and the parking lot locked after events are over at night. Specific security arrangements can be made by organizers for large events and tournaments.

- Fugitive Dust and Noise During Construction. We acknowledge the potential for complaints from residents during the construction of improvements to Waipio Access Road. Construction-related impacts will be temporary and will be mitigated through standard practices such as watering to limit fugitive dust, restricting construction to daylight hours, and requiring the contractor to assure that equipment and vehicles are properly muffled and meet Department of Health noise level requirements. This mitigation is provided in section 3.4.3 (fugitive dust) and 3.13.4 (noise) of the DEIS.

- Police Protection. The DEIS discloses the need for five additional officers for patrol purposes, not including officers required for special events.

- Waipahu Depot Street. For Phase 1 of the project, a roadway connection would allow access to and from the park via Waipahu Depot Street only during special events. At all other times, the Waipahu Depot Street access would be closed. Potential projects for Phase 2 include improvements to Waipahu Depot Street to safely accommodate additional traffic, as well as improvements to its connection with Farrington Highway.

- Noise Impacts on Ke Kula Maka'i. As stated in the DEIS, noise from the soccer park will be intermittent, primarily cheering and traffic. This type of noise is unlikely to exceed 50 dBA at the nearest residential noise-sensitive receptors. Noise impacts on Ke Kula Maka'i operations are expected to be minor, particularly during Phase 1 since the soccer park would be separated from the police facility by the incinerator site. However, understanding that police training activities are scheduled well in advance and that rescheduling classes would be inconvenient and disruptive, we are revising the mitigation given in section 3.13.4 of the DEIS. The sentence will now read: "To avoid possible adverse noise effects on the Ke Kula Maka'i Police Academy, event sponsors would be required to coordinate the timing of the events with the Academy to avoid or minimize impacts on police training activities."

- Academy Security. We recognize your concern about the potential for Academy security to be compromised with build-out of Phase 2. We also acknowledge that a solid wall between the Academy and the soccer park would not be a good solution. Phase 2 implementation is dependent upon future funding which has not been confirmed, and plans at this time consist of only a general layout which is subject to change. The issue of Ke Kula Maka'i security stated in your letter will be addressed as part of the Phase 2 planning and design process and will be coordinated with the Academy.

- Dormitories. The proposed dormitories are part of the Phase 2 development, which has not yet been planned in detail and would be dependent upon the availability of future funding. Siting of the dormitories in relation to the planned pistol range will be addressed in the Phase 2 planning and design process in coordination with the Academy.

If you have any questions, please contact Clay Ching at 527-6358.

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

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

RECEIVED

'98 SEP 11 P 1:27

Scott W.H. Seu, P.E.
Manager
Environmental Department

September 10, 1998

Department of Design and Construction
City and County of Honolulu
650 South King Street, Second Floor
Honolulu, HI 96813

Attention: Mr. Randall Fujiki

Subject: **Waipio Peninsula Soccer Park**

Thank you for the opportunity to comment on your August 1998 Draft EIS for the Waipio Peninsula Soccer Park, as proposed by the Department of Design and Construction, City and County of Honolulu. We have reviewed the subject document and have no comments at this time.

HECO shall reserve further comments pertaining to the protection of existing powerlines bordering the project area until construction plans are finalized. Again, thank you for the opportunity to comment on this DEIS.

Sincerely,

cc:
Mr. Gary Gill, OEQC

Belt Collins Hawaii
680 Ala Moana Blvd., Suite 100
Honolulu, HI 96813
Atten: Ms. Anne Mapes

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 2ND FLOOR
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PHONE: (808) 523-4564 • FAX: (808) 523-4567

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

ROLAND D. LIBBY, JR., AIA
DEPUTY DIRECTOR

CC-215

October 9, 1998

Mr. Scott W. H. Seu, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Seu:

Subject: Review Comments on the Draft Environmental Impact Statement <u>for the Waipio Peninsula Soccer Park Conceptual Master Plan</u>

Thank you for your letter of September 10, 1998, regarding the Draft Environmental Impact Statement for the above referenced project. We appreciate your interest in this project.

If you have any questions, please contact Clay Ching at 527-6358.

Very truly yours,

FOR RANDALL K. FUJIKI
Director

RKF:jo
cc: Stringer Tusher Architects
Belt Collins Hawaii

CHAPTER 8
LIST OF PREPARERS

This Final Environmental Impact Statement was prepared by Belt Collins Hawaii for the City and County of Honolulu Department of Design and Construction. The following people were involved in the preparation of this document:

Preparer	Education	Contribution
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T. Bryant Brothers, Wilbur Smith Associates	M.S., Transportation Engineering; B.S., Civil Engineering	Traffic Analysis
John Kirkpatrick, SMS Consulting	Ph.D., Anthropology	Social Impact Analysis

CHAPTER 9
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APPENDIX A

WAIPIO PENINSULA SOCCER PARK MASTER PLAN

Waipio Peninsula Soccer Park

Waipio Peninsula Soccer Park will be a venue for local, national and international soccer players to train and compete year-round. It will offer regulation outdoor soccer fields, including illuminated fields for night play; a stadium; a training center; indoor soccer arenas; and beach soccer facilities.

The 300-acre site is located on Waipio Peninsula between the Middle Loch and West Loch of Pearl Harbor on the south shore of Oahu. The property is bounded on the north by the Ted Makalena Golf Course, which is owned and operated by the City and County of Honolulu, and on the south by agricultural lands owned by the U.S. Navy. Thus, it commands unobstructed, panoramic views of Pearl Harbor, with Diamond Head and the Honolulu skyline in the distance.

The master plan includes the following:

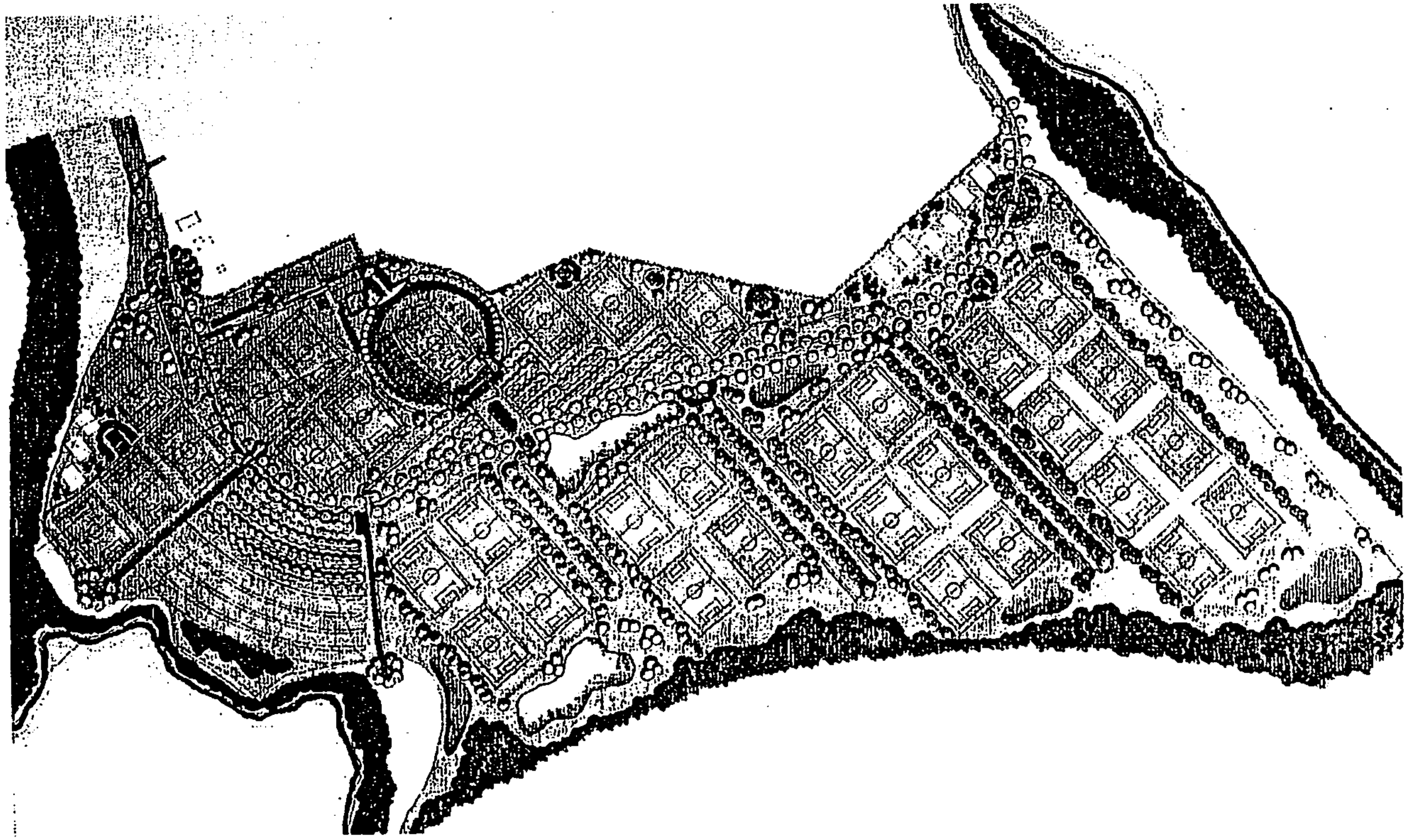
- Thirty-three regulation soccer fields, seven of which are illuminated.
- Stadium field with initial seating of 4,000 expandable to an ultimate capacity of approximately 18,000 with locker rooms, trainer facilities, media facilities, security, administrative offices, medical facilities, public concessions and restrooms.
- A training center with locker rooms, multi-purpose room, recreational and training facilities, conference and meeting rooms, kitchen and dining facilities, and dormitories.
- Two indoor soccer arenas with bleacher seating and support facilities.
- Five to ten beach soccer fields.
- Parking for up to 5,000 cars.

The site is accessed via Waipahu Depot Road on the west and the Waipio Point Access Road on the east. Both of these roads provide direct access to Farrington Highway and from there to the H-1 freeway and Kamehameha Highway, offering easy access to commercial centers of Waipahu Town, Pearl City/Aiea area and downtown Honolulu and the hotels of Waikiki.

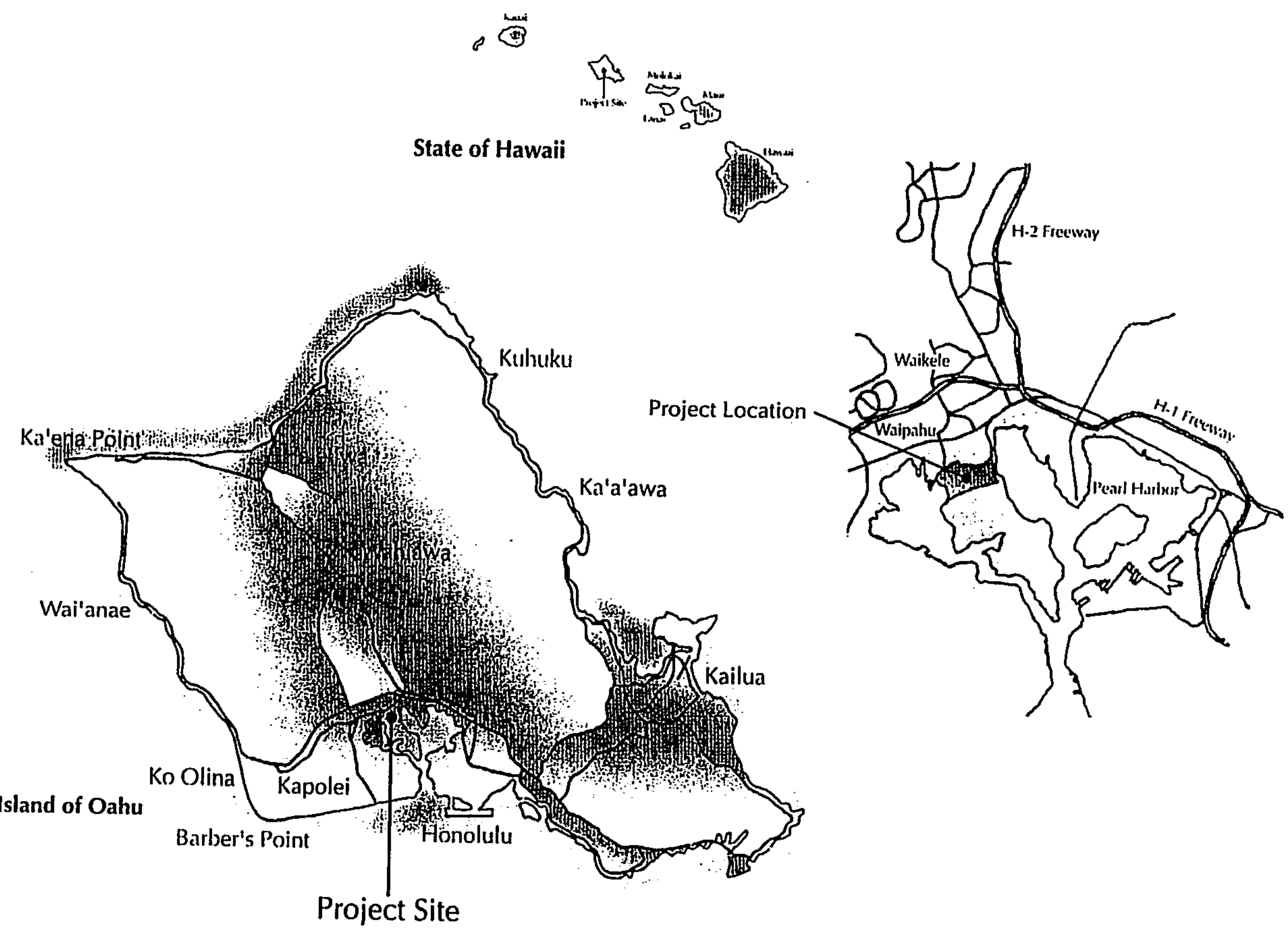
All soccer fields have optimal northwest to southeast orientation with cross-field and longitudinal slopes of 2% or less. A majority of the fields are conveniently arranged in a four-field pod allowing warm-up areas for players within the interior, separate of spectators. Berms will be developed at the perimeter of the field pods for spectator viewing of the games from beneath tree-shaded slopes. The pods have been designed to accommodate two rugby fields or one cricket field within each pod. Each pod can be managed as distinct elements, allowing multiple tournament play or training camps, or combined for a larger tournament format. Seven fields will provide lighting for evening play and extended training time.

Parking will be conveniently located for all fields. On-grade access is provided from at least one side of the fields to allow transport of materials to the each field.

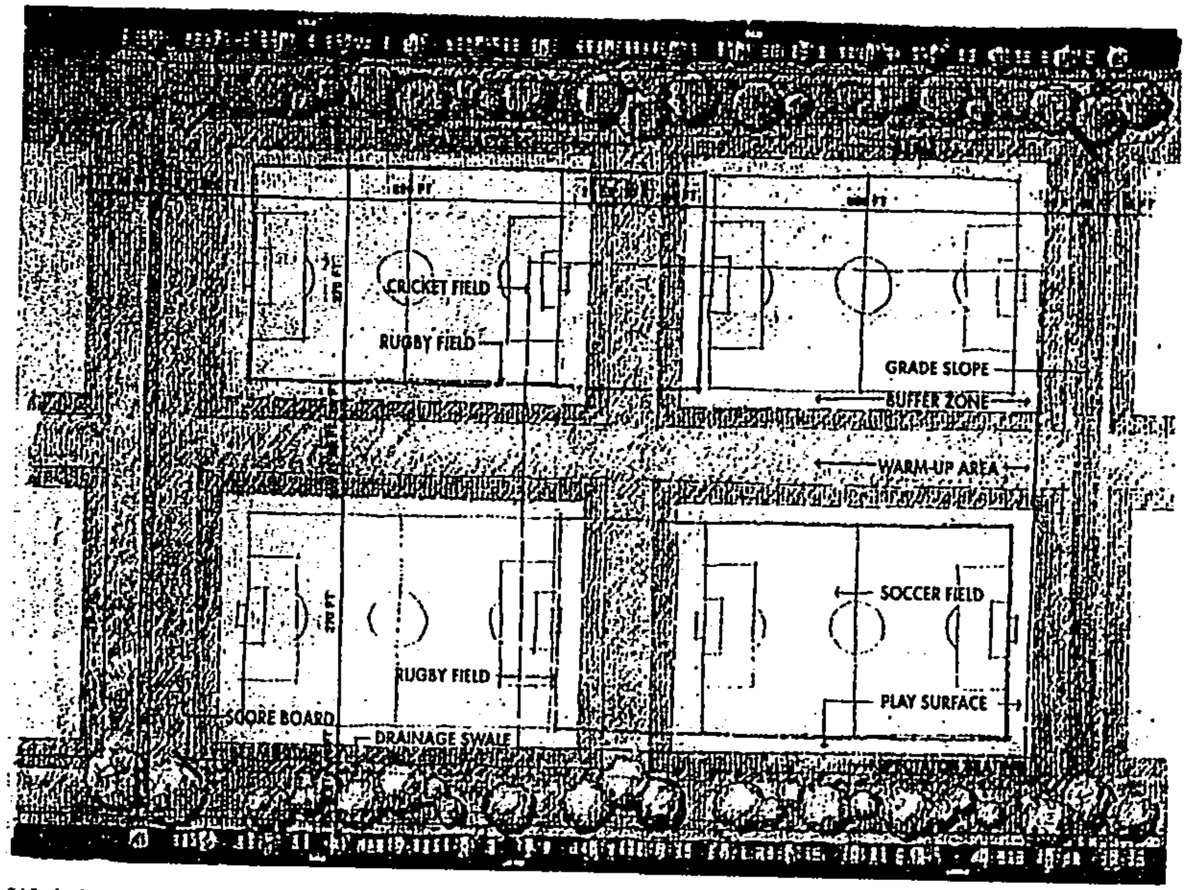
The entire complex is designed within a park like setting, with shade trees and a central water feature which functions as the irrigation reservoir for the park and adjoining golf course. Terraced play areas allow views of magnificent Pearl Harbor, the Ko'olau Mountains and Honolulu skyline beyond.



Waipio Peninsula: Soccer Park Master Plan



Waipio Peninsula: Project Location & Vicinity Maps



Waipio Peninsula: Four- Field Pod Plan

Waipio Regional Park

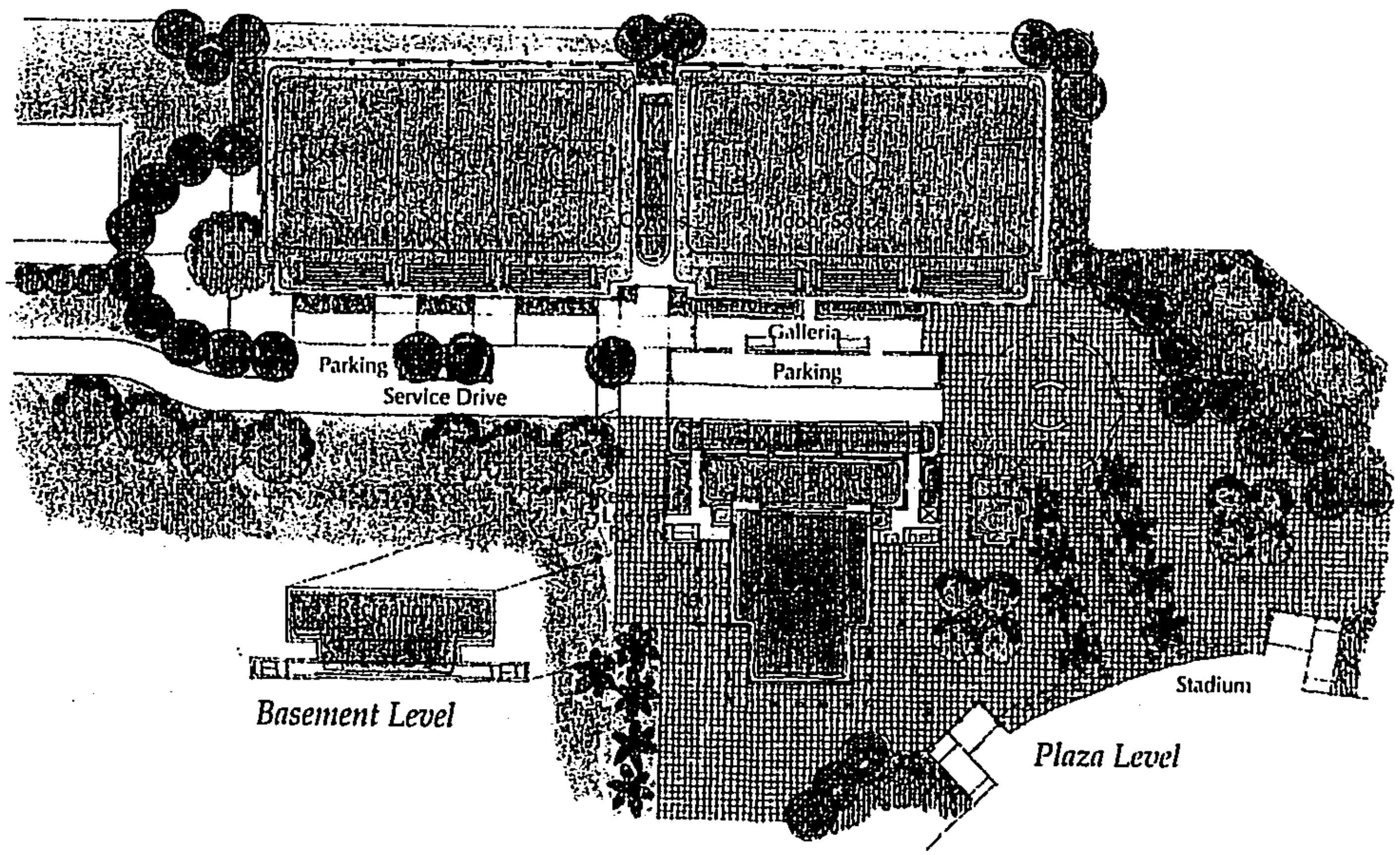
Within the four_field pod layout, team warm-up areas and tournament organizers are separated from the spectators. The area between the fields allows the ability to set-up tournament tents within the interior of the pod. Spectator seating is on tree-shaded earth berms arranged parallel to the long axis of the field. Shade trees will provide protection for the spectators from the sun. Score boards are at the corners of the fields, visible to both spectators and players within the pod.

Waipio Peninsula: Perspective at Training Center Plaza

The Training Center

The Training Center adaptively reuses an existing on-site industrial structure for the core facilities, consisting of the following:

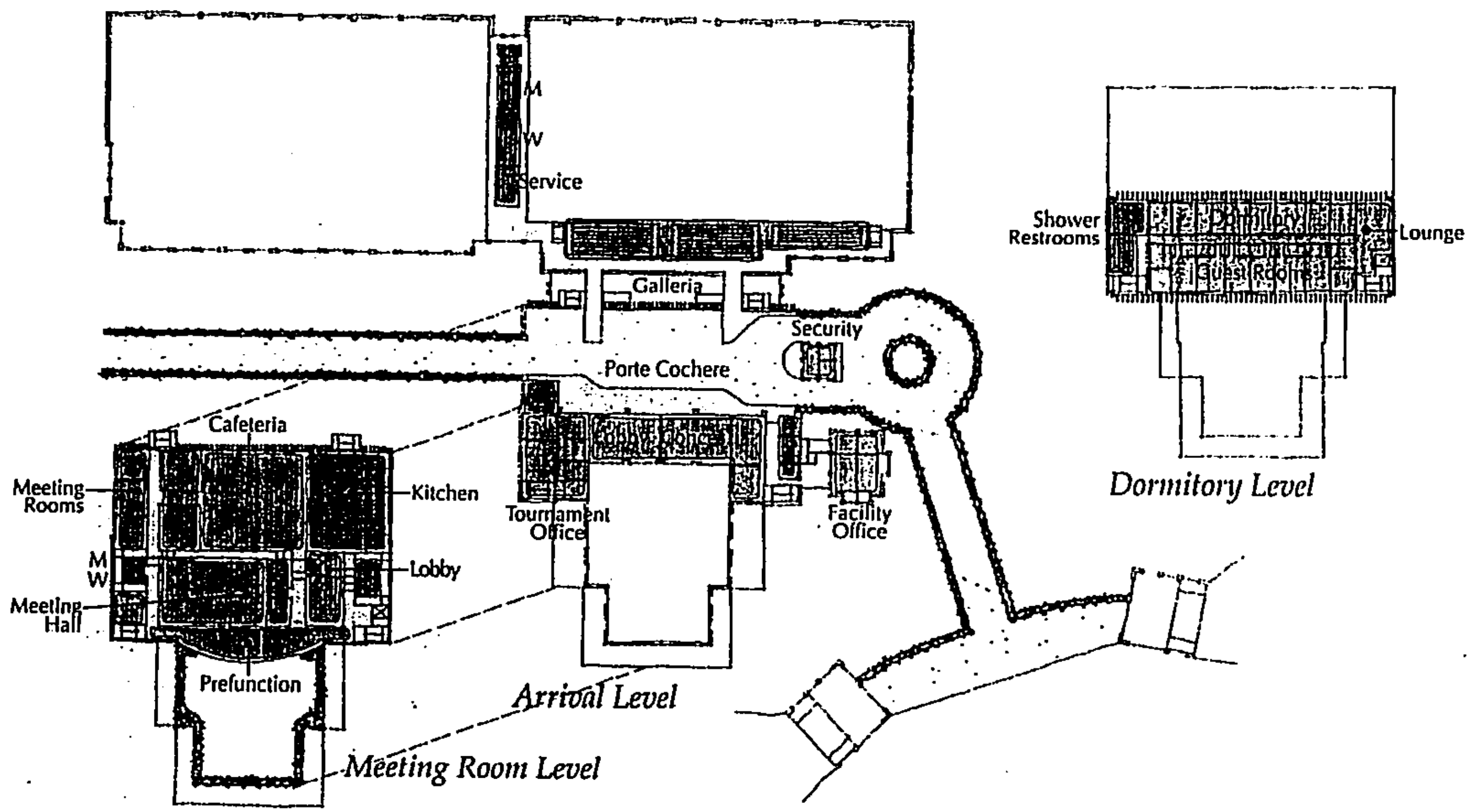
- A multi-purpose room of 7,800 square feet for training and community recreation.
- Two general locker rooms with showers, toilet facilities and trainer/therapy areas.
- One referees' locker room.
- Two medical/team trainer rooms.
- Furnished tournament offices separate from facility offices.
- Facility offices for permanent staffing and management of the Park.
- Lobby and registration center immediately adjacent to an elevated porte cochere for drop-off and pick-up of teams and dignitaries.



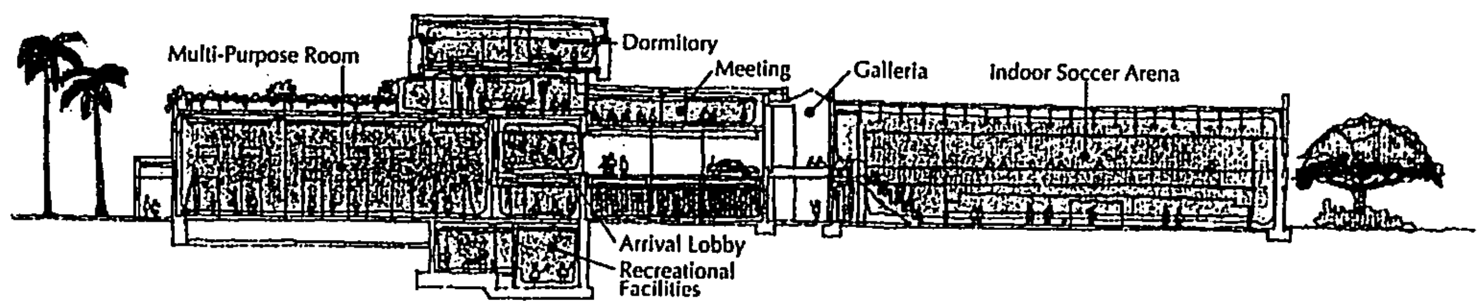
Waipio Peninsula: Training Center Plans—Ground & Basement Levels

- Concession shop area for tournament logo wear and other event sale items.
- A central dining room of 3,800 square feet with a full-service kitchen and independent access from the porte cochere for special events dining.
- Meeting facilities comprised of a 2,500 square feet events hall and 3,000 square feet of meeting rooms for training.
- Dormitory facilities accommodating up to 30 individuals for training camps or for tournament officials and referees.

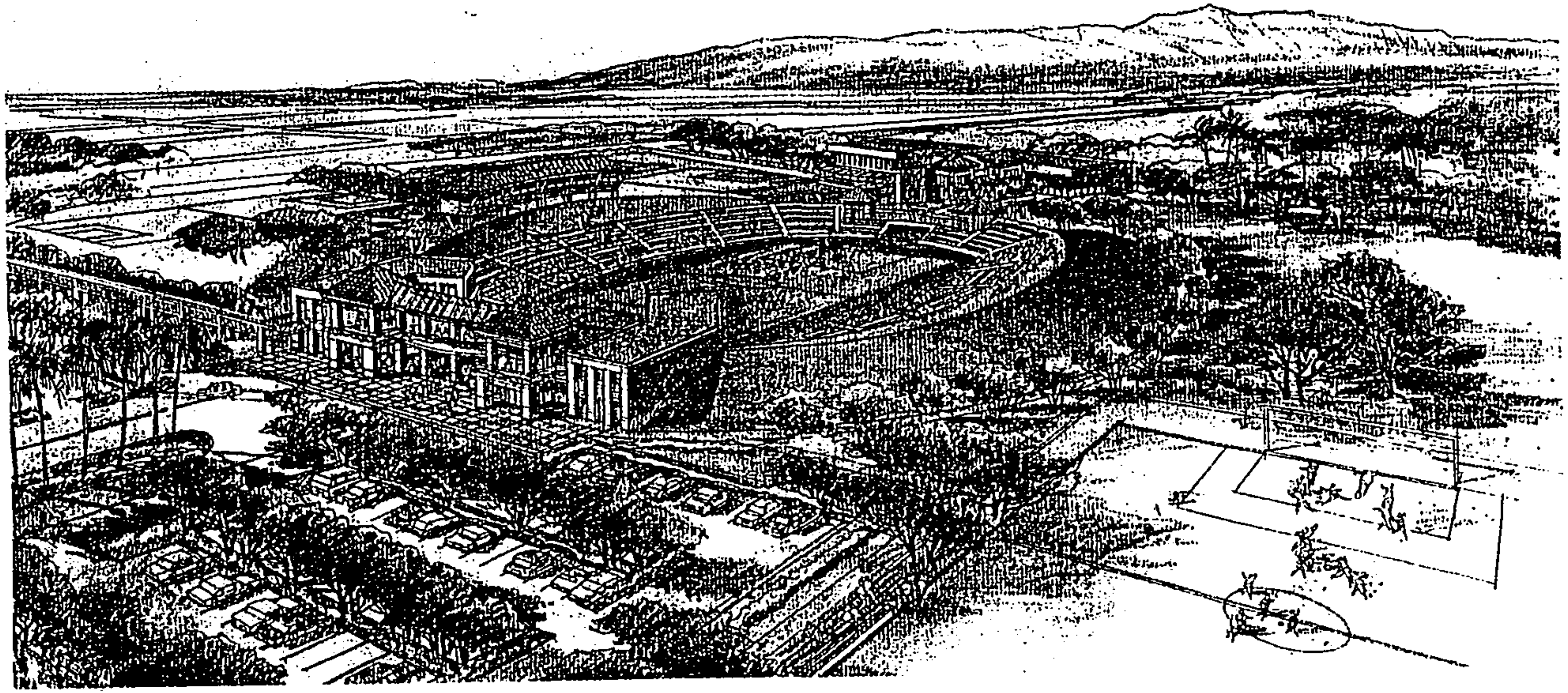
Adjoining indoor soccer arenas will provide two fields that can be used for competition and training, indoor football, youth basketball, volleyball and other community recreational needs.



Waipio Peninsula: Training Center Plans—Arrival, Meeting Rooms & Dormitory Levels



Waipio Peninsula: Section thru Training Center



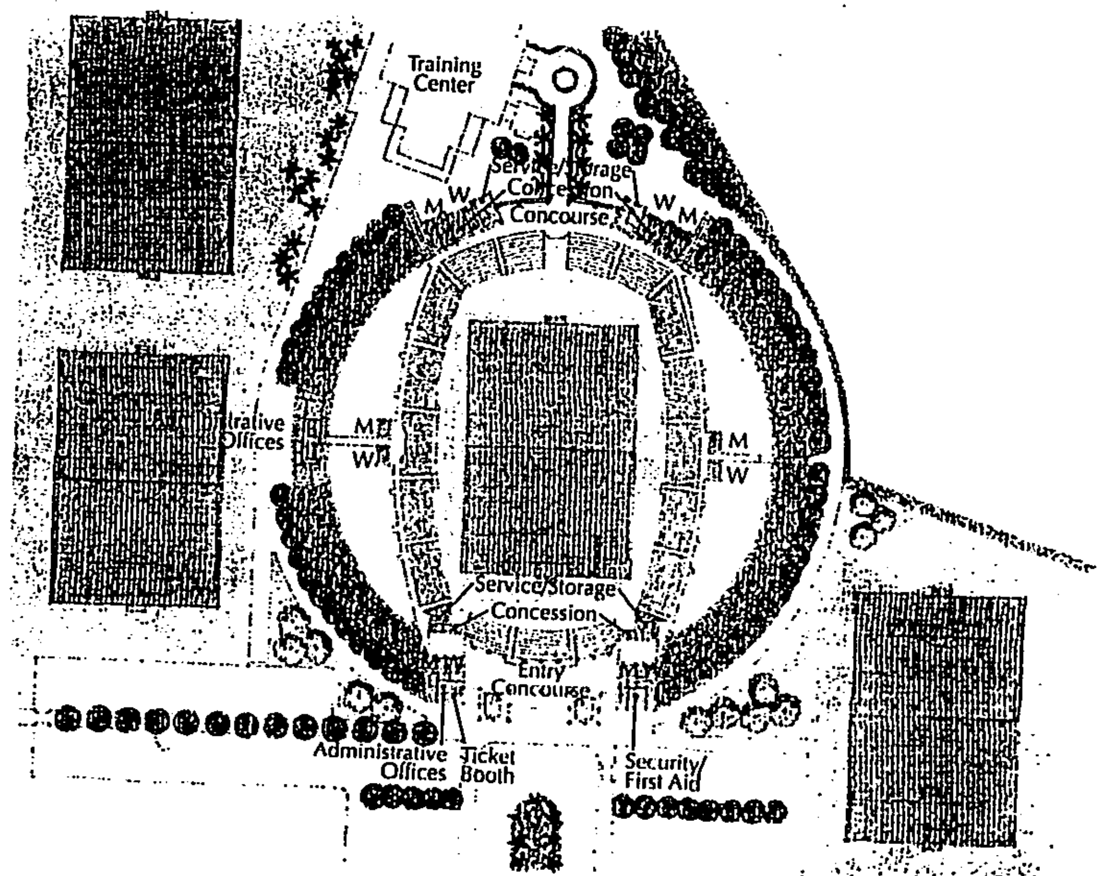
Waipio Peninsula: Aerial Perspective of Soccer Stadium

The Soccer Stadium

The stadium will be an earth bermed arena with structures at either end housing the required facilities. Initially the earth berm will be built with limited fixed seating adjacent to the field and grass seating above. As demand increases, the seating capacity can be expanded to approximately 18,000. This size of stadium will have the capability of hosting national team competitions as well as Major League Soccer events, special events and state tournament events.

Full media facilities will be developed, providing television and radio production areas, print media facilities including dark rooms and copy rooms, interview rooms, press booths and broadcast booths and office areas, as well as separate parking areas and production van parking.

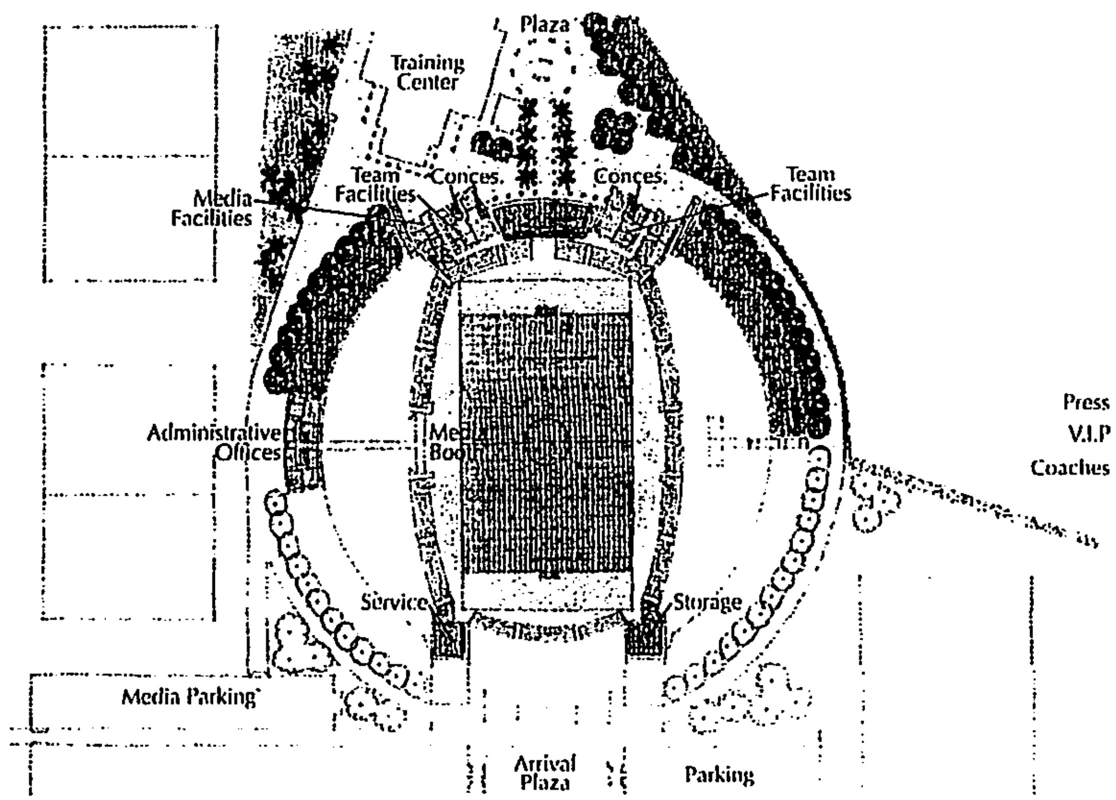
Immediately adjacent to the secured entry from the Training Facility will be two premier locker rooms with independent shower



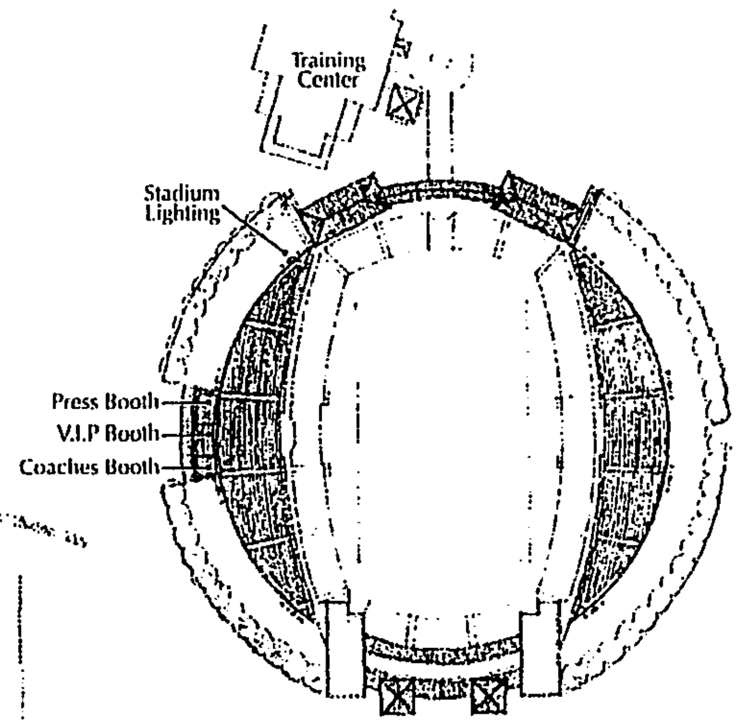
Waipio Peninsula: Soccer Stadium—Concourse Level Plan

and toilet facilities, trainer's room and therapy facilities, team doctor facilities and team manager offices. These will provide the necessary quality facilities required for national/international teams. Another four locker rooms with shared shower and toilet facilities will offer additional facilities for regional and local team tournaments.

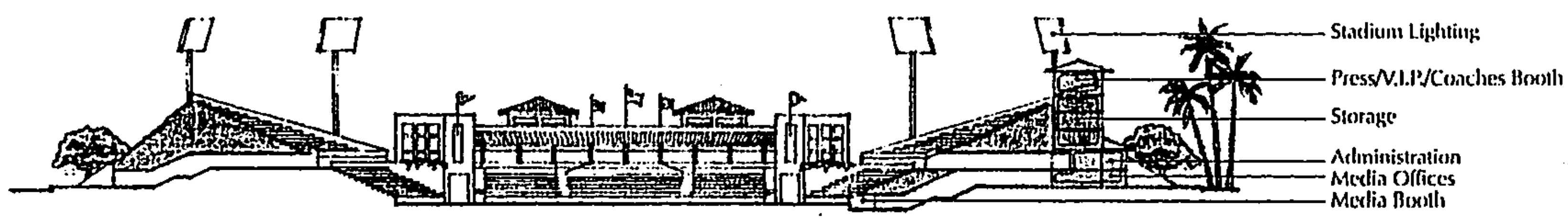
Referee locker rooms and facilities, medical office, drug-testing room and match-delegates office will be included in the sports facility functions. Food preparation, storage, concession booths, retail shops, security, first aid, administration offices and ticket booths will comprise the remainder of the support areas.



Waipio Peninsula: Soccer Stadium—Field Level Plan



Waipio Peninsula: Soccer Stadium —Press Box Level Plan

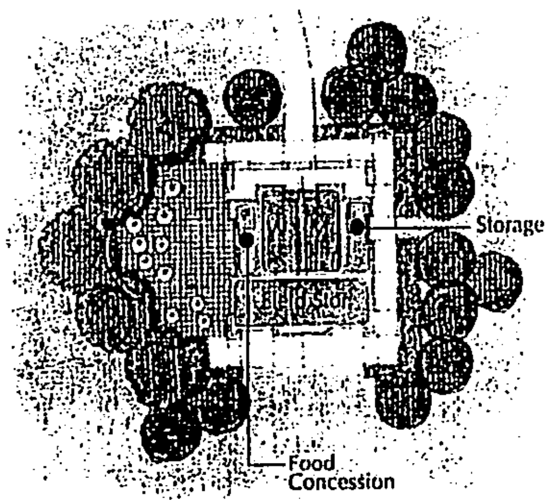


Waipio Peninsula: Section thru Soccer Stadium

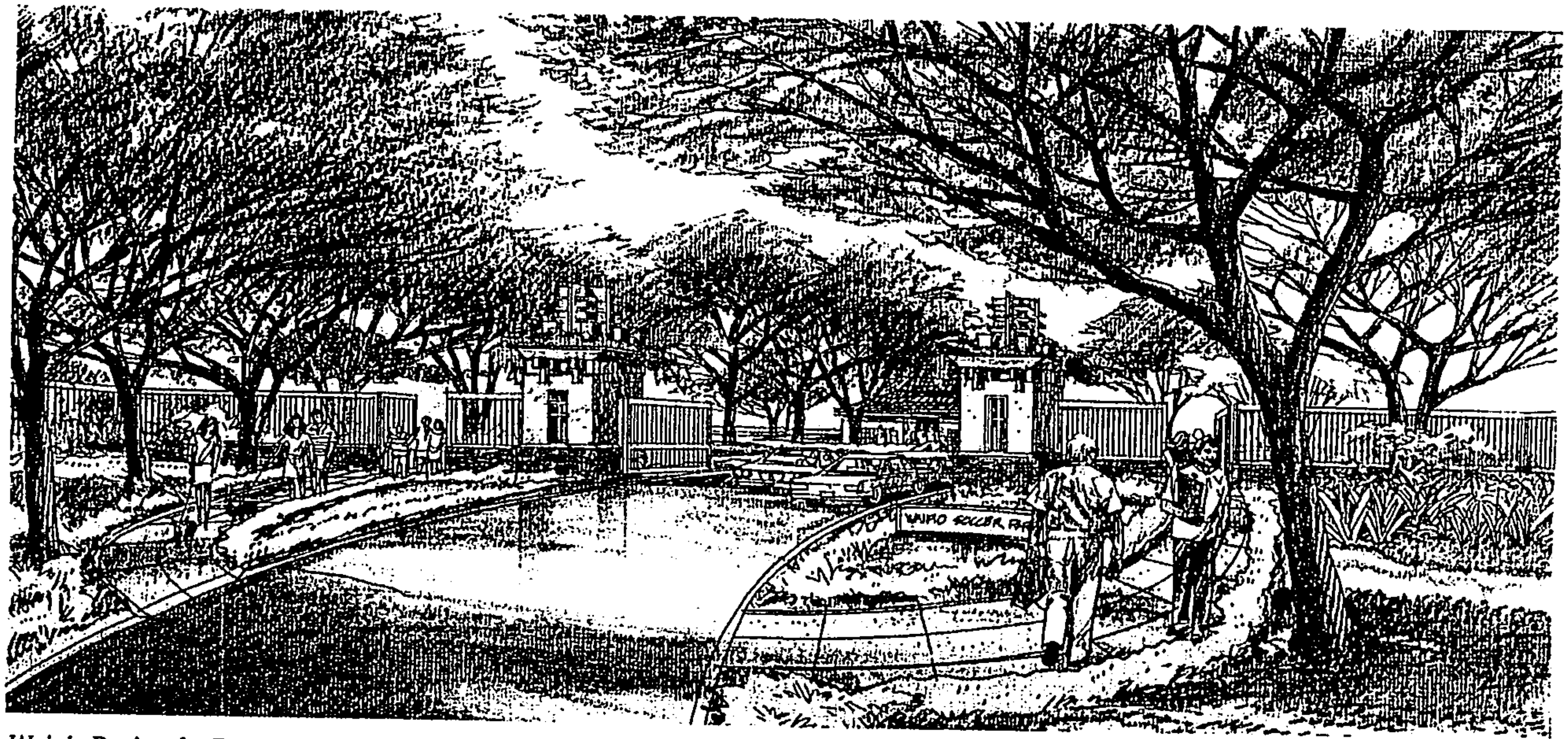
Waipio Peninsula: Perspective at Typical Comfort Station

The Comfort Station

To support the field areas and the players, comfort stations with mens and women's restrooms, storage for field and sports equipment, storage for field maintenance, and food concession booths will be located throughout the complex.



Waipio Peninsula: Typical Comfort Station Plan



Waipio Peninsula: Perspective at Park Entry

Waipio Peninsula Soccer Park Entry

The entry establishes the sense of arrival for the Waipio Peninsula Soccer Park, while providing the necessary security for the park. The portal expresses the simple, direct character which reflects the design traditions of Hawaii.

APPENDIX B

ALTERNATIVE SITES AND LAYOUT ANALYSIS

APPENDIX B

ALTERNATIVE SITES AND LAYOUT ANALYSIS

Prior to and during the selection of the Waipio Peninsula site for the City and County of Honolulu Soccer Park, the City and County of Honolulu Sports Committee, Soccer Task Force, reviewed alternative sites and layouts for the soccer park. The following describes the analyses performed and the results of those analyses. It is recognized that the analyses are relative subjective and reflect the views of the Soccer Task Force and project planners. However, it is believed the analyses have sufficiently taken into account the various selection criteria and soccer park requirements.

1. Alternative Sites

Through programmatic efforts, including community and local soccer sports industry input, it was determined that a site of approximately 250 to 300 acres would be required to create the needed number of fields and support facilities required to host regional and national level tournaments, as well as providing the fields for local use throughout the year. Ruling international and national soccer organizations generally require a minimum of 24 soccer fields for tournament play[1]. Each field is between 300 and 360 feet long and 165 to 225 feet wide and require side areas (for teams, coaching, and spectator areas) of approximately 50 feet on both sides of the field. Additionally, the fields require at least 100 feet of separation. Therefore, each field requires approximately 4 acres. Parking, circulation roadways, restrooms and concession stands, training areas, landscaping, support facilities, and drainage retention basins and areas add to the total land requirements. Few sites of the required total size exist within the urban area of Honolulu.

Alternative sites have been evaluated by the City and County of Honolulu Soccer Task Force and master planning consultants using the land area requirements noted above. Areas and sites identified for possible site locations included:

- Waipio Peninsula next to Waipahu Town (the project site);
- Barbers Point, Kapolei;
- Open agricultural sites in the Ewa or Kapolei areas;
- A Waiola site next to Waipio along Kamehameha Highway; and
- Kaiwi area in Hawaii Kai.

The following briefly describes each of the above sites:

<u>Waipio Peninsula Site (Project Site)</u>:

The site is an irregular rectangular parcel with access provided by Waipahu Depot Street and Waipio Point Access Road, both of which connect to Farrington Highway. The site is centrally located to the population center of Honolulu, and allows freeway access via the Waikele, Waipahu, and Kamehameha Highway exits off H1.

The site has been in agricultural use for the past 100 years, with significant depths of sediments from these activities deposited over the site. These deposits provide a separation from brackish water intrusion into the topsoil. Utilities are readily available from Waipahu Depot Street and Waipio Point Access Road. The site is zoned for Park use on the City and County of Honolulu Central Oahu Development Plan, and is in the State Agriculture District.

Site acquisition costs from the U.S. Navy do not include purchase cost, but does include infrastructure (non-potable irrigation water and roadway improvement) development costs. Development costs are comparable to those which would be expected for a non-developed property. Community acceptance of the site is high, both within the immediate community and the County-wide user community.

No significant negative environmental effects are anticipated from development of the site. The eventual development (build-out) of the site will mitigate existing environmental effects through reuse of the existing Waipahu Incinerator building and appropriate official closure of the Waipahu Municipal Solid Waste (MSW) land and ash fill. Parking and park space will be provided on the former MSW site.

<u>Barbers Point</u>:

Given the present allocation of land uses by the Barbers Point Naval Air Station Reuse Commission and other State and City and County of Honolulu agencies, it is unlikely that the required acreage could be set aside for use as a soccer park. However, for this analysis, it is assumed that a suitable site could be obtained for the proposed project. The site is located at the western edge of the major population center of Honolulu.

Freeway access from H1 is provided via Barbers Point Access Road and Fort Weaver Road - Geiger Avenue. The site has been a military reservation with varying levels of development involving industrial, residential, and open space. Geologically, the site is composed of low lying sediments above coralline limestone with known sink holes, and is prone to brackish water intrusion.

Utilities are readily available at the site, with the non-potable water source being either treated effluent from the City and County of Honolulu Honouliuli Waste Water Treatment Plant or brackish water wells located north of the site. The site is designated ??? on the City and County of Honolulu Ewa Development Plan and ?? by the State Land Use Commission.

Costs for acquisition from the U.S. Navy would not be a factor at this site, although acquiring the required acreage at this site would be problematic because of the number of uses already allocated. Development costs would be higher than those associated with the Waipio Peninsula site because of the need to import topsoil for turf growth and to combat brackish water intrusion. No significant environmental effects from the use of the site are anticipated.

[1] U.S. Youth Soccer Association, Region 4, Far West Regional Tournament Administrative Manual. Nov. 1, 1996.

The site did not rank high (see Table 2-1 below) due to its lack of central location, questionable geologic/soils characteristics, costs of development, and expected difficulty of developing a contiguous site, i.e., 250 to 300 acres, due to the number of expected users of adjacent areas and program areas already designated at the site.

Ewa/Kapolei Site:

Use of a site in this area presumes a 250 to 300 acre site could be developed on existing agricultural lands. The site would be located at the western edge of the population center of Honolulu. Freeway access would be provided from Fort Weaver Road and Barbers Point Access Road.

The area is relatively flat and the ground elevation is sufficiently high (+77 feet) to provide separation from brackish groundwater. Utilities are readily available within the immediate area, and non-potable irrigation water would be provided via existing wells or effluent from the City and County of Honolulu Honouliuli Waste Water Treatment Plant. The State land use designation is Agriculture, as is the City and County of Honolulu zoning.

Site acquisition costs would be relatively high, most likely with the City and County of Honolulu acquiring the land through eminent domain from the owner. Development costs would be similar to the Waipio Peninsula site, or possibly slightly less depending on the amount of grading required. No significant adverse environmental effects would be expected at the site, other than the loss of productive agricultural lands.

This site does not rank high due to high site acquisition costs, lack of central location, and existing land use.

Waiola Site:

The Waiola site is currently being master planned by the City and County of Honolulu for a community park with a variety of sports activities and facilities planned. The site is adjacent to Kamehameha Highway opposite the Waipio Community. Freeway access is provide via Kamehameha Highway, with a planned connection to the Waikele community.

The site has been in agricultural use until recently, is relatively flat, and is situated in the Central Valley area such that brackish water intrusion would not be a problem. Utilities are readily available within the immediate area, and non-potable irrigation water would be provided from wells or stream flows. The site is designated agriculture by both the State and City and County of Honolulu.

Site acquisition costs would be high and would require the use of the City and County of Honolulu's eminent domain powers. Development costs would be similar to the Waipio Peninsula site and no significant adverse environmental effects would be anticipated, other than the loss of agricultural lands.

Table 2-1

Site Evaluation Ranking

CRITERIA	SITE				
	Waipio Peninsula	Barbers Point	Ewa/Kapolei	Waiola	Kaiwi
Area and Configuration	5	3	5	5	3
Land Use and Zoning	5	4	2	5	1
Location	5	3	4	5	3
Access	4	3	4	5	5
Geology	5	3	5	5	3
Topography	4	3	5	5	3
Environmental Effects	5	4	4	5	1
Community Acceptance	5	4	4	2	1
Acquisition Costs	5	5	3	2	2
Development Costs	4	3	4	4	2
TOTAL	47	35	40	43	24

While the site is ranked only slightly less than the Waipio Peninsula site, it is considered less viable due to the acquisition costs and the perceived negative reaction from the community in that the soccer complex would not address the needs of other community sports and park requirements.

Kaiwi Site:

This site is located along Kalanianaole Highway in the Hawaii Kai area of east Honolulu. No direct freeway access is available, but the site is readily accessed from Kalanianaole Highway. The site is one of the few remaining natural areas on the island, and expected community reaction to establishment of a sports complex would be negative, given the community's reaction to the land owner's past actions involving proposed zoning changes and development.

Utilities are not readily available to the site and would require significant costs in extending services to the site. State land use is Conservation, and City and County of Honolulu zone designation is Preservation.

Site acquisition costs would be high given the current history regarding the value of the property as expressed by the owner (Kamehameha Schools/ B.P. Bishop Estate). Development costs would be higher than for the Waipio Peninsula site because of the lack of utilities serving the site or area, the rocky nature of the site, low elevation of the site next to the ocean, extensive earthwork requirements, brackish water barrier, and topsoil importation costs. The expected environmental effects of this site would be significant, as it would irretrievably alter the natural condition of the site. Community reaction would be negative and use of the site for a sports complex would be contrary to the State's planned use as a natural open area. This site is ranked the lowest for the reasons cited above.

The sites were analyzed in relation to the selection criteria noted below and each site was ranked relative to its ability to meet the goals and objectives of the project as well as the suitability of the site.

General selection criteria were established to rank the sites relative to one another and to verify the suitability of the site in response to the U.S. Navy's offer to lease the project site property to the City and County of Honolulu for soccer and related recreational purposes. The selection criteria were:

- site area and configuration
- State land use designation and County zoning compatibility
- location
- access
- geological considerations
- topography
- potential environmental effects
- community acceptance
- cost of acquisition
- cost of development

Although somewhat subjective, the soccer task force and project master planners assigned each evaluation element (criterion) a rating value of 1 to 5, with one being the least favorable and 5 being the most favorable relative to acceptability. The evaluation ratings were then totaled for the overall ranking of the sites. Table 2-1 indicates the results of the evaluation ranking of each site.

Detailed engineering analyses of each site were not conducted, but the empirical evaluation indicates the Waipio Peninsula site is the highest ranked site due to its central location, relatively good access, lack of significant adverse environmental effects, land use designations, and cost of acquisition. The Waiola site has a similar ranking, but the expressed needs of the community for a community and multi-sport park, and costs of acquisition do not make this site as desirable as the Waipio Peninsula site. The Waipio Peninsula site also has a shorter time period for acquisition and construction, thereby providing the community with the desired facilities at the earliest possible date.

2. Alternative Development Schemes

The alternative development schemes identified different layouts of the soccer fields and stadium as well as different ingress/egress routes. The primary factors in determining the optimum layout of the fields have been consideration of the prevailing wind direction and the overlying explosive safety quantity distance (ESQD) arcs. To the extent practical, the fields have been oriented perpendicular to the prevailing northeasterly tradewinds. Similarly, because of ESQD arc restrictions, all lighted fields as well as concession stands and restrooms have been located outside the 100 percent ESQD arc.

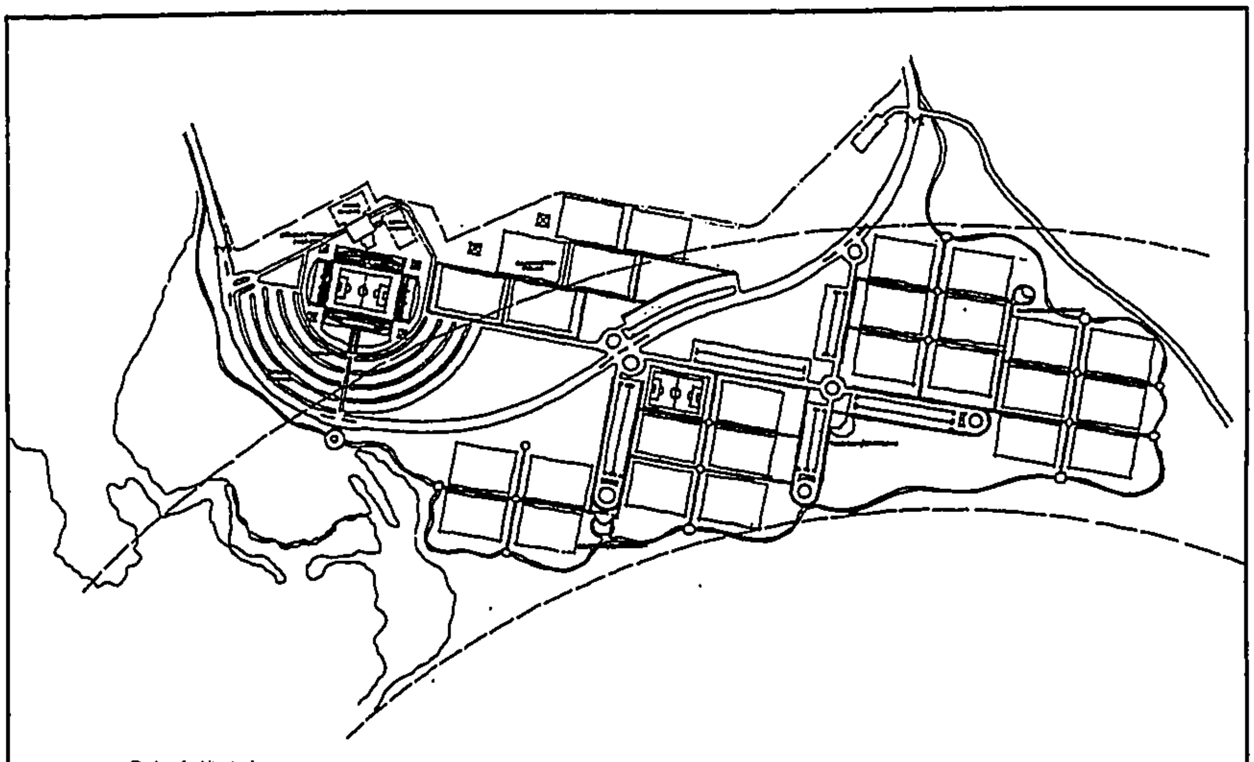
Over a dozen different development schemes, that is, alternative layouts of the soccer fields, have been examined. Figures 1 to 5 are representative of the various layouts considered. All soccer fields have been placed outside the 75 percent ESQD arc in all of the alternative layouts. The primary differences among the different layouts investigated are the location of the tournament field/soccer stadium, the internal roadway system, and the number and placement of the lighted play fields. In general, all of the alternative layouts analyzed, included at least 24 play fields at build-out.

The tournament field/stadium has been variously located on the westerly side of the site, and outside of the 100 percent ESQD arc, on or near the present Waipahu Incinerator ash fill site and on the northeasterly side of the site immediately adjacent to the FCC parcel.

The internal roadway system layouts have included a loop-type arrangement and pass through systems, that utilize both Waipio Point Access Road and Waipahu Depot Street. In the alternative layout planning, both roadways were upgraded to allow a greater number of vehicles than is presently possible.

In addition to the above, the different layouts have included different mixes and quantities of support services, such as restrooms, concession stands and parking next to or close to the play fields. A minimum of 600 parking spaces have been provided for the play fields in Phase 1 and 5,000 for the various stadium configurations with a maximum 18,000-seat stadium at build-out.

The benefits of Phase 1 development as planned will be the addition of 18 soccer fields for practice and games for the approximately 22,000 soccer players expected in 2001 and the capability to move tournaments presently held at Kapiolani Park to the new sports complex. Additionally, the project will benefit the agricultural lands south of the project site by bringing irrigation water to these lands as well as eliminating the use of 0.5 million gallons per day (mgd) of potable water for irrigation of the Ted Makalena Golf Course. Similarly, Phase 1 amenities will allow the City and County of Honolulu to market Honolulu and the state as a potential site for national and international soccer matches and tournaments. The success of this marketing effort could then lead to the completion of the sports complex , either with public, or possibly, private monies. The economic benefits of these actions are estimated to be approximately $4.4 million per year at build-out.

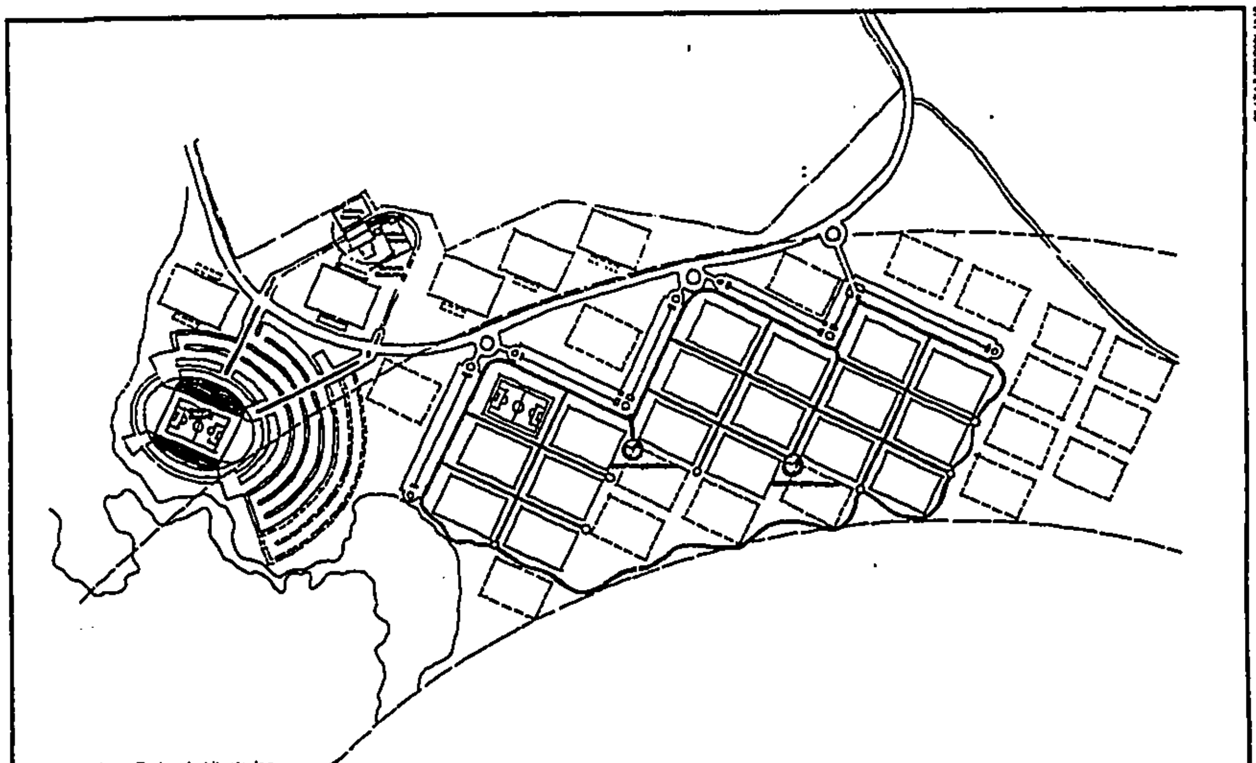


Source: Stringer Tusher Architects, Inc.

NORTH

0 400 800 1600
SCALE IN FEET

Figure 1
ALTERNATIVE 1

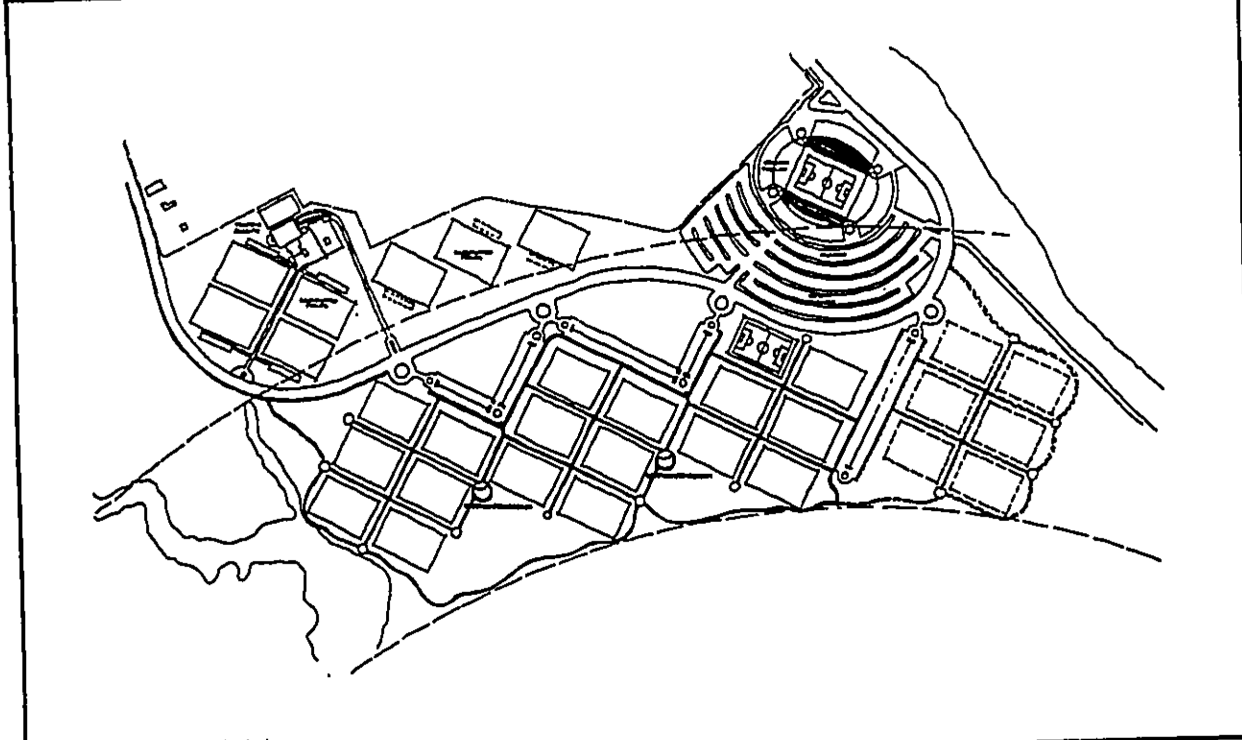


Source: Stringer Tusher Architects, Inc.

NORTH

0 400 800 1600
SCALE IN FEET

Figure 2
ALTERNATIVE 2

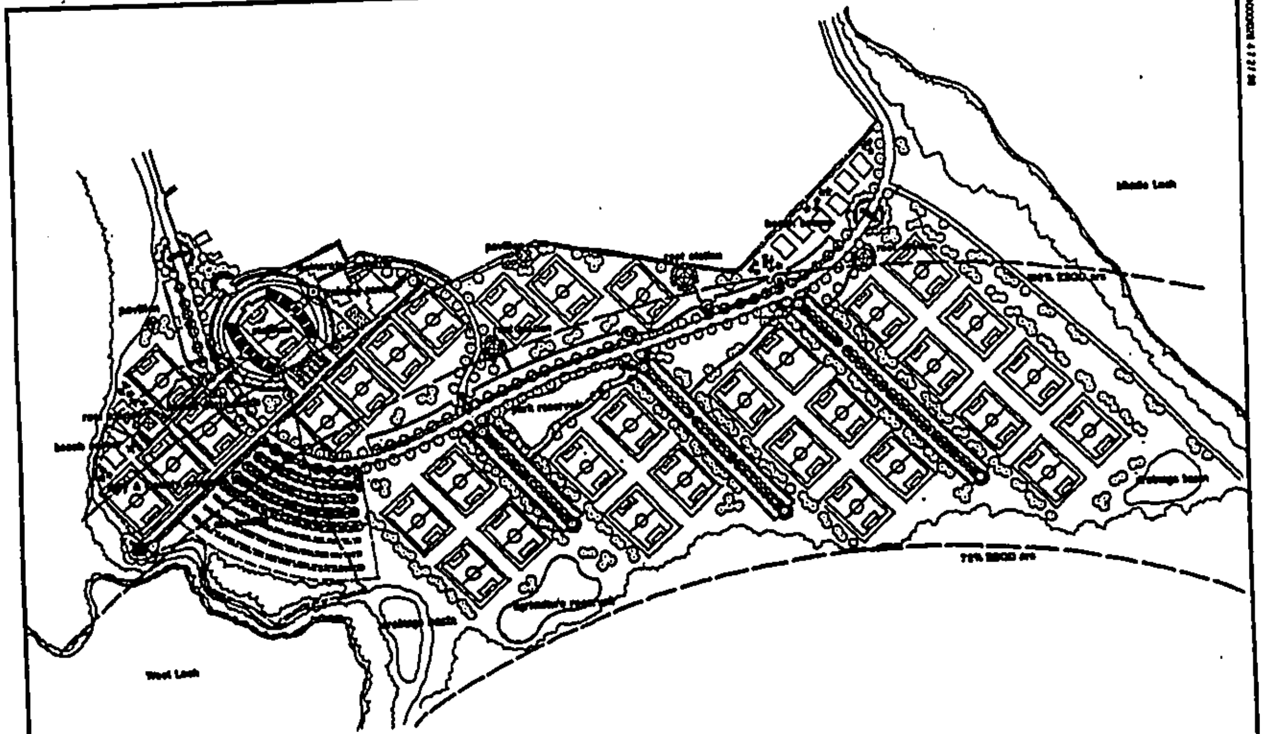


Source: Stringer Tusher Architects, Inc.

NORTH

0 400 800 1600
SCALE IN FEET

Figure 3
ALTERNATIVE 3

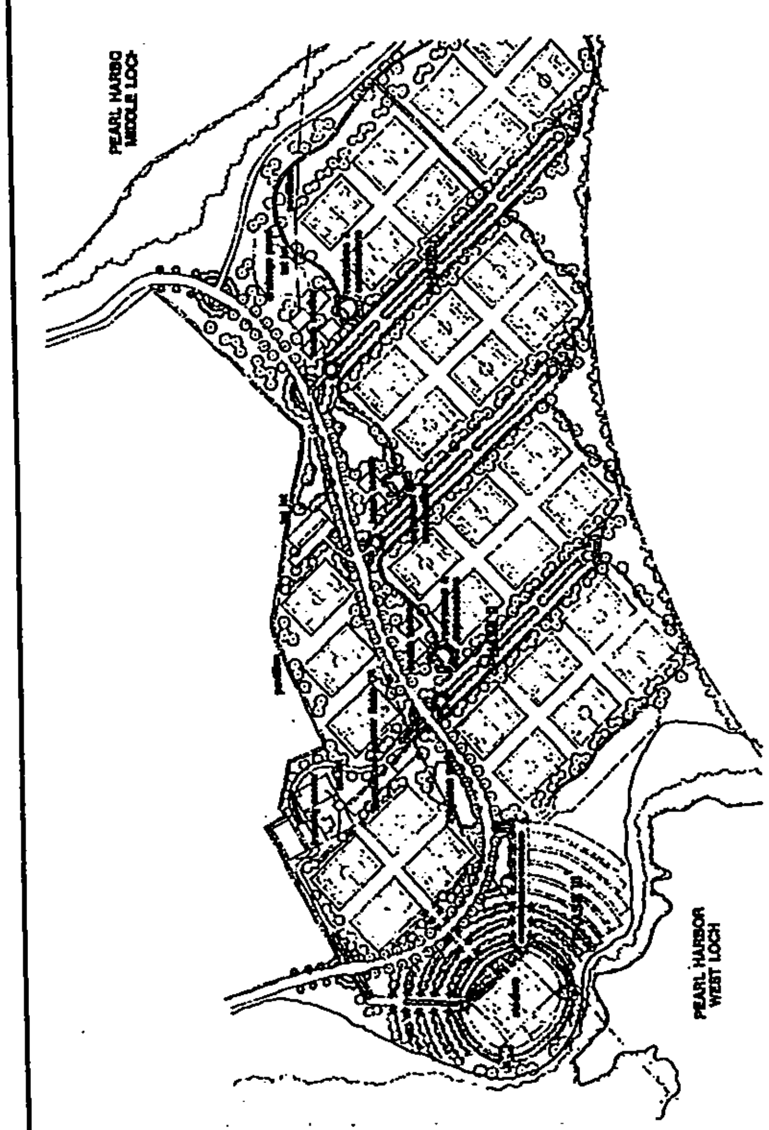


Source: Stringer Tusher Architects, Inc.

NORTH

0 400 800 1600
SCALE IN FEET

Figure 4
ALTERNATIVE 4



Source: Stringer Tusher Architects, Inc.

Figure 5
ALTERNATIVE 5

Generally, all of the various layouts analyzed would have the same or similar effects on the natural and economic environmental characteristics of the area and Oahu. Each of the alternative layouts would require clearing and grading, each would result in re-landscaping the project site, and each would result in the loss of existing wildlife habitat. Similarly, each alternative layout would require approximately the same quantity of irrigation water and other utility services, such as potable water, sewer, and electrical power.

The final Master Plan layout incorporates all of the elements required for a successful soccer park and makes the best use of the land available at the Waipio Peninsula site.

APPENDIX C

BOTANICAL SURVEY OF THE PROPOSED WAIPIO PENINSULA SPORTS COMPLEX SITE, HONOLULU

BOTANICAL SURVEY OF THE PROPOSED

WAIPI'O PENINSULA

SPORTS COMPLEX SITE, HONOLULU

by

Art Whistler
Isle Botanica

Prepared for

Belt Collins Hawai'i

April 1998

INTRODUCTION

The study site is located just south of Waipahu on Waipi'o Peninsula, which is bounded on the west side by West Loch, on the east side by East Loch, and at the southern tip by the entrance to Pearl Harbor. The study site, a parcel comprising about 200 acres, extends across the peninsula, except for the coastal strip to the east of the Waipi'o Point Access Road. The northern boundary of the irregularly shaped parcel corresponds to the southern edge of the Government Reservation (which contains an FCC facility), part of the southern edge the Ted Makalena Golf Course, and the northern edge of the Waipahu incinerator compound; the boundary of the northwest corner corresponds to the edge of the Kapakahi Stream; the western boundary corresponds to the waters of West Loch; the southern boundary corresponds to an ESQD arc extending from just inland of West Loch eastward to Waipi'o Point Access Road; and the eastern boundary runs just inside and west of the access road (see the vegetation map in Fig. 1 for the study site boundaries).

The whole peninsula has been highly disturbed for a long time, and there is no trace of any of the original vegetation. Most of the study site is covered with abandoned sugarcane fields, with its associated plantation roads, irrigation canals, settling ponds, dikes, and embankments. The northwest corner is covered with the former Waipahu incinerator complex, and south of that is a large area covered with several meters of landfill. The cultivation of sugar cane was abandoned in 1994, but persistent patches of cane can be found in some of the fields.

METHODOLOGY

The study site was visited by botanists from Isle Botanica on three days between 21 and 24 February 1998. After a reconnaissance to determine the boundaries, the area was thoroughly traversed and a checklist of the flowering plants was compiled. The vegetation types were identified and characterized based upon the dominant species present. Nearly all species were identified during the field work, but a few not immediately recognized were later identified using Wagner et al. (1990). The species found at the site were then compiled into a checklist (Appendix 1) which includes scientific name and author, common names, status (indigenous, endemic, or alien), and estimated abundance at the site.

A literature search was also carried out to determine what information about the study site was available (see Literature Cited), but previously recorded biological information was scarce. After a preliminary description of the vegetation was written, the site was revisited so that the written description could be compared to the actual site conditions to be sure that they matched.

RESULTS

A total of 84 plant species were recorded at the site (Appendix 1). Of these, only six are native--*Sesuvium portulacastrum* ('akulikuli), *Jacquemontia ovalifolia* (pa'u-o-Hi'iaka), *Abutilon incanum* (ma'o, questionably native), *Sida fallax* ('ilima), *Bacopa monnieri* (water hyssop), and *Waltheria indica* ('uhaloa). None of them is endemic to Hawai'i, i.e., they all are native to other places besides Hawai'i. The remaining 78 or 79 plants are alien (introduced, exotic) species, most of them naturalized weeds. A few, such as *Bougainvillea x buttiana* (bougainvillea), *Nerium oleander* (oleander), *Cassia x nealii* (rainbow shower), *Cordyline fruticosa* (ti plant, ki),

Schefflera actinophylla (octopus tree), and *Carica papaya* (papaya), are only found in cultivation. Three others, *Saccharum officinarum* (sugar cane), *Moringa oleifera* (horse-radish tree), and *Roystonea regia* (royal palm), are cultivated species that appear to have persisted in one or more places long after cultivation.

Because of decades of disturbance, mostly from the cultivation of sugar cane and the creation of landfills, no native vegetation is found at the site. The existing disturbed vegetation is not homogeneous, but can be divided into the following plant communities: (1) Managed Land Vegetation; (2) Secondary Scrub/Grassland; (3) *Cenchrus* Grassland (4) *Leucaena* Scrub; (5) Pickleweed Marsh; (6) Freshwater Marsh; and (7) Mangrove Forest. The last six, while not considered to be "native vegetation" because they are dominated by alien species, are natural and stable in composition. The boundaries between the communities discussed below and shown in the vegetation map (Fig. 1) are not always clear because the vegetation types often grade into each other and do not fit into discrete areas that are easily grasped, thus they are only approximate on the map.

(1) Managed Land Vegetation

This comprises the disturbed vegetation that occurs on land currently under some kind of management--typically, lawns, roads, and house sites. At the study site it comprises mostly the dirt roads and roadsides that traverse the area, the grounds of the former Waipahu incinerator (Fig. 2), the Waipi'o Point Access Road north of the study site, and a road and old railroad right-of-way leading north from the northwest corner. It is the least "natural" type of vegetation found at the site, since it has to be managed to maintain its current species composition. Alien weeds, such as *Chamaesyce hypericifolia*, *Chamaesyce hirta* (garden spurge), *Coccinea grandis* (ivy gourd), *Heliotropium procumbens* (weedy heliotrope), *Verbesina encelioides* (Mexican sunflower), *Tridax procumbens* (coat buttons), *Amaranthus spinosus* (spiny amaranth), *Cynodon dactylon* (crab grass), and many other herbaceous species dominate this kind of vegetation. Some hardy individual plants grow on the dirt roads themselves. None of the plants occurring in this habitat, except *Waltheria indica* ('uhaloa), is native to Hawai'i.

The roadsides of the Waipi'o Point Access Road, which, according to the construction plan, will be widened as an entrance road, are covered with managed land vegetation that is maintained (mowed and watered) as lawns and planted trees (Fig.3). The site of the proposed irrigation line runs from the incinerator compound north along Waipahu Depot Street, turns west along an old railroad right-of-way, and then north heading up to Farrington Highway along another right-of-way. This is also covered in part by managed land vegetation, but most of the northern part is currently a road and housing area (Fig. 4).

(2) Secondary Scrub/Grassland

The majority of the site comprises abandoned sugarcane fields along with their associated dikes, embankments, ponds, and irrigation ditches. This is not homogeneous vegetation, but is instead a mosaic dominated in different places by different single species or combination of alien weed species. Only one native species was found in this community--*Waltheria indica* ('uhaloa). The area has in common its occurrence on former sugarcane land, and the floristic differences are probably based on whether the field was last used as a ponding area or a cane field, the length of time since it was abandoned, and other less obvious factors. For descriptive purposes, these

variations are discussed below in four associations--vegetation types that are similar in structure but differ in dominant species.

Castorbean Scrub Association

A large triangular-shaped area on the south central side of the study site is labeled on some maps of the area as "mud ponds." In the milling of sugar cane, the large amount of waste water produced at the Waipahu mill was piped from there to the sugarcane lands, where it was impounded in artificial settling ponds. The water from these ponds was then used to irrigate the surrounding fields. After a few years these ponds were filled with sediment, after which they were either excavated and the walls (dikes) rebuilt, or they were abandoned and another pond constructed in the vicinity.

The vegetation in some of these abandoned ponds is dominated by *Ricinus communis* (castor bean). In some places, the trees are leafless and near-dead (Fig. 5), in other places, perhaps ones with more residual soil moisture, they are healthier looking. The only other common plant in these areas is *Coccinea grandis* (ivy gourd), and in some, the grasses *Chloris barbata* (inflated fingergrass) and *Brachiaria mutica* (California grass). The ivy gourd has recently become a problem weed in Hawai'i. It is a fast growing weed that is able to grow and cover trees in relatiavely dry areas (Fig. 6), and in some places at the study site its green leaves were in stark contrast to the surrounding parched grasses and shrubs.

California Grass Association

California grass is listed by the U. S. Army Corps of Engineers as a "facultative wetland" species, which means it is usually but not always found in wetlands. In addition to its abundance in some of the "mud ponds" noted above, it dominates an area at the center of the study site between the east-west access (dirt) road and the golf course. An old aerial photo (1978) shows standing water in this area and one in 1989 shows a grassland almost certainly dominated by California grass. The area appears to be a depression where irrigation water accumulated, possibly a long time ago as a settling pond, but it appeared to be dry at the time of the site visit (the dead California grass is so thick that you when you walk on it you do not touch the ground). Only the center of this area was green (Fig. 7). It is likely that it will eventually be replaced by *Panicum maximum* (Guinea grass).

The same association occurs in the irrigation canals at the site (Fig. 8). In some places patches of the California grass were mixed with barren, cracked soil, which suggests that the California grass will eventually disappear and more dryland-adapted species will eventually dominate. This association also occurs in the drainage area just to the north of the marsh (Fig. 9), where it occurs in patches among other alien weed species.

All these areas of California grass association would probably not be categorized as wetlands since they probably lack the requisite wetland soil and hydrology, and are merely remnant vegetation on areas formerly saturated with irrigation water. However, this needs to be confirmed by soil samples.

Guinea Grass Association

In other areas, particularly in the northeast corner of the study site between the Government Reservation on the north and the east-west access road to the south, *Panicum maximum* (Guinea grass) dominates (Fig. 10). This grass forms almost pure stands up to 8 ft in height that are penetrated only with difficulty. In the eastern half of this corner area the grass is mixed with

varying amounts of *Leucaena leucocephala* (koa haole) and *Ricinus communis* (castor bean), and in some places, clumps of sugar cane that are relicts of former cultivation. Few other species can grow in this dense grassland.

Mixed Species Association

A fourth association of this secondary scrub/grassland covers the abandoned cane fields at the southeast corner of the study site, bounded on the north by the east-west access road, on the west by the old ponding areas, and on the east by the Waipi'o Point Access Road. This area is very heterogeneous, and different species dominate in different places within it without any predictable pattern (Fig. 11). The most common species here are *Pluchea carolinensis* (pluchea), *Chloris barbata* (inflated fingergrass), *Ricinus communis* (castor bean), *Leucaena leucocephala* (koa haole), *Waltheria indica* ('uhaloa), *Atriplex semibaccata* (Australian saltbush), *Panicum maximum* (Guinea grass), and even a few patches of parched *Brachiaria mutica* (California grass).

(3) *Cenchrus* Grassland

This grassland vegetation covers the landfill area just to the south of the northwest corner of the study site. It also occurs north of this in a triangular area between the two branches of the Kapakahi Stream and Waipahu Depot Street, and in a rectangular area south of the incinerator plant (Fig. 12). This community is entirely dominated by *Cenchrus ciliaris* (Buffel grass). Other species found in much smaller amounts include *Waltheria indica* ('uhaloa), *Leucaena leucocephala* (koa haole), *Pluchea indica* (Indian pluchea), *Pluchea carolinensis* (pluchea), and

Cynodon dactylon (Bermuda grass). Of these, only *Waltheria* is native, but *Jacquemontia ovalifolia* (pa'u-o-Hi'iaka) and *Abutilon hirsutum* (ma'o) also were found here in small amounts.

(4) *Leucaena* Scrub

This community identified by the same name on the nearby 'Ewa Plain by Char and Balakrishnan (1979) is dominated by *Leucaena leucocephala* (koa haole). It occurs in narrow bands in the study area, principally on embankments. It also occurs at the makua (north) end of some of the gullies (Fig. 13). These embankments are found on the boundary of the study site, along the east-west access road, along a canal parallel and west of the Waipi'o Point Access Road, on two rock outcroppings in the center of the Guinea grass association south of the golf course, on the inland margins of some of the mangrove swamps, and several other places. In some places there is a scattering of *Prosopis pallida* (kiawe) trees, but these are generally fewer than the *Leucaena* trees. The latter may also be mixed with *Ricinus communis* (castor bean). Underneath the *Leucaena* trees the dominant ground cover is typically *Panicum maximum* (Guinea grass), and in some shaded places, *Asystasia gangetica* (Chinese violet).

(5) Pickleweed Marsh

This marsh is located along parts of the east shore of the study site. It is not a single marsh, but a series of small discontinuous areas sometimes found between the mangrove forest and the embankment at the west side of the landfill area. It differs from the marsh described below in that it is probably in an area of saline water, and is entirely dominated by the succulent, alien, halophytic (salt-loving) shrub *Batis maritima* (pickleweed), with a few patches or individual

plants such as *Atriplex semibaccata* (Australian saltbush), *Pluchea carolinensis* (pluchea), *Pluchea indica* (Indian pluchea), *Nicotiana glauca* (tree tobacco), and *Panicum maximum* (Guinea grass). On the inland margins *Prosopis pallida* (kiawe) and *Leucaena leucocephala* (koa haole) often dominate, and on the seaward margin, *Rhizophora mangle* (red mangrove). This area is definitely a wetland, but all the species found here are aliens. A similar type of marsh identified by the same name (pickleweed marsh) was described by Elliot and Hall (1977) just to the east at the head of West Loch. The pickleweed marsh at the study site is so small and discontinuous, however, that it was not distinguished from the mangrove swamp on the vegetation map (Fig. 1).

(6) Freshwater Marsh

This wetland vegetation is located at the south end of a low, shallow, troughlike area that extends from the landfill area down to the mangroves by the bay. At the north end of this depression, which is bounded on the east and west sides by dikes, *Cenchrus* grassland predominates (Fig. 14). But farther south towards the bay (West Loch), clumps of Guinea grass and perhaps farther south, California grass, predominate. Still farther south and seaward in this depression, the soil apparently becomes moister, and the vegetation changes to a freshwater marsh.

At its northern end there are large areas of the reedlike grass *Pennisetum purpureum* (elephant grass). Adjacent to the mangroves at the southern terminus of this depression there is a rectangular area of wetland marsh dominated by alien species. Several herbaceous species are common here, often in a kind of mosaic, the cause for which is not readily apparent. In some areas, especially close to the mangroves, *Cyperus alternifolius* (umbrella sedge) and *Pluchea indica* (Indian pluchea) dominate, although in one place nearly all the umbrella sedge is dead (Fig. 15). In other adjacent areas the dominant species are a mixture of *Ipomoea alba* (moonflower), *Brachiaria mutica* (California grass), *Cyperus alternifolius* (umbrella sedge), and *Coccinea grandis* (ivy gourd), all of them alien species. Also here is a small grove of royal palms (Roystonea regia), a species not reported to be naturalized in Hawai'i.

(7) Mangrove Swamp

This is the forest dominated by *Rhizophora mangle* (red mangrove), an alien species that is able to survive in saline conditions such as found in estuaries (Fig. 16). The seeds of this tree germinate on the tree to form a long embryonic root, which, when the seedling falls from the tree, may stick in the muddy saline soil and start the plant growing. Red mangrove forms a dense monodominant (containing only one species) forest along the edge of West Loch, where it grows in the standing water of the loch. There is often a narrow zone of shrubbery dominated by *Pluchea indica* (Indian pluchea) on its inland side, and in some places there is pickleweed marsh as noted above. The only native species found in this vegetation was a small amount of *Bacopa monnieri* (water hyssop) which occurred along its margins.

DISCUSSION

The major concern in a project like this is the presence of threatened or endangered species and the existence of wetlands on the site. However, as noted in the Results section, only five or

six native species were found during the field study, all of which are indigenous and not endemic, and none of which is a federally listed or candidate threatened or endangered plant species.

In addition to the six native species, three other plant species were Polynesian introductions, i. e., they were brought to Hawai'i by ancient Polynesian voyaging canoes because of their use to the ancients. These are *Thespesia populnea* (milo), *Saccharum officinarum* (ko, sugar cane), and *Cordyline fruticosa* (ti plant, ki). Milo is found growing along the edge of the mangroves at the site, particularly along the Waipi'o Point Access Road. It has a fine timber formerly used for carving. The sugarcane found at the study site is quite different from the food plant Hawaiians brought to the islands, since it has been extensively hybridized and bred to produce commercial varieties. Ti has long been used by Hawaiians as a food plant, but more importantly for medicinal and religious purposes. However, only a single ti plant was seen at the study site, and it was growing in a pot on the grounds of the incinerator. One more useful plant, one of the native species, should be mentioned--*Waltheria indica* ('uhaloa). This subshrub has long been used in Hawaiian medicine, but is a common weed throughout the lowlands of Hawai'i. With only these few significant cultural plants found at the site--all species that are common in Hawai'i--the plant cultural resources at the site are minimal.

All of the vegetation on the site is disturbed, and hence no sensitive plant communities are present other than the wetlands, which, however, are composed almost entirely of alien weed species. As noted above, three types of wetlands were identified--pickleweed marsh, freshwater marsh, and mangrove swamp. Only a single native species, *Bacopa monnieri* (water hyssop) was found in any of them. The inland areas of *Brachiaria mutica* (California grass) are probably not wetlands by the official definition because it is unlikely that they have the requisite hydrology and wetland soils. They were artificially created by sugarcane irrigation and will probably disappear because water is no longer being supplied to them.

Since the pickleweed marsh and the mangrove swamp are both on the periphery of the planned development, these may not be directly impacted by construction, but since they are wetlands they will have to be treated according to U.S. Army Corps of Engineers and U.S. Fish and Wildlife regulations. The freshwater marsh, however, is away from the margin and may be directly affected. The construction plans of the sports complex may not have to impinge on any of these wetlands except for the marsh. However, this marsh is small and poor in quality since it is dominated by alien plants, none of which are obligate wetland species.

Consequently, with the exception of the only natural resource on the site--the wetlands dominated by a few alien species--the development of the sports complex at the Waipi'o site should have little or no effect on the plant resources of Hawai'i.

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APPENDIX 1. PLANT SPECIES CHECKLIST OF THE WAIPI'O PENINSULA SPORTS COMPLEX SITE.

The following is a checklist of the vascular plants inventoried during the field study at the proposed sports complex site at Waipi'o peninsula, Honolulu. The plants are divided into two groups, Monocots, and Dicots. Within these groups, the species are presented taxonomically by family, with each family, and each species in the family, in alphabetical order. The taxonomy and nomenclature follow Wagner *et al.* (1990) with only a few exceptions. In most cases, common English and/or Hawaiian names listed have been taken from St. John (1973) or Porter (1972).

For each species, the following information is provided:
1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographic status. The following symbols are used:
   I = indigenous (native to Hawai'i as well as other geographic areas).
   P = Polynesian introduction (introduced to Hawai'i by Polynesians before the advent of the Europeans).
   X = Introduced or alien (not native, introduced to Hawai'i, either accidentally or intentionally, after the advent of the Europeans).

Species	Common Names	Status	Abundance
	MONOCOTS		
AGAVACEAE (Agave Family)			
Cordyline fruticosa (L.) A. Chev.	ti, ki	P	uncommon, cultivated
ARECACEAE (Palm Family)			
Roystonea regia (H.B.K.) O.F. Cook	royal palm	X	uncommon
COMMELINACEAE (Spiderwort Family)			
Commelina diffusa N. L. Burm.	honohono	X	uncommon
CYPERACEAE (Sedge Family)			
Cyperus alternifolius L.	umbrella plant	X	abundant in marsh
POACEAE (Grass Family)			
Brachiaria mutica (Forssk.) Stapf	California grass	X	locally abundant
Cenchrus ciliaris L.	Buffel grass	X	locally abundant
Chloris barbata (L.) Sw.	swollen fingergrass	X	locally abundant
Cynodon dactylon (L.) Pers.	Bermuda grass	X	occasional
Panicum maximum Jacq.	Guinea grass	X	locally abundant
Pennisetum purpureum Schumach.	elephant grass	X	abundant in marsh
Saccharum officinarum L.	sugar cane	P	persisting in fields
Setaria verticillata (L.) P. Beauv.	bristly foxtail	X	uncommon
Sporobolus diander (Retz.) P. Beauv.	dropseed	X	uncommon

Species	Common Names	Status	Abundance
	DICOTS		
ACANTHACEAE (Acanthus Family)			
Asystasia gangetica (L.) T. Anderson	Chinese violet	X	occasional
AIZOACEAE (Carpetweed Family)			
Sesuvium portulacastrum (L.) L.	'akulikuli	I	uncommon
Trianthema portulacastrum L.	----	X	occasional
AMARANTHACEAE (Amaranth Family)			
Achyranthes aspera L.	----	X	occasional to common
Amaranthus spinosus L.	spiny amaranth	X	occasional
ANACARDIACEAE (Mango Family)			
Schinus terebinthifolius Raddi	Christmas berry	X	uncommon
APOCYNACEAE			
Nerium oleander L.	oleander	X	cultivated
ARALIACEAE (Ginseng Family)			
Schefflera actinophylla (Endl.) Harms	octopus tree	X	uncommon, cultivated
ASTERACEAE (Sunflower Family)			
Bidens alba (L.) DC.	beggar's-tick	X	uncommon
Conyza bonariensis (L.) Cronq.	hairy horseweed	X	uncommon
Emilia fosbergii Nicolson	red pualele, emilia	X	uncommon
Pluchea carolinensis (Jacq.) G. Don	pluchea	X	locally common
Pluchea x fosbergii Cooperr. & Galang	hybrid pluchea	X	uncommon
Pluchea indica (L.) Less.	Indian pluchea	X	common
Sonchus oleraceus L.	sow thistle	X	uncommon
Tridax procumbens L.	coat buttons	X	occasional
Verbesina encelioides (Cav.) Benth. & Hk.	golden crownbeard	X	occasional
BATACEAE (Saltwort Family)			
Batis maritima L.	pickelweed	X	locally abundant
BIGNONIACEAE (Bignonia Family)			
Spathodea campanulata P. Beauv.	African tulip tree	X	uncommon
BORAGINACEAE (Heliotrope Family)			
Heliotropium procumbens Mill.	weedy heliotrope	X	occasional
CACTACEAE (Cactus Family)			
Opuntia ficus-indica (L.) Mill.	prickly pear, panini	X	uncommon
CARICACEAE (Papaya Family)			
Carica papaya L.	papaya	X	uncommon, cultivated
CARYOPHYLLACEAE (Carnation Family)			
Spergularia marina (L.) Griesb.	saltmarsh sand, spurry, mimi'ilio	X	uncommon
CHENOPODIACEAE (Goosefoot Family)			
Atriplex semibaccata R. Br.	Australian saltbush	X	locally common
Atriplex subrecta Verd.	----	X	uncommon
Chenopodium murale L.	'aheahea	X	occasional

Species	Common Names	Status	Abundance
CONVOLVULACEAE (Morning-Glory Family)			
Ipomoea alba L.	moonflower	X	locally common
Ipomoea cairica (L.) Sweet	koali	X?	uncommon
Ipomoea obscura (L.) Ker-Gawl.	bindweed	X	occasional
Ipomoea ochracea (Lindl.) G. Don	----	X	uncommon
Ipomoea triloba L.	pink bindweed	X	uncommon
Jacquemontia ovalifolia (Choisy) H. Hall.	pa'u-o-Hi'i'aka	I	uncommon
CUCURBITACEAE (Gourd Family)			
Coccinea grandis (L.) Voigt	ivy gourd	X	abundant
Momordica charantia L.	wild bittermelon	X	uncommon
EUPHORBIACEAE (Spurge Family)			
Chamaesyce hirta (L.) Millsp.	garden spurge	X	occasional
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X	occasional
Chamaesyce hyssopifolia (L.) Small	----	X	uncommon
Ricinus communis L.	castor bean, koli	X	abundant
FABACEAE (Pea Family)			
Acacia farnesiana (L.) Willd.	klu	X	uncommon
Albizia lebbeck (L.) Benth.	siris tree	X	uncommon
Cassia x nealii Irwin & Barneby	rainbow tree	X	uncommon, cultivated
Desmanthus virgatus (L.) Willd.	virgate mimosa	X	common
Glycine wightii (Wight & Arn.) Verdc.	----	X	uncommon
Indigofera spicata Forssk.	creeping indigo	X	uncommon
Leucaena leucocephala (Lam.) de Wit	koa haole	X	abundant
Pithecellobium dulce (Roxb.) Benth.	'opiuma, Manila tamarind	X	uncommon
Prosopis pallida (Humb. & Bonpl.ex Willd.) Kunth	kiawe, mesquite	X	occasional
Samanea saman (Jacq.) Merr.	monkeypod	X	uncommon, cultivated
Senna occidentalis (L.) Link	coffee senna	X	uncommon
LAMIACEAE (Mint Family)			
Hyptis pectinata (L.) Poir.	comb hyptis	X	uncommon
Leonotis nepetifolia (L.) R. Br.	orange lion's-ear	X	occasional
MALVACEAE (Mallow Family)			
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	X	uncommon
Abutilon incanum (Link) Sweet	ma'o, hoary abutilon	I?	uncommon
Malvastrum coromandelianum (L.) Garcke	false mallow	X	common
Sida ciliaris L.	----	X	uncommon
Sida fallax Walp.	'ilima	I	common
Sida spinosa L.	prickly sida	X	uncommon
Thespesia populnea (L.) Sol ex Corr.	milo	P	uncommon

Species	Common Names	Status	Abundance
MORACEAE (Mulberry Family)			
Ficus indica L.	rubber plant	X	uncommon, cultivated
Ficus microcarpa L. f.	Chinese banyan	X	uncommon
MORINGACEAE (Moringa Family)			
Moringa oleifera Lam.	horse-radish tree	X	uncommon
MYRTACEAE (Myrtle Family)			
Syzygium jambos (L.) Alston	rose apple	X	uncommon
NYCTAGINACEAE (Four-o'-Clock Family)			
Bougainvillea x buttiana Holtt. & Stand.	bougainvillea	X	uncommon, cultivated
Boerhavia coccinea Mill.	-----	X	occasional
PASSIFLORACEAE (Passionflower Family)			
Passiflora foetida L.	love-in-a-mist	X	occasional
POLYGONACEAE (Buckwheat Family)			
Antigonon leptopus Hook. & Arnott	Mexican creeper	X	uncommon
PORTULACACEAE (Purslane Family)			
Portulaca oleracea L.	common purslane	X	uncommon
RHIZOPHORACEAE (Mangrove Family)			
Rhizophora mangle L.	red mangrove	X	locally abundant
SCROPHULARIACEAE (Snapdragon Family)			
Bacopa monnieri (L.) Wettst.	water hyssop	I	uncommon
SOLANACEAE (Nightshade Family)			
Nicotiana glauca R.C. Graham	tree tobacco	X	common
STERCULIACEAE (Cocoa Family)			
Waltheria indica L.	'uhaloa	I	common

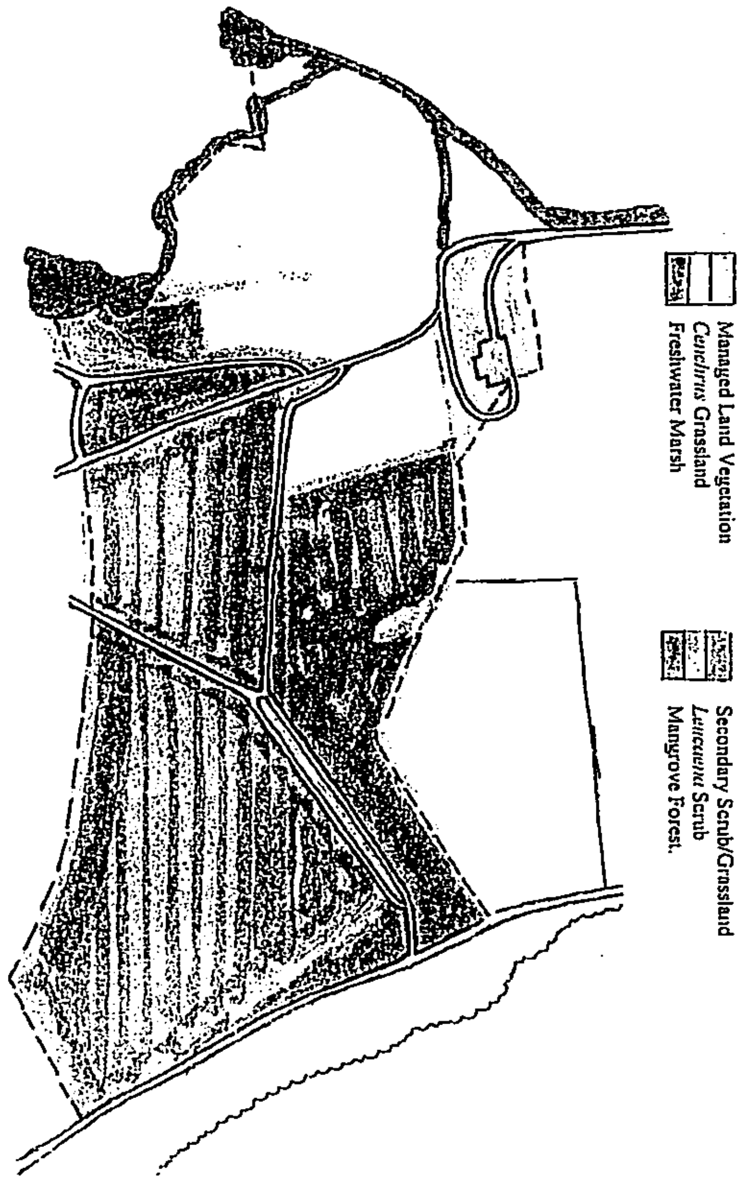

Fig. 1. Vegetation map of the Waipi'o peninsula study site.

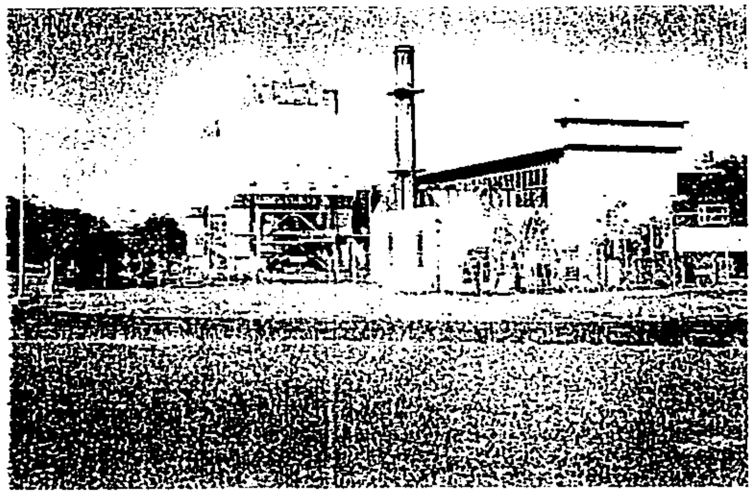

Fig. 2. The grounds of the Waipahu incinerator, unpaved areas of which are covered with managed land vegetation.

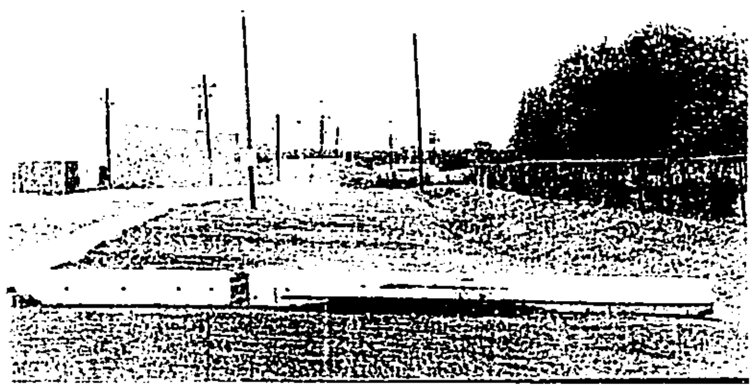

Fig. 3. Waipi'o Point Access Road north of the study site. It is maintained by mowing and watering (as taking place in the photo) the lawns.

Fig. 4. Railroad right-of-way extending north from the northwest corner of the study site, and now comprising a road.

Fig. 5. Castorbean association in an abandoned settling pond. Notice the lack of leaves on the shrubs.

Fig. 6. *Coccinea grandis* (ivy gourd) overgrowing *Rininus communis* (castor bean) at the study site.

Fig. 7. California grass association still green in the center of the field.

Fig. 8. *Brachiaria mutica* (California grass) with *Ricinus communis* (castor bean) dominating an irrigation ditch.

Fig. 9. *Brachiaria mutica* (California grass) in drainage area leading down to the freshwater marsh.

Fig. 10. Guinea grass association, with a rock outcropping in the center dominated by *Leucaena leucocephala* (koa haole).

Fig. 11. Mixed species association dominated by various grasses and shrubs.

Fig. 12. *Cenchrus* grassland at the northwest side of the study site.

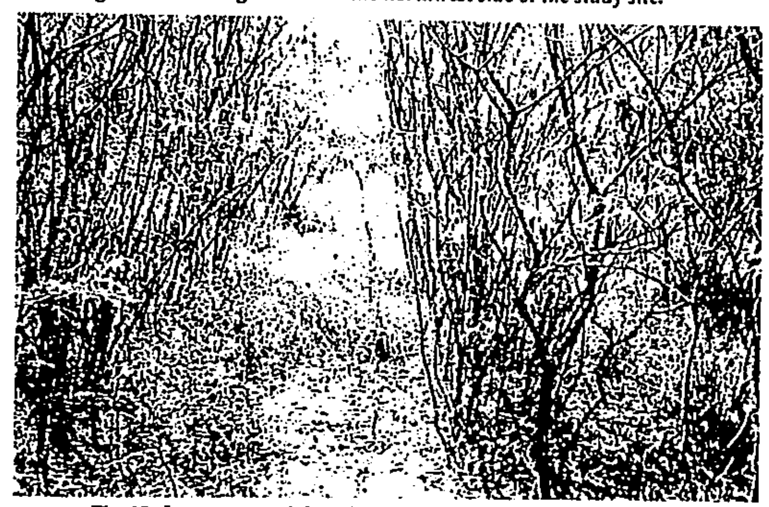

Fig. 13. *Leucaena* scrub in a dry drainage canal, dominated by *Leucaena leucocephala* (koa haole).

Fig. 14. Freshwater marsh dominated by *Pluchea indica* (Indian pluchea) and *Cyperus alternifolius* (umbrella sedge).

15. Freshwater marsh with a small grove of *Roystonea regia* (royal palms).

Fig. 16. Mangrove swamp dominated by *Rhizophora mangle* (red mangrove), with a zone of *Leucaena* scrub in the foreground.

APPENDIX D

A RECONNAISSANCE SURVEY OF TERRESTRIAL VERTEBRATE SPECIES WITHIN THE PROPOSED WAIPIO SOCCER COMPLEX SITE, WAIPAHU, ISLAND OF OAHU, HAWAII

REPORT:

A Reconnaissance Survey of Terrestrial Vertebrate Species, within the Proposed Wai-pi'o Soccer Complex Site, Wai-pahu, Island of O'ahu, Hawai'i.

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Introduction

This report summarizes the findings of a two and a half day ornithological and mammalian survey of the proposed Wai-pi'o Soccer Complex site. Fieldwork was performed between April 2nd and April 4th, 1998. The area surveyed is located on the Wai-pi'o Peninsula, in Wai-pahu, on the Island of O'ahu, Hawai'i (Fig. 1).

The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of the proposed development site. In addition, we were asked to assess the probability of any usage of the site by listed species given the habitat available.

During the course of this two and a half-day survey, no endangered or threatened native avian or mammalian species were detected within, or in the immediate vicinity of the proposed development site.

General Site Description

The proposed development site is on the Wai-pi'o Peninsula located in Pearl Harbor. The peninsula is bound to the west by West Loch, on the east by Middle Loch and to the south by the entrance to Pearl Harbor. The site encompasses approximately 200 acres extending across the peninsula from West Loch to the eastern boundary of the Wai-pi'o Point Access Road, but not including the coastal strip on the shore of Middle Loch. The northern boundary of the property is irregular; it is formed by the northern boundary of the Wai-pahu incinerator compound, part of the southern boundary of the Ted Makalena Golf course, and the southern boundary of a U.S. Government reservation that includes an FCC facility. The Kapakahi Stream and the waters of the West Loch form the western boundary. The southern boundary is demarcated by the Navy's 75% ESQD Arc (Fig. 2).

The habitat found on the peninsula is heavily disturbed agricultural lands. The area was under sugar cultivation from just before the turn of the century, until 1994 when O'ahu Sugar Co. shut down their operation. Former plantation roads, dikes, embankments, settling ponds, and abandoned sugar cane fields crisscross the area. The northwest corner is the former Wai-pahu incinerator plant ashfield and an abandoned City and County of Honolulu landfill.

The vegetation within the site is dominated by alien species; principal among the 80 odd species identified was naturalized weed species. During the course of the botanical

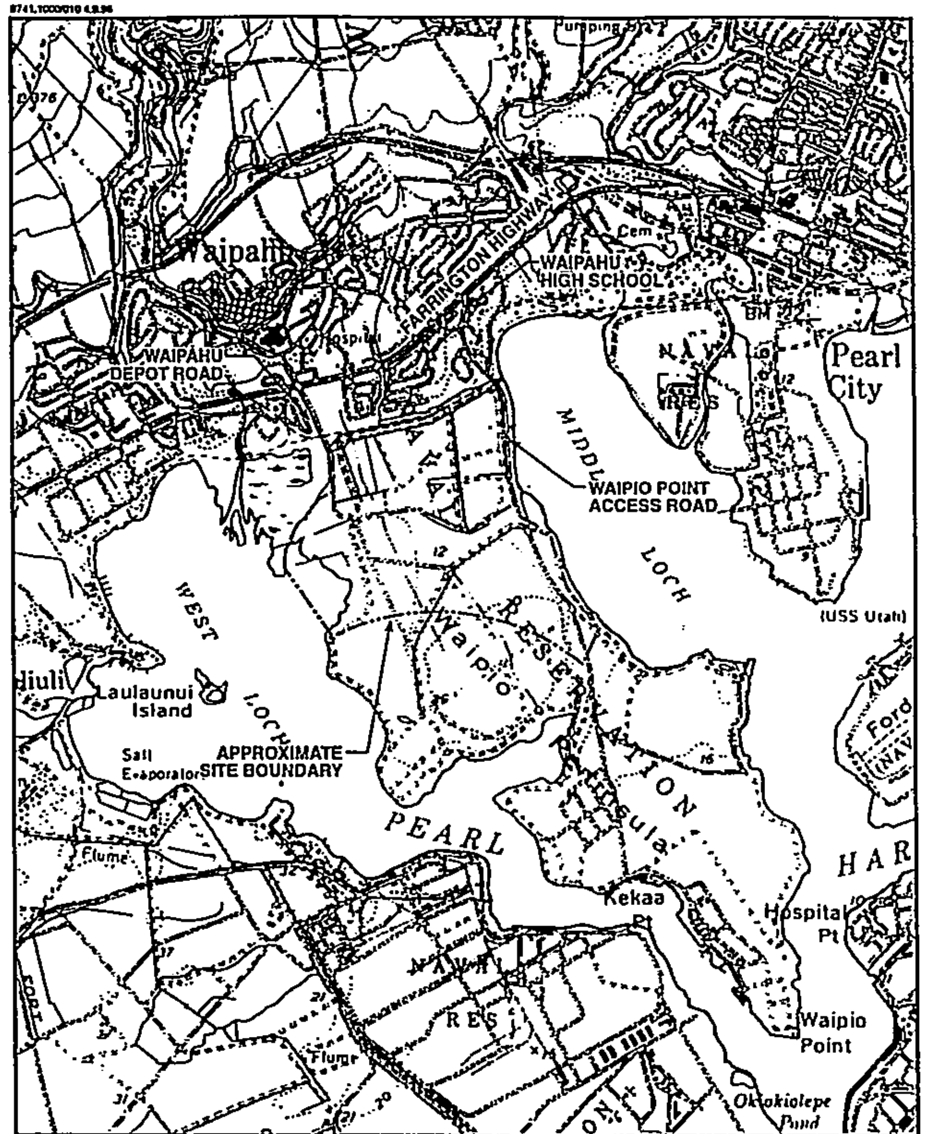


Figure 1
PROJECT LOCATION
Waipio Sports Complex
Prepared by Belt Collins Hawaii
April 1998

survey no endemic plant species were identified, and only 5 or 6 indigenous species were found (Whistler 1998). For a detailed discussion of the vegetation present on the site please see Whistler (1998).

Previous Surveys:

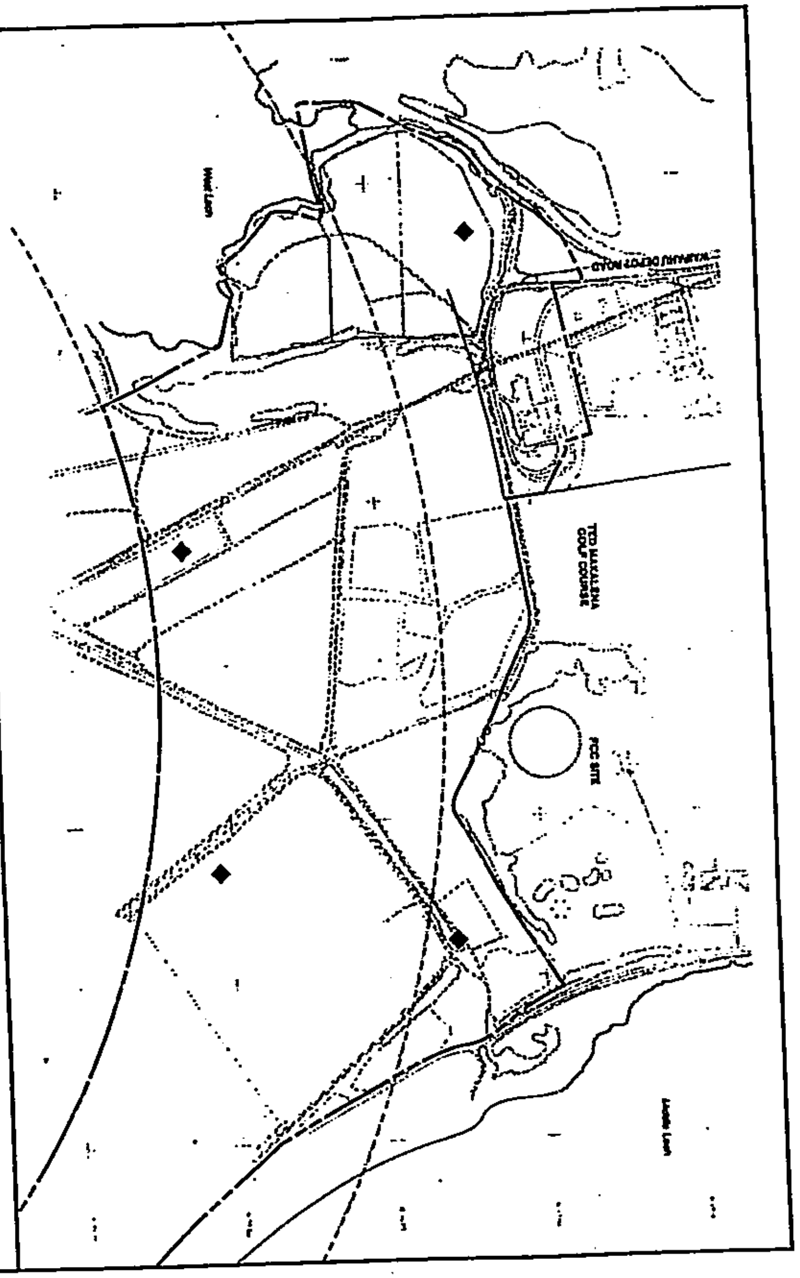
In the late 1960's comprehensive annual waterbird surveys were initiated by the biologists at the state Division of Forestry and Wildlife (DOFAW) to monitor the four remaining resident endemic waterbird species found in the main Hawaiian Islands. Since 1978 these waterbird surveys have been conducted throughout the state on a semi-annual basis (Engilis 1988, Engilis and Pratt, 1993). The Wai-pi'o peninsula has been included in those counts since at least the early 1970's. Shallenberger surveyed Wai-pi'o peninsula during the course of a survey of wetlands in Hawai'i in 1976-1977 (Shallenberger 1977). Due to the importance of the man made wetlands on the peninsula to migratory waterfowl and shorebirds; bird watchers have also been monitoring the area since the late 1950's. Numerous first state records, and other interesting migratory and extralimital records have been published in the ornithological literature. Two of the more comprehensive papers addressing multiple records from the area are Pyle et al. (1988), and David (1991).

Mammalian Survey Methods:

In an effort to detect the presence of endangered Hawaiian hoary bats (*Lasiurus cinereus semotus*), two stationary remote bat census stations were deployed on two successive nights. Sampling was conducted on April 2 and 3rd, 1998 (Fig. 1). Broadband AnaBat II ultrasonic bat detectors coupled to voice activated cassette recorders and remote timing devices were used to detect bat vocalizations. In addition; visual scans were made for bats during crepuscular periods on two evening and two mornings. Count stations were sampled once. Following techniques developed by Krusic et al. (1996), units were calibrated using a pet ultrasonic flea collar. The tapes were reviewed and the number of bat passes recorded, were counted.

Avian Survey Methods:

The border of the entire site was walked, as were as many of the former plantation roads as possible. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Walking counts were concentrated during the early morning hours between 0600 hrs. and 1100 hrs., the peak bird activity time. A tally was made of birds detected during the census time on site. An additional 2 hours were spent on the site between 1800 hrs. and 2000 hrs. on the evenings of the 2nd and 3rd, in an attempt to



Note: Locations are approximate.

NORTH 0 400 800 1600 SCALE IN FEET

Figure 2

STUDY SITE

LEGEND
◆ Bat Census Station

detect Newell's Shearwaters overflying the site. Time not spent counting was used to search the site and the surrounding area for wetlands, and listed avian waterbird species.

Avian phylogenetic order used in this report follows *Birds Of The World: A Checklist 4th Edition* (Clements 1991), and the *1st and 2nd Supplements to Birds Of The World: A Checklist 4th Edition* (Clements and Principe, Jr. 1992, Clements 1997); scientific nomenclature follows *The AOU Checklist of North American Birds* (AOU 1983), and the *35th through the 41st Supplements to The AOU Checklist* (AOU 1985-1997), Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986), and, plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner et al. 1990). Place names follow *Place Names of Hawaii* (Pukui et al, 1976)

Results:

A total of 20 avian species representing 13 families were detected within the immediate vicinity of the site (Table 1). All but two of the species recorded are alien species (Introduced to Hawai'i by man). A lone Northern Shoveler (*Anas clypeata*) was seen flying over the site-heading northeast. This migratory duck species is one of the commoner annual waterfowl visitors to the state. Several Pacific Golden Plover (*Pluvialis fulva*) were also detected. Pacific Golden Plover are by far the most common migratory shorebird found annually throughout the state. No endangered or threatened avian species were detected within the proposed development site.

Two mammalian species; domestic dog (*Canis familiaris familiaris*), and small Indian mongoose (*Herpestes auropunctatus auropunctatus*) were detected while on site. No rodents were detected during the course of this survey; however, it is likely that roof rats (*Rattus rattus*), Norway rats (*Rattus norvegicus*) and house mice (*Mus musculus*), utilize the site. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see mammals. It is also probable that cats (*Felis catus*) also utilize the site at times. All of these introduced mammalian species are deleterious to avian populations. Hawai'i's sole endemic terrestrial mammalian species, the endangered Hawaiian hoary bat, or 'Ope'ape'a, was not detected. The findings of both the avian and mammalian surveys were consistent with the present habitat available. No expected species were missed, and no unexpected species were encountered.

Discussion:

There have been monumental changes in the avian makeup of the Wai-pi'o peninsula following the closure of O'ahu Sugar Co.'s operation in 1994. Between the turn of the century and 1995-96 the man made wetlands on the peninsula supported large numbers

Table 1
Key to Table 1

RA = Relative Abundance
A = ≥ 100
C = ≥ 50 - ≤ 99
U = ≥ 25 - ≤ 49
R = ≥10

Avian Species Detected During The Wai-pi'o Soccer Complex Faunal Survey

Common Name	Scientific Name	RA
GEESE, SWANS & DUCKS - Anatidae		
Northern Shoveler.	*Anas clypeata.*	R
HERONS - Ardeidae.		
Cattle Egret.	*Bubulcus ibis.*	C
PLOVERS & LAPWINGS – Charadriidae		
Pacific Golden Plover.	*Pluvialis fulva.*	C
PIGEONS & DOVES – Columbidae		
Rock Dove.	*Columba livia.*	R
Spotted Dove.	*Streptopelia chinensis.*	C
Zebra Dove.	*Geopelia striata.*	A
MIMIC THRUSHES & ALLIES – Mimidae		
Northern Mockingbird.	*Mimus polyglottos.*	R
STARLINGS – Sturnidae		
Common Myna.	*Acridotheres tristis.*	A
OLD WORLD FLYCATCHERS & ALLIES – Muscicapinae		
White-rumped Shama.	*Copsychus malabaricus.*	R
BULBULS – Pycnootidae		
Red-whiskered Bulbul.	*Pycnonotus jocosus.*	A
SILVEREYES – Zosteropidae		
Japanese White-Eye.	*Zosterops japonica.*	C
OLD WORLD SPARROWS – Passeridae		
House Sparrow.	*Passer domesticus*	U
WAXBILLS & ALLIES – Estrildidae		
Common Waxbill.	*Estrilda astrild astrild*	C
Red Avadavat.	*Amandava amandava.*	C
Nutmeg Manikin (Scaly-breasted Munia)	*Lonchura punctulata topela*	C
Chestnut Manikin (Black-headed Munia)	*Lonchura malacca.*	C
Java Sparrow.	*Padda oryzivora.*	R
FRINGILLIDS – Fringillidae		
House Finch.	*Carpodacus m. mexicanus.*	A
EMBERIZIDS – Emberizadae		
Northern Cardinal.	*Cardinalis cardinalis.*	C
Red-crested Cardinal.	*Paroaria coronata.*	R

of waterbirds including the four extant endangered Hawaiian waterbird species found in the main islands; Hawaiian Duck (*Anas wyvilliana*), and Hawaiian Coot (*Fulica alai*) are endemic at the species level, and the Common Moorhen (*Gallinula chloropus sandvicensis*), and Hawaiian Stilt (*Himantopus mexicanus knudseni*) are endemic at the sub-species level (USFWS 1992, DLNR 1986). The area also was a major migratory shorebird and waterbird stopping off point between September and April each year. Many of the more than 80 species of migratory and extralimital avian species which have been recorded from Hawai'i have been recorded from the peninsula (Engilis 1988, Pyle et al. 1988, David 1991, Pyle 1992, Pyle 1997). Between 1995 and the present, the settling ponds have dried up and become overgrown with a mix of castor bean (*Rininus communis*), California grass (*Brachiaria mutica*), Buffle grass (*Cenchurus ciliaris*), Guinea grass (*Panicum maximum*) and many other alien weed species. No wetland habitat suitable to sustain waterbirds, or shorebirds remains within the proposed development parcel. The shoreline along the western side of the parcel is heavily vegetated with red mangrove (*Rhizophora mangle*) all but obscuring the beach mudflats. This dense vegetation all but precludes the utilization of the intertidal zone by shorebirds. The avian and mammalian species detected during the course of this survey reflect the general trend in alien terrestrial vertebrate species that currently dominate the lowland areas of the Island of O'ahu.

There are several wetlands that support the four extant endemic waterbird species currently found on O'ahu relatively close to the subject property. The closest wetland is Pou-hala Marsh located just northwest of Kapakahi Stream on the Wai-pi'o peninsula. A triumvirate of the DLNR, United States Fish and Wildlife Service (USFWS), and Ducks Unlimited are currently working on an enhancement plan for this wetland. There are two units of the Pearl Harbor National Wildlife Refuge (PHNWR) located on the Pearl City Peninsula just across Middle Loch from the property. Another unit of the PHNWR is located on the Ewa side of West Loch immediately adjacent to the West Loch Golf Course. Given the close proximity of these four wetlands to the proposed development site it is probable that on occasion the site is overflown by Hawaiian Coot, Hawaiian Stilt, Common Moorhen and Hawaiian Duck. Following the construction of the soccer fields, watered grassy areas may be attractive to Hawaiian Stilts, and any number of migratory shorebirds. Should any reservoirs or ponds be constructed on the site, these may attract Hawaiian Coots, Hawaiian Ducks and Hawaiian Moorhens.

The threatened Newell's Shearwater (*Puffinus newelli*) may occasionally overfly the site. No nesting colonies have to date been detected on the Island; however, small numbers of this species have been recovered on the Island following "downing" incidents. The

majority of these birds were found on the Honolulu side of the Ko'olau's (Banko 1980, R. L. Pyle, pers. comm., B. Flint, pers. comm., D. Smith, pers. comm.).
If any of the soccer fields are lit, it is likely that the lights will attract moths and other nocturnally flying insects which in turn may attract foraging Hawaiian hoary bats.

Recommendations:

1. To avoid disturbance to Hawaiian Stilts and any other threatened or endangered waterbird species utilizing the Pou-hala Marsh, the red mangrove barrier on the southeast side of the Kapakahi Stream should not be disturbed.

2. To avoid the downing of Newell's Shearwaters resulting from interactions with external lights, it is recommended that any lights planned for the soccer complex be shielded.

Threatened and Endangered Avian Species Accounts:

Please refer to the following threatened and endangered avian species accounts for more detailed information on the occurrence of each species on the Island of O'ahu.

Newell's Shearwater: (*Puffinus newelli*) 'A'o

Newell's Shearwaters were listed as threatened by the USFWS in 1975 (USFWS 1992). This species breeds on Kaua'i, Hawai'i, Moloka'i and possibly in extremely small numbers on O'ahu. Newell's Shearwater populations have dropped precipitously since the 1880's (Banko 1980). The taxonomy of this species is poorly resolved. It has long been considered a sub-species of the Manx Shearwater (*Puffinus puffinus*). In 1983, the AOU separated the Pacific forms of the Manx Shearwater from this species. Hawai'i's race became a sub-species of the Townsend's Shearwater (*Puffinus auricularis*) (AOU 1983), although other authors, myself included, prefer to consider this a separate species (*Puffinus newelli*) (Pratt et al. 1987, Clements 1991). This pelagic species nests high in the mountains in burrows excavated under thick vegetation, especially uluhe fern (*Dicranopteris linearis*).

Newell's Shearwaters are extremely vulnerable to predation by terrestrial mammals. Their nesting burrows are quite odoriferous, especially when there are young birds present. This making it easy for cats, rats and mongooses to find them. A secondary threat, especially to fledging birds, is being disoriented by lights on their way to sea. When disoriented, seabirds often collide with manmade structures and, if not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals.

Hawaiian Duck (*Anas wyvilliana*) Koloa maoli

First described in 1878 by Sclater (AOU 1983), this species was formerly much more common than it currently is. By the early 1960's, this endemic Hawaiian species was limited to the Islands of Kaua'i and presumably Ni'ihau. Efforts by biologists from State Department of Land and Natural Resources (DLNR) to propagate this species and then reintroduce them on O'ahu have been successful. A total of 350 captive reared birds were released on O'ahu (Engilis and Reid 1993). The O'ahu population is currently estimated at approximately 300 birds (Engilis and Reid 1993, Engilis and Pratt 1993).

The breeding biology of this species in the wild has been poorly studied. Breeding behavior has been recorded from all months of the year. The peak breeding activity appears to be from November to May.

Common Moorhen (*Gallinula chloropus sandvicensis*) 'Alae ke'oke'o

Very little is known about this, the most secretive of Hawaii's waterbird species. Census techniques are still inadequate to accurately estimate population densities. Current estimates of the statewide population range from 350 to 750 birds, with an estimated 250 birds on O'ahu (Engilis and Reid 1993, Engilis and Pratt 1993). These figures are in reality, guess work.

The Moorhen is harder to study than the previously described Hawaiian Duck, consequently, even less is known about the breeding biology of this species in Hawai'i. Nesting occurs year-round, with a peak in activity extending from March through August (Engilis and Reid 1993).

Hawaiian Coot (*Fulica alai*) 'Alae 'ula

Hawaiian Coots are found on all the main islands with the exception of Kaho'olawe. The state population is estimated at between 1500 to 2000 birds. O'ahu's population has averaged between 500 and 700 birds (Engilis and Reid 1993). The Hawaiian Coot was formerly considered a sub-species of the American Coot (*Fulica americana*) (AOU 1983), however, following work by H. D. Pratt, this Hawaiian endemic has been elevated to full species status (AOU 1993, Sibley et al. 1990).

Hawaiian Coots nest primarily from March through September (Shallenberger 1977). Nesting has been recorded in all months of the year (David, pers. obs.)

Hawaiian Stilt (*Himantopus mexicanus knudseni*) Ae'o

The Hawaiian endemic sub-species of the mainland Black-necked Stilt has a State population of between 1200 and 1600 birds (Engilis and Reid 1993). O'ahu supports a population of between 500 and 750 birds (Engilis and Pratt 1993).

Hawaiian Stilts are approximately 10% larger than their closest relative the Black-necked Stilt (*H. m. mexicanus*) found in North and Central America. Hawaiian Stilts average 407 mm in height, with a wing length of 233 mm, bill of 76 mm and legs of 203 mm. They feed in areas ranging from dry mud to belly deep water, usually in water about 100 mm deep. Stilt feed on a wide range of aquatic wildlife; in Hawai'i, they are known to eat aquatic insects and their larvae such as waterboatmen, shore flies, polychaete worms, crabs, and small fishes, and probably consume a wide variety of other aquatic organisms opportunistically.

Nesting occurs between March and August, with a peak in activity in May and June. They generally lay a clutch of 4 eggs with incubation taking approximately 24 days; both parents share in incubation duties. Chicks are precocial, leaving the nest within 24 hours after hatching, but return frequently and are brooded by their parents for some time after hatching. Young birds are capable of flight within about 30 days (Shallenberger 1977, Berger 1981, R. David pers, obs.).

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APPENDIX C

ARCHAEOLOGICAL, HISTORICAL, AND CULTURAL RESOURCES SURVEY, WAIPIO PENINSULA SPORTS COMPLEX SITE

APPENDIX E

SOCIOECONOMIC IMPACT ASSESSMENT OF THE WAIPIO PENINSULA SPORTS COMPLEX

SMS

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SOCIO-ECONOMIC IMPACT ASSESSMENT OF THE WAIPI'O PENINSULA SOCCER PARK

June 1998
Revised September 1998

Prepared for:

Belt Collins Hawai'i
City and County of Honolulu

SMS affiliations:

Allan Barker Associates
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Strategic Mapping, Inc.

EXECUTIVE SUMMARY

Project

The Waipi'o Sports Complex will be a soccer-oriented facility, including fields and a tournament play area, on Waipi'o Peninsula, in Pearl Harbor. In Phase I, some 18 soccer fields, including three lighted fields and a lighted tournament field would be developed by 2001. Parking areas and restrooms would be built. In Phase II, the number of fields would increase to 34, and stadium facilities would be added at the tournament field. Also, the nearby Waipahu incinerator, which would have already been cleaned up, would be reused as a training facility with offices, a dormitory, a cafeteria, and indoor soccer fields. Phase II is scheduled for 2010.

For Phase I, Waipi'o Access Road would be improved between Farrington Highway and the site. In Phase II, Waipahu Depot Road would become an alternative access road.

Most of the land used for the project belongs to the US Navy. The Navy would allow development by the City and County of Honolulu in exchange for access to irrigation water for farms lower on the peninsula. The City and County plans to develop the Complex, but will seek a partner to operate the facility and assume some of the costs.

Context

The project is located at the southern edge of Waipahu, in the Central O'ahu Development Plan Area, on O'ahu. Waipahu was a plantation town, centered on the O'ahu Sugar Company mill, which closed in 1995. Increasingly, its residents sought work in other urban areas. New developments surrounding the older Waipahu Town area are middle-class suburbs. Interest in soccer is extensive on O'ahu with some 20,000 players involved in the sport. It is growing by at least 5% annually, especially in newer residential areas (including the newer Waipahu subdivisions).

Demand for play fields is strong, with many youth teams seeking practice and play space. Currently, Kapi'olani Park is the sole space available for tournaments. Because of space limitations there, soccer tournaments on O'ahu are not as large as they could be in another venue. Soccer is well established in the Central O'ahu and adjacent 'Ewa DP areas. Increasing numbers of young families will be located in the area in the coming decades. Hence the Waipi'o site responds both to islandwide and to local needs.

Economic Impacts

Exhibit ES-A summarizes the economic impacts of the project. Construction of Phase I will cost some $12.6 million, while Phase II costs are estimated as $36.0 million. Some 92 person-years of construction work are involved in Phase 1 (supporting an additional 235 indirect and induced jobs). In Phase II, 264 person-years of construction work will be generated which will support an additional 419 person-years of indirect and induced construction-related work.

Exhibit ES-A: ECONOMIC IMPACTS OF THE PROJECT

IMPACTS	PHASE 1	PHASE 2	CUMULATIVE THROUGH 2020
Construction (Whole Phase)			
Direct Jobs	92	264	
Total Jobs	244	683	
Total Income	$8,624,895	$24,218,494	
Operations (Annual)			
Direct Jobs	7	15	
Total Jobs	12	28	
Direct Income	$ 178,055	$ 338,517	
Total Income	$ 331,549	$ 704,166	
City and County of Honolulu			
Balance of Revenues over Costs			
Best Case Est.	$ 1,068,847	$ 4,439,786	$ 5,508,633
Worst Case Est.	$ (3,672,797)	$ (6,536,472)	$ (10,209,269)
State of Hawaii			
Balance of Revenues over Costs			$17,169,318

NOTE: This table compiles data analyzed in Chapter 3. See that chapter for further detail.

The project will provide employment for a few people at the site and in the nearby farm area. Statewide impacts would come, after Phase II is fully in operation, to some 28 direct, indirect and induced jobs annually, earning some $704,000 (1997 dollars).

Revenues and costs to government agencies were studied. Revenues for the City and County would depend on arrangements with an operator and with youth soccer organizations. Based on preliminary estimates, City and County revenues would range from an annual profit of approximately $119,000 to an annual loss of

approximately $408,000 in Phase I. After Phase II is completed, revenues are estimated to range from an annual profit of $403,000 to an annual loss of $594,000.

The State would gain tax revenue from construction and operations on-site and cash flow associated with visitor spending. The cumulative total by the year 2020 is estimated as about $17.2 million.

Demographic Impacts

No new residents would be attracted to O'ahu by the facility. Visitors – players, their coaches and families – would come for tournaments and sports camps.

Social Impacts

The project would encourage the development of a sport enjoyed by many on O'ahu, while providing an opportunity for expanding sports tourism. It would add an entertainment venue, locating it in a region where none now exists.

For Waipahu, the project will serve as a stimulus to encourage sports among the residents of the older areas near the site. It could moreover bring together residents of newer and older areas in a common activity, helping to establish a shared identity for residents of the community.

Businesses along Farrington Highway, especially fast food outlets, will see a small increase in their clientele.

Nearby residential areas will see increased traffic, and could be affected by parking or noise associated with large events. These small neighborhoods are now isolated on the makai side of Farrington Highway, so even occasional congestion and noise would be a major change in their local conditions. For Waipahu High School, which is located along Waipi'o Access Road, the Complex would offer additional sports fields. However, traffic congestion associated with events at the High School could be worsened if events occur at the same time at the Soccer Park.

Concerns about public safety will likely arise because the project will make large play and parking areas accessible. According to City and County police, as many as five additional officers could be needed to patrol, not including officers called on duty for special events. As noted below, the US Navy will require procedures to maintain public safety in the course of operations.

The project adjoins the Police Training Academy. Activities at the Academy will be visible from the berm surrounding the tournament field and from the training center. As a result, security of activities there could be compromised unless steps are taken to hide the academy. Conversely, training activities at the academy involving sirens and flashing lights could be distracting to stadium-goers.

The site also adjoins the Ted Makalena golf course Near the tournament field, golfers could hit balls over existing fences and hit people on the site unless landscaping, fencing and other design features are used to buffer the soccer area from the golf course.

The southern half of the site is in an Explosive Safety Quantity Distance arc (or "blast zone"). The Department of Defense Explosives Safety Board, responsible for setting safety standards for all ammunition and explosives use by the military, has reviewed the proposal. The board found that the site provides adequate safety for the proposed recreational use so long as no structures other than firmly anchored soccer goals are built within the blast zone. According to the Navy, in the unlikely event of an accidental explosion, soccer park users are unlikely to be seriously injured.

Mitigation of Adverse Impacts

Adverse impacts can be minimized by planning and cooperation among community groups and public agencies. The concerns regarding increased traffic on the two access roads to the project site could be addressed if the operator of the complex works with community and police officials when planning special events which might bring in increased traffic. Concerns of the Police Training Academy and Ted Makalena golf course could be addressed by working with officials at both facilities to upgrade existing fencing between these facilities and the project site.

Public safety concerns can be met, and risks mitigated. The US Navy will include, as a requirement of leasing much of the site, that the City develop operations procedures for maintenance and security, and share these with users responsible for special events. Procedures will include meeting standards for lighting, establishing hours of closure, assuring that police patrols will move through the project site before gates are locked and will go up to the gates afterwards

CONTENTS

EXHIBITS

1.0: INTRODUCTION

1.1 PROJECT DESCRIPTION

The Waipi'o Sports Complex is planned for Waipi'o Peninsula, in Pearl Harbor. The project site is located makai of the Ted Makalena Golf Course and will stretch across the peninsula from Waipi'o Point Access Road to Kapakahi Stream. The project will occupy approximately 300 acres. Most of the land used for the project belongs to the US Navy. The Navy would allow development by the City and County of Honolulu in exchange for access to irrigation water for farms lower on the peninsula. The City and County plans to develop the Complex, but will seek a partner to operate the facility and assume some of the costs. Most of the playing fields will be located within the Navy-designated Explosives Safety Quantity Distance arc (more commonly known as a "blast zone"). No structures are allowed in this area.

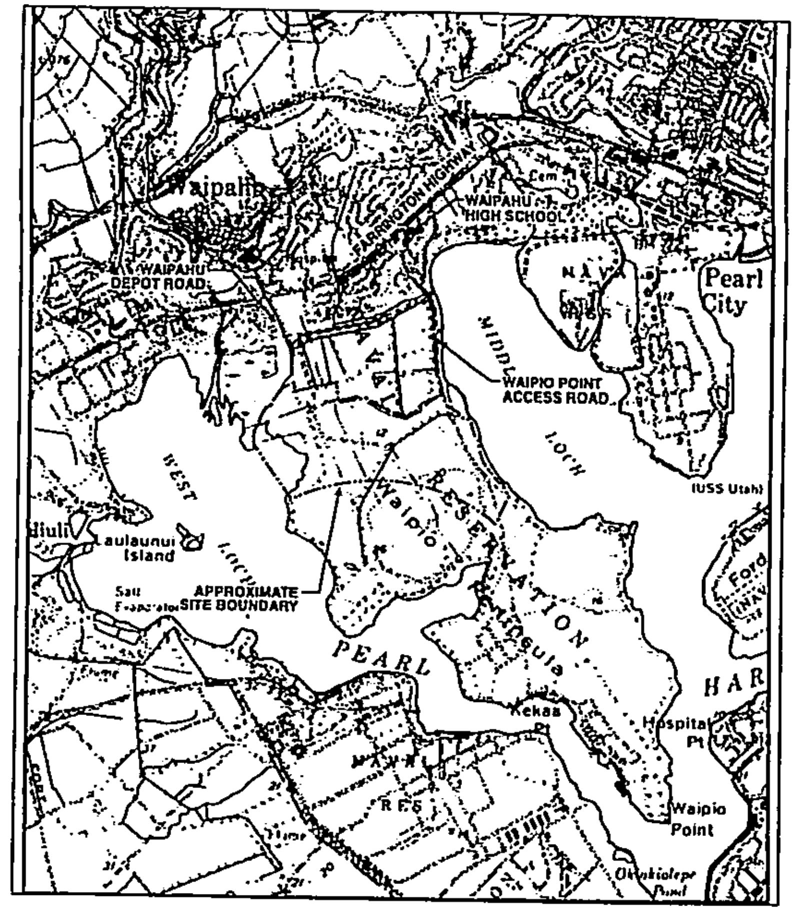
The project designers envision a facility which will meet the needs of island youth and adults who play soccer. The facility should also be able to accommodate tournaments at the local, regional, national and international level. At completion, the project will have 34 regulation-size soccer fields and a tournament field. (Fields could also be used for such sports as rugby and cricket.) The tournament field and ten other fields will be lighted. The project also includes rehabilitating and remodeling an existing, but abandoned, municipal incinerator, to include offices, training facilities, a dormitory, a cafeteria, a multipurpose room, and indoor soccer fields.

The project will be completed in two phases. Construction on Phase I should commence prior to the end of 1998 and the facility should be available for play by 2001. In this first phase, some 18 soccer fields, including three lighted fields and the tournament field would be developed. A parking lot to accommodate 3,000 cars and internal roadways will also be constructed. In Phase I the only support structures to be included are restrooms. Waipi'o Point Access Road will provide access to the site and will be improved. Phase I construction will also include constructing an irrigation water transmission line from Waikele Stream makai of Farrington Highway to the project site. This water will be used at the project site as well as on nearby land makai of the site which will be developed for agricultural purposes by the Navy.

Phase II of construction will commence when there is available funding, but is currently planned to be completed by the year 2010. This phase of the construction will include adding additional fields, increasing seating at the tournament field, and developing the complex's training center. Improvements will

also be made to Waipahu Depot Street which will be used as another avenue of reaching the Soccer Park.

Exhibit 1-A: LOCATION MAP



1.2 PURPOSE AND SCOPE OF THIS REPORT

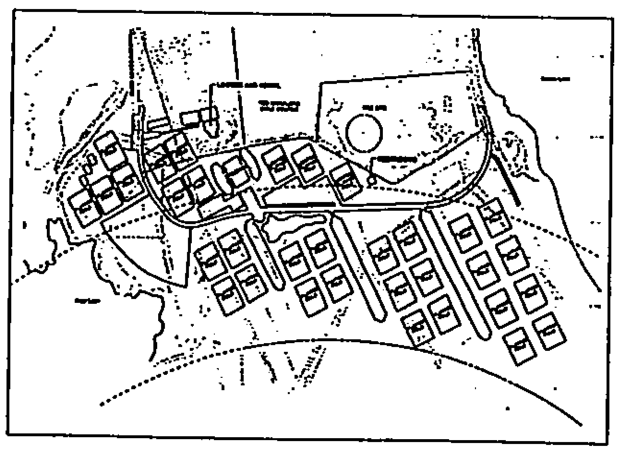
This report assesses the socio-economic impacts of the proposed project. It takes into account both existing conditions and likely future trends in the area surrounding the project. This report is intended to serve as an appendix to an Environmental Impact Statement being prepared by Belt Collins Hawai'i.

The report is written to identify and disclose information that may be of use to decision makers and members of the general public as they evaluate the implications of the project. Discussions of the likely points of compatibility of the project with surrounding land uses, of potential impacts, and of steps which might minimize unwanted impacts are intended to help in the EIS process and to contribute to community planning over the long term.

The sections of this report deal with the following:

- Existing conditions and emerging trends in the area surrounding the project;
- Economic impacts of the project;
- Social impacts; and
- Mitigation measures and processes that could appropriately respond to potentially adverse impacts of project development.

Exhibit 1-B: PRELIMINARY CONCEPT PLAN



2.0 SOCIAL AND ECONOMIC CONTEXT

2.1 OVERVIEW OF CURRENT AND EXPECTED FUTURE CONDITIONS

The proposed project will be located on the Waipi'o Peninsula. The Peninsula is located within the Central O'ahu Development Plan Area. To the north of the proposed project is the City and County of Honolulu Police Training Facility, the Ted Makalena Golf Course (also owned by the City and County), and a federal reservation used by the Federal Communications Commission (FCC). To the west is Kapakahi Stream, a state-owned parcel leased to the City, and the West Loch of Pearl Harbor. On the East, the project site is bordered by the naval reservation, the FCC federal reservation, and Waipi'o Point Access Road. The Naval reservation extends along the south border.

Waipahu is the nearest community, located immediately to the north of the project site. Further afield are other communities in the Central O'ahu and 'Ewa Development Plan Areas.

2.1.1 O'ahu

Although O'ahu is the third largest of the major Hawai'ian islands, it is home to nearly three-quarters of the state's population. It is also the center of the State's government, financial, commercial, industrial and tourism activities. Given the favorable climate of the islands, use of existing outdoor recreation facilities by both residents and visitors is extensive. Interest in soccer is widespread on O'ahu, with some 20,000 residents participating in the sport, from young children to adults. Interest in soccer has been growing steadily over the years and is expected to continue growing at an annual rate of 5%.

2.1.2 Central O'ahu

For most of this century, Central O'ahu was dominated by plantation agriculture. Much plantation land has been converted to housing, facilitating the growth of an urban zone. In 1990, Central O'ahu had about 130,000 residents, almost 16% of O'ahu's population.

More recently, the region has undergone rapid growth in the areas around Mililani and Waipahu. Development has continued to spread throughout the region at a rapid pace in planned communities and infill projects. In 1990, Central O'ahu contained 13% of the island's residential units. By 2020, the regional population is forecast to be 186,629, 17.4% of the island population and 143% of the 1990 area population.

2.1.3 'Ewa

The 'Ewa DPA is located just to the south of the Central O'ahu DPA. The region contains the 'Ewa Plain, which is an elevated coral shelf, and the Makakilo uplands. The weather on the 'Ewa Plain is characterized by fairly dry conditions.

Portions of the 'Ewa plain were cultivated prior to the arrival of the Europeans. However, by the late 19th century, the area was used solely for grazing livestock. Around the turn of the century, irrigation was brought to the dry plain and the cultivation of sugar cane flourished. As plantation communities developed, sugar became the center of the area both economically and culturally. Over the past several decades the production of sugar has declined due to decreasing profits and intense foreign competition. Sugar operations in 'Ewa, as in Waipahu, ceased completely in 1995 when the O'ahu Sugar Company closed its operations.

In recent years, much of the region's land has been devoted to urban development. The region has been designated as an area for urban expansion, with Kapolei planned as O'ahu's future Second City. In 1990, the 'Ewa DPA housed about 5% of O'ahu's residents, with a population of approximately 43,000. The population of the area is planned to increase to approximately 125,000 by 2020 according to projections by the City and County of Honolulu, at which time it will house nearly 12% of the island's residents.

2.2 ISLAND CONTEXT

2.2.1 The Island Economy

The State of Hawai'i has nearly 1,200,000 residents and about 160,000 visitors present on any given day. Its economy is highly dependent on tourism and government spending. Other sectors, notably construction, also depend on tourism and government spending.

O'ahu has three-quarters of the State population and is the center of commercial activity. Because it is home to the entire range of economic activities found in Hawai'i, it generates proportionately more output and more jobs than the other counties. Hence, unemployment is much lower in the City and County of Honolulu (i.e., O'ahu) than elsewhere:

Exhibit 2-A: AVERAGE JOBCOUNT AND UNEMPLOYMENT, 1997

	Jobcount	Unemployment Rate
City and Country of Honolulu	403,350	5.3%
Maui County	55,200	7.5%
Hawaii County	49,450	10.2%
Kauai County	23,250	11.3%
State of Hawaii	531,850	6.4%

Source: Hawaii State Department of Labor and Industrial Relations, 1998

O'ahu's population grew rapidly in the years after 1940. The sugar and pineapple economy of the island and state was disrupted by World War II. After the war, there was an increasing centralization of the state population on O'ahu, as many residents of the outlying areas came to live in the urban center.

Tourism. During the 1960s, tourism emerged as Hawai'i's major industry. Tourism experienced rapid growth through the late 1980s. This new industry brought long-term economic growth for the state. The Persian Gulf War, Hurricane Iniki, and a recession in California and later one in Japan, had the impact of depressing Hawai'i's tourism figures. The number of visitor arrivals fell dramatically from a high of nearly 7 million visitors in 1990 to a low in 1993 of 6.1 million. Economic growth has been slow since then although visitor arrivals began to increase again in 1994. The economies of many Asian nations began experiencing economic problems beginning in late 1997. The Hawai'i Visitors and Convention Bureau now estimates that arrivals for 1998 will at best remain flat, but could possibly decline by as much as 2% from the level of 1997 arrivals. (HVCB, *Updated 1998 Visitor Outlook, April 29, 1998*)

These developments will have an adverse effect on the economy of O'ahu. Overall, over 70% of those arriving in Hawai'i visit O'ahu. Asian visitors have generally preferred O'ahu, so any decrease in the number of visitors arriving from Asian nations can have a negative impact on the island economy. Nonetheless, the State's and O'ahu's economies will continue to be tourism-based for many years to come.

In response to volatile tourism trends, Hawai'i has tried to seek multiple visitor markets. First, it sought to attract Asian visitors as well as North American. That strategy proved very successful. More recently, Hawai'i has sought to develop niche markets — ecotourism, health tourism and sports tourism. The Waipi'o project is part of Hawai'i's commitment to sports tourism.

Military Activity In Hawai'i and on O'ahu Military activity forms a major sector of the Hawai'i state economy. Federal military expenditures in Hawai'i totaled nearly $3.3 billion in 1996 (Bank of Hawai'i, 1997b). The military and family members, account for about 11% of O'ahu's population. Military activity ranks as Hawai'i's third largest industry or economic sector, after tourism and construction. The percent of GSP that Federal military spending represents has remained above 9% and has even reached 11.5%. While construction and tourism have been subject to major swings, military spending has been relatively constant. Construction of more military housing as well as base modifications at Pearl Harbor and elsewhere have also had an impact on federal spending in Hawai'i during the 1990s. Despite the closing of NAS Barbers Point in 1999, military manpower and spending are expected to remain at or near current levels over the next few years.

The military share of the state economy has been estimated as about 12% to 14% and military land on O'ahu amounts to 21% of the island's surface area. The military and military activity are also located overwhelmingly on O'ahu:

Exhibit 2-B: MILITARY ACTIVITY, STATEWIDE & ON O'AHU, 1996

		O'ahu	
	Statewide	Number	Share of State
Military Personnel Ashore	43,019	42,811	99.5%
Military Family Members in Hawaii	55,337	55,056	99.5%
Department of Defense (DoD) Civilian Personnel (1996)	16,824	15,225(1)	90.5%
Housing Units Owned by Armed Forces (1995)	21,060	20,971	99.6%
Acreage Owned or Controlled by DoD	238,937(2)	81,459	34.1%

Notes: (1) O'ahu figures exclude 1,599 employees in unidentified locations. Figures for Honolulu, Kunia, Lualualei, Pearl City, and Wahiawā not included — figures forthcoming. (2) Acreage on Kaho'olawe is included.

Source: DBEDT, 1996

Construction. The construction industry in Hawai'i has witnessed a steady decline over the last several years. The total value of construction put in place has decreased from a high of $4.3 billion in 1991 to $3.2 billion in 1996. During that same time period, the number of jobs in construction decreased from 33,550 to 23,450, a drop of 30%. Construction on O'ahu has exhibited similar trends. In

1991, the value of construction put in place was $3.6 billion and had dropped by 23% in 1996 to $2.7 billion.

The decline in the prospects of construction is very noticeable in the area of new residential construction. Home builders have scaled back on the construction of new housing units because of existing housing inventory. On O'ahu, housing unit authorizations dropped more than 50 percent during 1996. (Bank of Hawai'i, *Construction in Hawai'i - 1997*, 1997a) New home absorption on O'ahu has also been affected by increased military housing construction. Combined with military personnel reductions, these have reduced the housing demand within the military population.

Agriculture. Historically, the sugar plantations were an important aspect of the state's and island's economy. Over the last several years, there was a rapid acceleration of the demise of these plantations. The result of the closure of these operations has been the opening up of former sugar cane lands to other uses. On O'ahu, some of the former sugar cane lands in Central O'ahu and in 'Ewa have been converted to short-term agricultural leases. This has resulted in more small and medium-sized farms and the development of greater diversification of agricultural crops. Urbanization is expected for much of the remainder of former sugar cane lands.

Tied to the development of alternatives uses of former sugar cane lands is the issue of the availability of water. This is true whether the land is put to other agricultural uses or is urbanized. Use of lands for sugar in the Central and 'Ewa regions of O'ahu was dependent on water imported from the windward side of the island via the Waiahole Ditch and by the drilling of wells by private developers. For the region, the key issue is the availability of Waiahole Ditch water. While this matter may still be appealed, water for Central O'ahu agricultural uses seems sure to continue. Waipi'o Peninsula lands (including part of the project site) were formerly planted in sugar cane. These lands were irrigated by wells drilled by Amfac. The availability of these wells for the proposed project is in question. Current project plans call for construction of an irrigation water transmission system drawing on the nearby Waikele stream.

2.2.2 Island Demographics

O'ahu's population grew rapidly in the years after 1940. As Exhibit 2-C shows, population growth has slowed over time at the County (i.e., island) level.

Overall, the island population growth is expected to continue at nearly the same rate between 1990 and 2010 as in the 1980s, according to unpublished forecasts used by the City & County Planning Department.

Exhibit 2-C: POPULATION TRENDS, CITY AND COUNTY OF HONOLULU - 1960-1997

	1960	1970	1980	1990	1997
Population	500,409	630,528	762,565	836,321	869,147[1]
	1960-1970	1970-1980	1980-1990	1990-1997	
Average Annual Growth Rate	2.3%	1.9%	0.9%	0.55%[1]	

Notes: (1) Based on revised Table 1.06, DBEDT, *State of Hawai'i Data Book 1996*, 1997b.

Hawai'i is known as a multi-ethnic state. No racial, ethnic or nationality group forms the majority. Sample data from the State's Health Surveillance Program indicate that both non-Caucasian ethnic groups and inter-ethnic mixing are common. In the last Census, Hawai'i stood out as the state with the largest share of its population made up of persons of Asian and Pacific Islands descent (62%) and the smallest share made up of Caucasians (33%) (U.S. Census, 1991; Morgan Quitno, 1993):

Exhibit 2-D: ETHNIC STOCK - STATE AND CITY AND COUNTY OF HONOLULU, 1992

	State	City and County of Honolulu
Ethnic stock		
Unmixed	63.0%	65.0%
Caucasian	23.3%	22.5%
Japanese	19.7%	21.1%
Chinese	4.6%	5.9%
Filipino	10.5%	9.8%
Hawaiian	0.8%	0.6%
Korean	1.4%	1.8%
Black	1.8%	2.3%
Puerto Rican	0.4%	0.4%
Samoan	0.5%	0.6%
Mixed	37.0%	35.0%
Part Hawaiian	18.6%	16.5%
Non-Hawaiian(1)	18.4%	18.5%

NOTES: Categories are those used in source, presented in same order as in source. Definitions separate persons of mixed race from others, unlike Census data. Source provided estimates of the total number of people in each group These are converted to percentages in this exhibit for ease of comparison.

(1) Includes miscellaneous races and not reported.

Source: DBEDT, 1997b.

As seen in Exhibit 2-D, the ethnic make up of the O'ahu is very similar to that of the state as a whole.

2.2.3 Recreation

Park Facilities. Hawai'i's mild weather enables residents and visitors to participate in a wide variety of outdoor recreation activities. The Department of Parks and Recreation is responsible for 429 parks, totaling over 6,000 acres (City and Country of Honolulu, 1998). In the City and County of Honolulu, the Department of Parks and Recreation has the responsibility, among others, for planning, design, construction, maintenance, and operation of all city and county parks and recreation facilities. Such facilities range from beach parks to golf courses.

Overall Demand for Playing Fields. As part of the seventh update to the *State Comprehensive Outdoor Recreation Plan*, a survey was conducted among Hawai'i residents to determine their perceived recreational needs. One area of inquiry was whether residents felt the state needed more recreational facilities of various types. Overall, 60% of those surveyed felt there was a need for more "playing fields and courts for sports." (See Exhibit 2-E) The perception of the need for more of these facilities was strongest among families with teenage children.

Survey respondents were also asked to indicate, from the six categories of recreation activities, on which type of activity the government should first spend any extra money to help people enjoy outdoor recreation more. Parks with playing fields and courts for sports was again the third most frequently named activity. Responses were nearly evenly split among families of all sizes. (See Exhibit 2-F.)

Exhibit 2-E: RECREATION NEEDS

Do you think Hawaii needs more ...	Household Composition				Overall
	Children <6	Children 7-12	Children 13-18	No Children	
Places for picnics, sunbathing, or other outdoor activities	64.8%	69.0%	67.8%	49.8%	58.0%
Playgrounds for kids	82.9%	79.7%	77.0%	57.5%	68.8%
More paths for jogging/biking	80.0%	78.6%	77.9%	73.4%	76.1%
More playing fields and courts for sports	68.1%	63.5%	69.2%	52.0%	60.3%
More places for ocean recreation	44.6%	48.7%	47.1%	31.8%	38.1%
Other open land mauka for outdoor recreation	65.1%	65.7%	65.2%	52.6%	59.2%

Source: Department of Land and Natural Resources, *State Comprehensive Outdoor Recreation Plan (SCORP)*. Honolulu, HI, 1996.

Exhibit 2-F: GOVERNMENT SPENDING ON RECREATION

Government should spend extra money first on ...	Household Composition				Overall
	Children <6	Children 7-12	Children 13-18	No Children	
Beach parks	12.7%	19.2%	24.9%	23.1%	20.2%
Boating facilities	1.6%	1.4%	1.4%	2.1%	1.8%
Parks with playing fields and courts for sports	21.2%	22.5%	23.0%	16.6%	19.5%
Playgrounds	33.5%	20.8%	16.2%	16.2%	20.3%
Other parks near where people live	10.2%	13.3%	15.7%	15.2%	15.6%
Parks and open areas mauka	17.0%	13.8%	15.7%	15.2%	15.6%

Source: Department of Land and Natural Resources, *State Comprehensive Outdoor Recreation Plan (SCORP)*. Honolulu, HI, 1996.

Major New Projects. Other projects under consideration and which would add to the recreational opportunities for island residents include:

- **Waiola Sports Complex.** The project would be part of the City and County's proposal to develop a regional park and sports complex that, when completed, will include a variety of recreational facilities: baseball and soccer fields; basketball and volleyball courts; an in-line skating court; a skateboarding bowl; an aquatic center; and a community center (PlanPacific, 1998). The plans also call for passive recreational uses.

  More recent reports suggest that development of this park project will place less emphasis on attracting professional level baseball activity. In this manner, the complex would not be in direct competition with a similar facility proposed by the state for East Kapolei.

- **Barbers Point Elite Facility (Potential Sports Complex).** The City and County of Honolulu has plans for an Olympic-standard sports competition and training facility at Barbers Point. After the closure of NASBP in mid-1999, the land for this facility is to be transferred to the City and Country of Honolulu. At this time, though, no development timetable has been determined.

- **East Kapolei Sport Complex.** This sports complex is part of the state's East Kapolei project (PBR Hawaii, 1998). This proposal has been presented to the community as a facility designed to encourage professional teams to come to Hawai'i for spring training (Bakutis, 1997; Kosaki, 1997). The complex would also be available for exhibition games and, when not in use by professionals, to the surrounding community. Groundbreaking for the first phase of this facility will take place during 1998; completion is currently scheduled for 2000.

Island Soccer Demand. The City and County of Honolulu Department of Parks and Recreation has, island-wide, 30 fields available for soccer, plus two practice fields. Four of these fields are not available during baseball season because they overlay an existing baseball or softball field. This is only a partial listing of available fields. Some soccer teams use Department of Education facilities for practice and play. Also, soccer fields can vary in size, depending on the age of the players. For instance, one regulation-size field could accommodate two fields. Furthermore, anecdotal evidence suggests that for practice, teams will practice anywhere they can.

Kapi'olani Park in Waikiki has been the venue for major soccer tournaments. The park is actively used by island residents and during tournament games can be crowded. Many of the current uses of the park are contested by some as not in line with the terms on which the park passed into government hands.

One lighted field, at Ala Wai Park, is available. Leagues using O'ahu fields include:

- American Youth Soccer Association teams (AYSA): 1,060
- Hawai'i Youth Soccer Association (HYSA) teams: 200
- Adult Leagues (Men, Women, Coed): 115

In addition to the above users, there are approximately 121 high school soccer teams and 4 college soccer teams. Other users of the public fields include rugby and cricket teams. These teams have not been included in any calculations for the proposed Soccer Park.

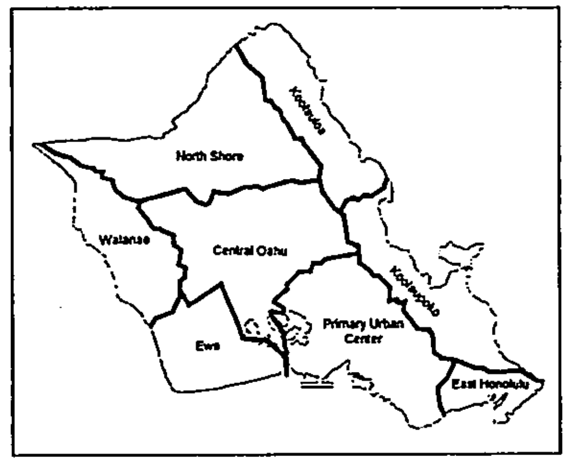
2.3 REGIONAL CONTEXT

For planning purposes, the island of O'ahu is divided into eight Development Plan Areas (DPAs). These include a central urban area (the Primary Urban Center) and seven urban-fringe or rural areas. The Central O'ahu DP and 'Ewa DP areas have been designated as areas for future new urban growth. In fact, the 'Ewa DPA has been designated as the Secondary Urban Center for the island. The

proposed project will be located in the Central O'ahu Development Plan Area, near the boundary with the 'Ewa DPA.

Using preliminary and unpublished City and County Planning Department forecasts for the year 2020, the resident population of O'ahu is projected to grow from 836,231 in 1990 to approximately 1.2 million in 2020, an average annual rate of growth of nearly one percent for the island as a whole. (Resident population figures in the recently published DBEDT 2020 Series (5/97) are somewhat different from those developed by the City and County Planning Department. This discussion will utilize the Planning Department numbers, though, because they are used in developing forecasts on O'ahu by small areas.) The rate of growth varies for each DPA. The 'Ewa DPA is projected to experience the highest average annual rate of growth at approximately 3.6 percent while that of the Primary Urban Center is projected to be only 0.5%.

Exhibit 2-G: O'AHU DEVELOPMENT PLAN AREAS (DPAs)



Likewise, the share of the island's population who live in the PUC is projected to decrease through 2020 to 47%. The 'Ewa and Central O'ahu DPAs, in contrast, are the only DPAs on the island projected to grow their share of the island's population.

Exhibit 2-H: RESIDENT POPULATION FORECAST FOR O'AHU DPAs

DPA	1990	Share	2000	Share	2010	Share	2020	Share
PUC	432,023	51.7%	454,520	50.4%	478,189	48.9%	503,090	47.0%
Ewa	42,931	5.1%	61,267	6.8%	87,433	8.9%	124,775	11.6%
Central O'ahu	130,526	15.6%	147,048	16.3%	165,660	16.9%	186,629	17.4%
East Honolulu	45,654	5.5%	47,629	5.3%	49,690	5.1%	51,840	4.8%
Ko'olaupoko	117,694	14.1%	119,139	13.2%	120,602	12.3%	122,083	11.4%
Ko'olauloa	14,263	1.7%	14,535	1.6%	14,812	1.5%	15,094	1.4%
North Shore	15,729	1.9%	16,914	1.9%	18,189	1.9%	19,560	1.8%
Wai'anae	37,411	4.5%	40,698	4.5%	44,268	4.5%	48,155	4.5%
Total O'ahu	836,231		901,747		978,844		1,071,226	

SOURCE: City and County of Honolulu Planning Department preliminary forecasts for 2020; 2000 and 2010 projections derived from those forecasts

2.3.1 Economy

As of 1990, 77% of jobs on O'ahu are in the Primary Urban Center. In the coming years, the employment opportunities for Central O'ahu's residents may include a wider range of jobs in the Central O'ahu DP and 'Ewa DP areas in addition to the job base in the Primary Urban Center. It is anticipated that, along with the development of the secondary urban center in the 'Ewa region, most expansions in retail, industrial and government activity will occur there and in the Waipahu/Mililani area. The Central O'ahu Development Plan provides for new employment opportunities in industrial, commercial, and residential support areas that are designed to serve the surrounding communities.

Exhibit 2-I summarizes employment projections by the City and County Planning Department. They indicate that the number of new jobs created (about 78,000) will be smaller than the number of new residents for the area (approximately 138,000) for the period 1990 to 2020. However, the annual rate of growth for employment opportunities in Central and 'Ewa will outpace the rate of population growth. For the combined Central O'ahu and 'Ewa areas, the rate of employment growth is projected at one and one-half times the rate of population growth for the period 1990 to 2020 (employment is projected to increase by 135%, and population by about 80%).

Most of the growth in employment opportunities is projected for the 'Ewa DPA. That development may lag behind these projections. Nonetheless, the trend towards people both living and working in Leeward O'ahu will no doubt continue.

Exhibit 2-I: EMPLOYMENT (JOBS) FORECAST FOR OAHU DPAs, 1990-2020

DPA	1990	Share	2000	Share	2010	Share	2020	Share	Average Annual Growth Rate
PUC	390,576	77%	412,300	75%	435,233	73%	459,441	69%	0.5%
Ewa	17,434	3%	26,903	5%	41,514	7%	64,061	10%	4.4%
Central O'ahu	40,153	8%	48,666	9%	58,984	10%	71,490	11%	1.9%
East Honolulu	7,058	1%	7,625	1%	8,237	1%	8,898	1%	0.8%
Ko'olaupoko	34,800	7%	34,713	6%	34,627	6%	34,541	5%	0.0%
Ko'olauloa	4,861	1%	5,951	1%	7,286	1%	8,921	1%	2.0%
North Shore	3,583	1%	3,987	1%	4,435	1%	4,935	1%	1.1%
Wai'anae	5,611	1%	6,858	1%	8,383	1%	10,246	2%	2.0%
O'ahu	504,076		547,003		598,700		662,533		

SOURCE: City and County of Honolulu Planning Department forecasts for 2020; 2000 and 2010 projections were derived from those forecasts

2.3.2 Demographics

The 'Ewa Development Plan Area is an area of contrasts. Residential developments range from the old 'Ewa Villages dating from the plantation days to the many new subdivisions surrounding these villages. Kapolei, also located on the 'Ewa plain, is home to many new residential developments. Kapolei has been designated as the future second city and many new businesses have moved offices there. A new State office building should be completed soon and the City and County of Honolulu is planning to build a civic center to house some city offices. The state's only major industrial park, Campbell Industrial Park, is located in 'Ewa as is O'ahu's second major harbor. The Naval Air Station Barbers Point is scheduled to close in mid-1999 after which a large portion of the base will be redeveloped into a wide variety of uses.

Central O'ahu contains both established communities that have long served as plantation towns — Waipahu and Wahiawā — and new developments. Of the new developments, Mililani Town is a planned community with homes a light-industrial/technology park, and a major shopping center. Waikele includes both extensive residential areas and a major shopping center. It is located between Waipahu and other subdivisions, not as a separate community.

While Central O'ahu is much more populous than the 'Ewa DPA, the two areas' populations are very similar. The population in both areas was young in 1990, with about 30% age 17 and under. About one quarter of the population in both were of Filipino ancestry. Caucasians formed the largest single ethnic group, but amounted to only 30% of the population in Central O'ahu and 40% of the population in 'Ewa. Household incomes were slightly higher for 'Ewa households. The average household size in Central O'ahu — 3.49 persons per household —

was slightly less than the 'Ewa average, but still much higher than the island-wide average of 3.02 persons per household. (See Appendix A for additional demographic data.)

2.3.3 Recreation

The region surrounding the project site are included within the State's planning areas for 'Ewa (Planning Area 22) and Central O'ahu (Planning Area 23). The area stretches from Pearl Harbor west as far as Nanakuli and northwest as far as Schofield Barracks and Wahiawā. Recreational facilities within this area include beach parks, regional and district parks, hiking trails, and golf courses. (Department of Land and Natural Resources, 1996) The redevelopment of NAS Barbers Point after the base closes in mid-1999 calls for extensive outdoor recreation facilities. The time frame of the availability of these new facilities will extend over many years. The new residential developments in this area, particularly in 'Ewa, will increase the demand on recreation facilities in the area and underline the importance of further developing recreation facilities for residents.

Development of recreation facilities is addressed in the development plans for each area. The 1995 *Central O'ahu Development Plan*, currently being updated, noted several regional recreational attractions which are located within the development plan area. Active recreation facilities include the proposed Waiola Regional Park. Currently, an environmental impact statement is being prepared for the development of that regional park and sports complex and a few unlighted soccer fields will be included within that development. The Waipahu Town Plan, a special area plan of the Central O'ahu DP, discusses development of recreation facilities within the Waipahu Town area. Included in its discussions were a privately-developed sports complex on the Waipi'o peninsula, in the same general area of the current project site. A public golf course, possibly located within the blast zone, was discussed as a possible way to provide monies to support other activities at the complex. Subsequently, the publicly-developed and owned Ted Makalena golf course was constructed and is currently in operation. It is located just mauka of the proposed project site.

A bike path currently terminates at the Waipi'o Point Access Road just makai of Waipahu High School. Current State and City and County plans call for connecting this end of the bike path to existing bike paths in 'Ewa. The City and County will construct the continuation of the bike path from Waipi'o Point Access Road to Waipahu Depot Street. It will be constructed on an old railroad right-of-way along the mauka border of the Ted Makalena Golf Course. The State will pick up construction of the bike path from Waipahu Depot Street, utilizing the same railroad right-of-way. It is possible that construction of the irrigation water

transmission line for the project and Navy agricultural lands makai of the project site will interfere with the bike path. This would occur at the point of intersection within the vicinity of Waipahu Depot Street. Any disruption, though, should be minimal and of short duration. Current plans by the State and City and County are to include funding for the bike path in next year's fiscal year budget. Depending on actual construction timetables, it is even possible that construction of the irrigation water transmission line will not interfere with the bike path.

2.3.4 Waipahu

Waipahu (Hawai'ian for "gushing water") was originally named for a famous spring in the area. In ancient times, Waipahu was comprised of three *ahupua'a* – Waipi'o, Waikele, and Hō'ae'ae. Several fishing villages and numerous fishponds were located in the area, which was also well-suited for wet-land farming of such Hawaiian staples as taro (Beechert, 1974). Photographs show fish ponds on outlines along the west side of the Waipi'o Peninsula (south of the project site).

In the late nineteenth century, the area thrived with independent farmers — both Hawai'ians growing taro and Chinese immigrants growing rice for several local rice mills. However, the region was dramatically transformed when the Oahu Sugar Company began operations in 1897 (Nedbalek, 1984).

James Campbell had purchased 40,000 acres of arid land in the 'Ewa Plain, and his successful experiments with artesian well production made large-scale sugar production feasible in both 'Ewa and neighboring Waipahu. For his part, Benjamin Dillingham established a railroad from Honolulu to Leeward Oahu in order to facilitate shipment of agricultural products, and he subsequently worked with Campbell to consolidate sufficiently large parcels of land to create the Oahu Sugar Company. Finally, Paul Isenberg provided much of the capital through H. Hackfeld and Company (predecessor to AMFAC), and became O'ahu Sugar's first president. Through their continued efforts, an area with little agriculture was rapidly turned into a major plantation.

For the first half of this century, Waipahu's economic and social structures were linked to the plantation. Waipahu schools and community facilities were named for plantation managers such as August Ahrens and Peter L'Orange. Major commercial operations were started by former plantation workers, such as Zempan Arakawa, and relied on other plantation workers as customers. Oahu Sugar Company provided housing, day care, and other social services at rates designed to keep much of its workforce on the plantation.

Societal changes brought about by World War II particularly affected sugar communities such as Waipahu. Union influence expanded greatly. Oahu Sugar entered a period of low-cost housing development for sale to employees which extended into the 1970s.

In the 1970s, Hawaii's sugar industry entered a period of serious economic decline. Oahu Sugar Company gradually reduced its workforce and took marginal lands out of production. During the early 1990s O'ahu Sugar continued to reduce its operations and in 1995 closed for good.

During the plantation period, Waipahu was an urban center in its own right. In recent decades, its population has increasingly been employed elsewhere on O'ahu. In 1990, the total number of jobs in Waipahu were approximately 7,827. That represented 2% of jobs on O'ahu and 17% of jobs in the Central O'ahu Development Plan Area.

Suburbs around the older part of Waipahu have added new residents, but these have had separate subdivision names and have depended on the urban center and regional malls for commercial resources and employment.

The town had been reduced economically and culturally to one of many suburbs. However, Waikele has become a new shopping destination for the entire island, and new retail and community facilities around the old O'ahu Mill Stack are intended to provide a new focus for community life.

3.0: ECONOMIC IMPACTS

3.1 OVERVIEW

As a recreational facility serving the needs of residents, the Waipi'o Peninsula Soccer Park will have modest economic impacts. Those are mainly due to the opportunities for attracting visitors to tournaments, camps and clinics held at the site. This chapter provides estimates of construction employment, operations employment, and fiscal impacts of the project. Impacts on agriculture on Waipi'o Peninsula are also estimated.

3.2 EMPLOYMENT AND INCOME

The project involves short-term jobs related to construction and long-term jobs associated with continuing operations. Employment associated with both construction and operations fall into three broad types:

- Direct jobs are immediately involved with construction of a project or with its operations. Direct jobs are not necessarily on-site: construction supports construction company personnel in offices and base yards, as well as on site.
- Indirect jobs are created as businesses directly involved with a project purchase goods and services in the local economy.
- Induced jobs are created as workers spend their income for goods and services.

Indirect and induced employment in Hawai'i can be estimated using multipliers from a model of input-output relations in Hawai'i's economy developed by State researchers.

Jobs are not necessarily located at the site of a project. As a rule of thumb, some 20% of direct construction jobs are off-site (in baseyards, offices, and the like). Indirect and induced jobs are measured on a statewide basis. These are likely to be concentrated in commercial and/or industrial centers, rather than near a job site.

3.2.1 Construction

Construction costs for development of Phase I of the project will be approximately $12.6 million (See Exhibit 3-A). This first phase of construction will generate an estimated 92 person-years of work as shown in Exhibit 3-A. An additional 152 person-years of indirect and induced construction-related work would be created during this phase of the project.

Phase II construction costs will be approximately $36.0 million (See Exhibit 3-A). This phase of construction will generate an estimated 264 person-years of work, which in turn will support 419 indirect and induced person-years of construction-related work.

An estimated $8.6 million (in 1997 dollars) in income from direct as well as indirect and induced construction-related jobs will be generated by Phase I construction work. Phase II construction work will generate an additional $24.2 million in such income. Calculations for indirect and induced jobs use multipliers from the recently updated DBEDT model which is based on 1992 interindustry transactions (DBEDT, 1997a):

Exhibit 3-A: CONSTRUCTION-RELATED JOBS AND INCOME

	Phase I	Phase II
Construction spending	$12,550,000	$36,000,000
Employment		
Direct construction jobs	92	264
Indirect and induced jobs	152	419
TOTAL	244	683
Incomes (in 1997 dollars)		
Direct jobs	$4,178,424	$11,985,916
Indirect and induced jobs	$4,446,472	$12,232,577
TOTAL	$8,624,895	$24,218,494

NOTES Construction jobs calculated from average industry ratio of employment to spending, 1996.
Type II employment multiplier from DBEDT (1997a) update of Input-Output Model of Hawaii State economy, averaging construction industry multipliers. Incomes are construction industry industry average and total covered average incomes, 1996, adjusted to 1997. Multipliers on this job are allocated 90% to heavy construction and 10% to "other" construction.

SOURCES: Bank of Hawaii, 1997a; DBEDT, 1997a; Hawaii State Department of Labor and Industrial Relations (DLIR), 1997.

3.2.2 Operations

The Soccer Park will generate new operational jobs and income. As shown in Exhibit 3-B, the first phase of the project will generate relatively few operational jobs. On average, about 12 direct, indirect and induced operational jobs will be created in Hawai'i after completion of Phase I of construction.

When the entire complex is operational (scheduled for year 2010), there will be training facilities with offices, a dormitory, a cafeteria, and indoor soccer fields, as well as a large tournament facility. These new facilities will also lead to the creation of several more new jobs. Exhibit 3-B shows the jobs created by each phase of the project. After final buildout, the estimated annual workforce income generated from direct, indirect and induced operational jobs would be about $704,000 (1997 dollars).

Exhibit 3-B: OPERATIONS-RELATED JOBS AND INCOME

	2001	2005	2010	2015	2020
Direct Jobs (FTE)					
Administration	2	2	5	5	5
Maintenance	3	3	5	5	5
Food Service	0	0	2.7	2.7	2.7
Training Camp Counsellors	0	0	1.0	1.0	1.0
Parking Attendants	1.0	1.0	1.0	1.0	1.0
Ticket Office	0.5	0.5	0.5	0.5	0.5
SUB-TOTAL	6.5	6.5	15.3	15.3	15.3
Indirect and Induced Jobs	5	5	13	13	13
TOTAL	12	12	28	28	28
Annual Income (1997 $s)					
Administrative	$ 75,465	$ 75,465	$135,465	$135,465	$135,465
Maintenance	$ 80,090	$ 80,090	$123,479	$123,479	$123,479
Food Service	$ -	$ -	$ 32,449	$ 32,449	$ 32,449
Camp Counsellors	$ -	$ -	$ 26,624	$ 26,624	$ 26,624
Parking Attendants	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500
Ticket Office	$ 8,000	$ 8,000	$ 8,000	$ 8,000	$ 8,000
TOTAL DIRECT	$ 176,055	$ 176,055	$338,517	$338,517	$338,517
Indirect and Induced Jobs	$ 155,493	$155,493	$365,649	$365,649	$365,649
ANNUAL TOTAL (All Jobs)	$ 331,549	$331,549	$704,166	$704,166	$704,166
AVERAGE ANNUAL INCOME, 2001-2020					
Direct Jobs	$ 265,409				
All Jobs	$ 536,488				

Note: Incomes estimated for each position. Indirect and induced jobs estimated using multiplier for Amusement Services (1.819). All incomes are shown in constant 1997 dollars.

3.2.3 Agricultural Development

The project will allow renewed use of about 900 acres on Waipi'o Peninsula for agriculture. The site might be used for seed corn production or diversified agriculture. Diversified agriculture at the site could account for nearly 70 jobs. However, these do not count as an "impact" in the same sense that project jobs do. Project jobs involve new facilities for residents and tourists that will stimulate new visitor arrivals. Farming on the Waipi'o Peninsula responds to growing demand from the resident market, but could simply replace farming elsewhere in Hawai'i. The impact is a matter of location – where diversified agriculture will occur – rather than a new socio-economic trend. For every bushel of produce grown on the peninsula, it must be assumed (for lack of evidence that demand would be stimulated) that a bushel would not be grown elsewhere in Hawai'i.

Before O'ahu Sugar closed, the firm showed that its fields could be extremely productive. In 1985, the plantation as a whole set a world record, with 21.63 tons of sugar produced per acre (Office of State Planning, 1992). The Waipi'o Peninsula fields were cultivated and irrigated by O'ahu Sugar. Now, the land has reverted to the Navy while the O'ahu Sugar water transmission system can only be used at considerable cost.

Apart from the land for the Soccer Park, the Navy has about 900 acres of land on the peninsula that could be available for agricultural lease. That land has been reported as a mix of alluvial soil, clays, and dredge material. In many areas it is similar to soil found on the 'Ewa Plain to the west.

Development of new transmission lines for the Soccer Park and Navy lands to the south will make agriculture on the Navy lands potentially viable. Without irrigation, those lands have been classed as of little agricultural value. The Land Study Bureau, for example, classed nearly all the peninsula lands as "E" (in an "A" to "E" scale) without irrigation (Land Study Bureau, 1972). With irrigation, the soils are classed as productive – "B" or "C" under the Land Study Bureau classification, "I", "II," or "III" under the Soil Conservation Service classification (US Department of Agriculture, Soil Conservation Service, 1972).

Decision Analysts Hawai'i, Inc. (1998) has estimated the economic impacts of diversified agriculture on O'ahu using the following rules of thumb for viable farms:

- Average gross annual revenues per acre: $10,000;
- Jobs per acre: .075; and
- Average salary: $18,000.

With full development of the agricultural land on the peninsula, farmers leasing land from the Navy could accordingly produce up to $9.0 million worth of crops, and employ some 67.5 workers with a payroll of $1.2 million.

In 1997, the total value of fruits and vegetables grown on O'ahu came to $34.9 million. Should development of Waipi'o agricultural lands replace use of land off-island (and the total value of O'ahu-grown fruits and vegetables come to about $44 million), the Waipi'o farms would yield 20% of the island's locally grown produce. However, that $9 million would only amount to 3% of the fruits and vegetables that come to market in Honolulu (based on a total of $294.5 million in 1997, according to Hawai'i Department of Agriculture tallies).

3.3 IMPACTS ON THE LABOR MARKET

Construction and operations at the Waipi'o Peninsula Soccer Park will have minimal overall impacts on the local labor market. While the complex is new, and it allows new sports promotion activities on O'ahu, the project will neither create many jobs nor demand the skills found only off-island.

3.4 PROGRAM

A program for the Soccer Park was developed by members of the mayor's Public-Private Sports Industry Task Force working with Stringer Tusher Architects, Inc. This program of usage has been used for calculating the economic and fiscal impacts of the Soccer Park. The program combines a strong commitment to resident sports with support for tournaments and clinics to draw both local and visiting teams. Soccer would be the lead sport, but other field sports could be played on site. Additional activities and uses could be proposed for the complex; these have not been included in our calculations. Exhibit 3-C shows an estimated per hour on-site population, based on the assumed program of usage.

Exhibit 3-C: POPULATION PER HOUR ON SITE

	Phase I	Total Project
Average Weekday Population/hour		
Afternoon	324	672
Evening	100	320
Average Weekend Population/hour		
Day	486	1,018
Evening	100	515
Peak Daily Population/hour		
Tournaments(1)	900	1,900
Special Events(1)	3,000	15,200

Notes: Population per hour - present on-site for some part of an hour, based on assumptions about field usage.
(1) During tournaments, it is also possible that the training center would also be used, thereby increasing by that number the population on-site. (Assumes 200 at training center)

The Waipi'o Complex will address an island-wide need for additional soccer fields for practice and play. Furthermore, it is expected that by developing this facility, there will be added opportunities for expanding tournament play. To date, tournament play has been limited to some six fields at Kapi'olani Park in Waikiki, the only site on O'ahu able to handle tournament play. The fields at Kapi'olani Park, though, do not provide ideal conditions for soccer play.

After completion of Phase I construction, the facility will be used extensively for practice and play by both youth and adult soccer teams. Tournaments will be moved to the new complex. Because of the size of the new facility, it is expected that local soccer associations will be able to host regional and other large-scale soccer tournaments. In addition to tournaments currently hosted by local soccer organizations, it is expected that at least one regional and one international tournament could be hosted at the new complex every four years. These two tournaments could attract an estimated 3,480 new visitors to Hawai'i annually (two tournaments in a 4-year period, annualized) (See Exhibit 3-D). These visitors would spend an estimated $3.3 million annually (See Exhibit 3-E).

(The visitor spending estimates used here are based on the programs, discussions members of the Sports Industry Task Force, and calls to Mainland US soccer venues. They are intended as conservative, in the absence of a detailed market study.

Exhibit 3-D: ESTIMATED ON-SITE VISITOR POPULATION

	2001	2005	2010	2015	2020
Local Tournaments	4,930	4,930	4,930	4,930	4,930
National/Intl Tournament	1,740	1,740	1,740	1,740	1,740
Regional Tournament	1,740	1,740	1,740	1,740	1,740
Training Camps	-	-	500	500	500
TOTAL	8,410	8,410	8,910	8,910	8,910

NOTE: Visitor Population is the number of persons coming to Hawaii because of activities at the sports complex.

Exhibit 3-E: ESTIMATED VISITOR SPENDING

	2001	2005	2010	2015	2020
Event					
Local Tournaments	$ 4,605,300	$ 4,605,300	$ 4,605,300	$ 4,605,300	$ 4,605,300
National/Intl Tournament	$ 1,625,400	$ 1,625,400	$ 1,625,400	$ 1,625,400	$ 1,625,400
Regional Tournament	$ 1,625,400	$ 1,625,400	$ 1,625,400	$ 1,625,400	$ 1,625,400
Training Camps (1)					
TOTAL	$ 7,856,100	$ 7,856,100	$ 7,856,100	$ 7,856,100	$ 7,856,100

NOTES: Average length of stay - 9 Days; Average spending: Adults: $140/day/person; players: $70/day/player
(1) Those attending the training camps may have relatives who would come when the camp is over. For lack of a Hawaii precedent, we have chosen, conservatively, not to include any additional visitor spending for these individuals.

Additionally, the lighted tournament field will be able to accommodate special events, such as concerts, similar to those currently held at the Waikiki Shell. The size of these events would be limited by the seating. Presently, plans call for minimal bleacher seating, perhaps 1,000 seats, in Phase I. Additional seating will be on grass berms. With Phase II, some 4,000 to 10,000 seats would be installed.

3.5 IMPACTS ON LOCAL GOVERNMENT FINANCES

The cumulative net fiscal impact of building the Waipi'o Peninsula Soccer Park on the State is different for the State and the City and County of Honolulu. For the State, there will be a positive fiscal impact. For the City and County of Honolulu,

the impact depends on arrangements with a private-sector partner and that partner's success in using the site. The result could be either positive or negative, depending on the scenario.

3.5.1 State of Hawai'i

State revenues are based largely on excise and income taxes. Hence the State will gain revenues from direct expenditures, workforce incomes, and workforce spending. Exhibit 3-F shows calculations of State revenues associated with construction of this facility. Exhibit 3-G deals with revenues associated with operating the facility.

It is anticipated that the proposed complex will attract visitors to Hawai'i. Commencing with completion of Phase I, visitors would likely be members of soccer teams coming to Hawai'i to participate in regional, national, or international soccer tournaments. In addition to individual team members, coaches, family members and others will accompany team members to the tournament. It is very likely that they will stay for several days before or after the tournament. After completion of Phase II, and the training center is open, additional visitors can be expected to come to participate in week-long soccer training camps, as shown in Exhibit 3-D. The State will also benefit from spending by these visitors while they are in Hawai'i. This would be in the form of the State's portion of the transient accommodations tax and excise tax on spending other than for accommodations.

Local government operations are for visitors as well as residents, so there is a cost associated with bringing new visitors to Hawai'i. In calculating the expenditures associated with these visitors, the average cost method has been used. The calculations used to arrive at the average cost per visitor for state government operations are shown in Exhibit 3-H.

Exhibit 3-F: STATE CONSTRUCTION REVENUES

	Phase 1	Phase II
Construction cost	$12,550,000	$36,000,000
Total workforce income	$8,624,895	$24,218,494
[illegible]		
Taxes		
Excise Taxes		
Construction Spending (1)	$502,000	$1,440,000
Construction-Related Workforce Spending (2)	$251,959	$707,495
Corporate Income Tax (3)	$31,375	$90,000
Personal Income Tax (4)	$495,231	$1,390,596
TOTAL	$1,280,565	$3,628,090

NOTES: All dollar figures are 1997 dollars.
(1) Calculated at 4% of direct construction spending.
(2) Calculated at 4% of workforce income spent on taxable items. Taxable share estimated from 1992-93 US Bureau of Labor Statistics study.
(3) Calculated as 0.25% of construction spending, from 1989-90 data on business receipts and corporate income tax collections.
(4) Calculated as 5.7% of workforce income, based on 1992 data on individual tax liability and gross income.

SOURCES: DBEDT, 1996; Hawaii State Department of Taxation, 1991.

Exhibit 3-G: STATE OPERATIONS-RELATED REVENUES AND COSTS

in 1997 dollars	2001	2005	2010	2015	2020
State operations-related revenues					
Taxes on workforce incomes (1)					
Income taxes (2)	$ 19,037	$ 19,037	$ 40,432	$ 40,432	$ 40,432
Excise tax on disposable income	$ 9,686	$ 9,686	$ 20,571	$ 20,571	$ 20,571
Taxes on visitor spending					
Transient Accommodation Tax (TAT) (3)	$ 450,450	$ 450,450	$ 450,450	$ 450,450	$ 450,450
Excise Tax	$ 146,664	$ 145,778	$ 141,626	$ 141,626	$ 141,626
Excise Tax on Operations-related Revenues					
Visitor Spending	$ 3,780	$ 4,668	$ 8,818	$ 8,818	$ 8,818
Resident Spending	$ 78,217	$ 79,105	$ 169,549	$ 170,914	$ 172,655
TOTAL REVENUES	$ 705,834	$ 706,721	$ 831,446	$ 832,811	$ 834,552
State operations-related costs					
Cost of public services to visitors	$ 158,480	$ 158,480	$ 167,902	$ 167,902	$ 167,902
Balance of revenues over costs, for operations	$ 547,353	$ 550,241	$ 663,544	$ 664,908	$ 666,650
Cumulative balance, 2001 to 2020	$12,260,663				

NOTES: (1) See Exhibit 3-B for operations-related income.
(2) See notes to Exhibit 3-F for factors used to calculate taxes.
(3) TAT rate (11.0%) is based on provisions of SB2259 SD1, HD1, currently awaiting the Governor's signature.

Exhibit 3-H: PER CAPITA AVERAGE COST, STATE OF HAWAI'I SPENDING

Operating Expenditures, by Function	FY 1994 Total Expenditure (In $1,000,000s)	Cost Per – Resident	Cost Per – Visitor
General government			
Control	$ 113.7	$ 88.28	$ 88.28
Staff	$ 368.8	$ 311.10	$ -
Public safety	$ 187.4	$ 140.49	$ 140.49
Highways	$ 125.1	$ 232.84	$ 232.84
Natural resources	$ 42.8	$ 34.25	$ 34.25
Health and sanitation	$ 188.7	$ 145.01	$ 145.01
Hospitals and institutions	$ 331.9	$ 281.48	$ -
Public welfare	$ 831.6	$ 873.90	$ -
Education	$ 1,432.8	$ 864.99	$ -
Recreation	$ 38.0	$ 71.84	$ 71.84
Urban redevelopment and housing	$ 142.8	$ 42.83	$ -
Utilities and enterprises	$ 288.4	$ 193.01	$ -
Unemployment compensation	$ 244.0		
Social Security and pensions	$ 275.2	$ 127.12	$ -
Intergovernmental expenditures	$ 2.4	$ 3.22	$ -
Debt service	$ 460.3	$ 292.23	$ -
Cash capital improvements	$ 455.4		
Miscellaneous	$ 113.4	$ 9.75	$ -
Total	$5,636.1	$3,712.34	$ 712.70
adjusted to 1997 $s	$ 8,043.7	$3,980.80	$ 764.24

SOURCES: DAGS, 1995; DBEDT, 1996, tables from DBEDT, 1997b available over the Internet.

3.5.2 City and County of Honolulu

The City and County's cost and revenues will greatly depend on (a) the specific terms on which the facility is operated, and (b) the program of activities developed for the site. A program has been sketched, but no operator, much less a detailed operating agreement, has been chosen.

For EIS purposes, it is necessary to study the range of realistic alternatives. Two different operating scenarios are sketched here. SMS stresses that these are preliminary. Further market and operations plans could lead to a much more precise estimate.

The first scenario assumes that the City and County is successful in finding an operator for the facility who successfully markets the facility to the level identified in the program. The City and County will receive a share of the revenues coming into the complex, but will not bear any of the operating or maintenance costs. This scenario produces a net positive fiscal impact on the City and County.

An alternative scenario assumes that the City and County assumes the role of operator. While it will continue to receive a share of the revenues generated by the facility, it will also assume operating and maintenance costs associated with operating the facility. Using this scenario, the net fiscal impact on the City and County of Honolulu is negative, at least through the year 2020.

For the City and County of Honolulu, the cumulative net fiscal impact of the proposed project is a positive $6.7 million, through 2020 under the first scenario. (Over the 20-year period, the average annual net gain would be $334,500 [1997 dollars].) Under this scenario, it was assumed that the City and County would receive a portion of revenues generated by activities at the complex. It also assumes that it will receive a certain portion of the transient accommodations tax collected on those coming to Hawai'i to participant in tournaments and activities at the complex. These calculations are shown in Exhibit 3-I.

Under the alternative scenario, the City and County cannot locate an operator for the facility and assumes that role itself, the net cumulative fiscal impact is estimated as a negative $9.0 million (1997 dollars), through the year 2020. (The average annual net cost of operations under this scenario comes to $451,400) These calculations are shown in Exhibit 3-J.

In each of the scenarios, costs for the City and County of Honolulu associated with bringing new visitors to Hawai'i were estimated. The average cost method has been used and is shown in Exhibit 3-K. The estimated costs to operate the Soccer Park shown in Exhibit 3-L would be assumed by the City and County of Honolulu if it stepped into the role of operator of the Soccer Park. The estimated operating costs are adapted from comparable facilities on the Mainland US and locally.

Exhibit 3-I: CITY AND COUNTY OF HONOLULU OPERATIONS-RELATED REVENUES AND COSTS — INDEPENDENT OPERATOR

	2001	2005	2010	2015	2020
Transient Accommodation Tax (1)	$ -	$ -	$ -	$ -	$ -
Usage Fees (2)	$ 15,448	$ 21,342	$ 27,183	$ 31,448	$ 36,888
Cafeteria/Concessions (3)	$ 157,743	$ 163,649	$ 323,190	$ 323,190	$ 323,190
Dormitories (4)	$ -	$ -	$ 11,300	$ 11,300	$ 11,300
Ticket Sales (5)	$ 60,000	$ 60,000	$ 157,500	$ 157,500	$ 157,500
Parking (6)	$ 7,200	$ 7,200	$ 18,000	$ 18,000	$ 18,000
SUBTOTAL	$ 240,391	$ 252,191	$ 537,173	$ 541,437	$ 546,878
Cost of public services to visitors	$ 130,308	$ 130,308	$ 138,055	$ 138,055	$ 138,055
Balance of revenues over costs	$ 110,083	$ 121,883	$ 399,118	$ 403,382	$ 408,823
CUMULATIVE BALANCE 2001-2020	$ 5,508,833				

NOTES: All figures are constant 1997 dollars

(1) Per SB 2239 SD1, HD1, beginning with Fiscal Year 1999-2000, $90MM of the TAT collected by the State would go to the counties. The City and County of Honolulu would receive 44.1% ($39.69MM). It is assumed that visitors coming to Hawaii because of the sports complex would be marginal and therefore not add to the City and County TAT income.

(2) Included within this is the assumption that the number of soccer teams increases at a constant rate of 5% per year through 2020. The actual rate of increase could vary over that time. An assumption is also made that each team pay $25 which goes towards operations of the soccer complex. It is not known whether the soccer teams would accept paying a fee or a fee of this amount. It is assumed that the City and County would receive 25% of usage fees collected and the operator would receive 75%.

(3) It is assumed that the City and County will received 25% of gross receipts.

(4) It is assumed that the City and County will receive 25% of fees.

(5) It is assumed that the City and County will receive 10% of ticket sales. Sales volume based on assumptions provided regarding the size of the event. Based on ticket prices: $20 - Concert; $15 - Sporting Event.

(6) Uses attendance figures provided and assumes 5 people/car and $2/car. Assumes that City and County will receive 50% of fees.

Exhibit 3-J: CITY AND COUNTY OF HONOLULU OPERATIONS-RELATED REVENUES AND COSTS — CITY AND COUNTY AS OPERATOR

	2001	2005	2010	2015	2020
Transient Accommodation Tax (1)	$ -	$ -	$ -	$ -	$ -
Usage Fees (2)	$ 61,792	$ 85,367	$ 108,730	$ 125,785	$ 147,552
Cafeteria/Concessions (3)	$ 157,743	$ 163,649	$ 323,190	$ 323,190	$ 323,190
Dormitories (4)	$ -	$ -	$ 11,300	$ 11,300	$ 11,300
Ticket Sales (5)	$ 60,000	$ 60,000	$ 157,500	$ 157,500	$ 157,500
Parking (6)	$ 7,200	$ 7,200	$ 18,000	$ 18,000	$ 18,000
SUBTOTAL	$ 286,735	$ 316,216	$ 618,720	$ 635,775	$ 657,542
Operating Expenses	$ 587,413	$ 587,413	$ 1,092,886	$ 1,092,886	$ 1,092,886
Cost of public services to visitors	$ 130,308	$ 130,308	$ 138,055	$ 138,055	$ 138,055
Balance of revenues over costs, for operations	$ (430,986)	$ (401,505)	$ (612,221)	$ (595,166)	$ (573,399)
CUMULATIVE BALANCE 2001-2020	$ (10,209,269)				

NOTES: All figures are constant 1997 dollars

(1) Per SB 2239 SD1, HD1, beginning with Fiscal Year 1999-2000, $90MM of the TAT collected by the State would go to the counties. The City and County of Honolulu would receive 44.1% ($39.69MM). It is assumed that visitors coming to Hawaii because of the sports complex would be marginal and therefore not add to the City and County TAT income.

(2) Included within this is the assumption that the number of soccer teams increases at a constant rate of 5% per year through 2020. The actual rate of increase could vary over that time. An assumption is also made that each team pay $25 which goes towards operations of the soccer complex. It is not known whether the soccer teams would accept paying a fee or a fee of this amount. It is assumed that the city would receive 100% of usage fees collected.

(3) It is assumed that the City and County will received 25% of gross receipts.

(4) It is assumed that the City and County will receive 25% of fees.

(5) It is assumed that the City and County will receive 10% of ticket sales. Sales volume based on assumptions provided regarding the size of the event. Based on ticket prices: $20 - Concert; $15 - Sporting Event.

(6) Uses attendance figures provided and assumes 5 people/car and $2/car. Assumes that City and County will receive 50% of fees.

Exhibit 3-K: PER CAPITA AVERAGE COST, CITY AND COUNTY OF HONOLULU SPENDING

Operating Expenditures, by Function	FY 1994 Total Expenditure (in $1,000s)	Cost Per -- Resident	Cost Per -- Visitor
General government			
Control	$8,963	$ 7.56	$ 7.56
Staff	$83,181	$ 95.70	$ -
Public safety			
Police and fire	$156,210	$ 169.70	$ 169.70
Other	$20,574	$ 22.35	$ 22.35
Highways	$28,413	$ 30.87	$ 30.87
Health and sanitation	$101,093	$ 109.82	$ 109.82
Recreation	$55,149	$ 59.91	$ 59.91
Interest	$72,324	$ 83.20	$ -
Bond redemption	$87,225	$ 100.35	$ -
Retirement and pension	$70,860	$ 81.52	$ -
Economic and urban development	$27,926	$ 32.13	$ -
Mass Transit	$82,943	$ 95.42	$ 95.42
Cash capital improvements	$17,705	$ 20.37	$ -
Miscellaneous	$63,266	$ 72.78	$ -
Total	$873,833	$ 978.38	$ 588.01
adjusted to 1997 $s	$937,023	$1,046.96	$ 628.38

SOURCES: DBEDT, 1997a; Tax Foundation of Hawaii, 1996.

Exhibit 3-L: ESTIMATED OPERATING COSTS

	Phase I FTE	Phase I Wages	Phase I Fringe, Taxes	Phase I Subtotal	Phase I Annual Total	Phase II FTE	Phase II Wages	Phase II Fringe, Tax	Phase II Subtotal	Phase II Annual Total
Staff										
Management	2	$ 75,465	$ 21,130	$ 96,595		5	$ 135,465	$ 37,830	$ 173,295	
Grounds/Maintenance	3	$ 80,090	$ 22,425	$ 102,516		5	$ 123,478	$ 34,574	$ 158,053	
Food Service	0	$ -	$ -	$ -		2.7	$ 9,228	$ 2,588	$ 32,449	
Training Camp Counselors	0	$ -	$ -	$ -		1.8	$ 20,000	$ 5,600	$ 28,824	
Parking (FTE)	0.6	$ 12,500	$ 3,500	$ 10,396		0.5	$ 12,500	$ 3,500	$ 8,064	
Ticket Office (FTE)	0.1	$ 18,000	$ 4,480	$ 1,659		0.1	$ 18,000	$ 4,480	$ 1,536	
					$211,130					$ 400,131
Contract Services		Range per event								
Tournament field cleanup		$ 300	$ 800		$ 3,600					$ 3,600
Event-related (ushers, security)		$ 250	$ 1,000		$ 3,000					$ 6,000
Trash pick up					$ 42,000					$ 42,000
Grounds					$ 82,473					$ 155,782
Infrastructure										
Routine maintenance					$ 27,779					$ 52,471
Equipment/Repair					$ 17,424					$ 32,512
Utilities										
Water/sewer					$100,000					$ 200,000
Electric					$100,000					$ 200,000
TOTAL					$587,413					$1,092,896

4.0: SOCIAL IMPACTS

4.1 OVERVIEW

This section describes potential impacts on lifestyle, family life, and community organization. It is an independent consultant's assessment, based on research conducted for this study, interviews with key informants, and SMS Research's experience of communities and projects throughout Hawai'i.

Social impacts are shaped by planning and design decisions, by interactions with the surrounding community, and by outside forces and events. The assessment of social impacts, therefore, deals with tendencies, dangers, and opportunities, not inevitable consequences. Potential unwanted impacts and problems of compatibility can usually be reduced or avoided. Section 5 discusses measures for mitigating potential adverse impacts.

The proposed project enjoys significant support among those who enjoy soccer. From their perspective, the complex addresses a long unmet need on the island for more and better soccer playing fields. Others view it in a positive light for the increased opportunities it provides for youth participation in outdoor sports.

Major Social Impacts. These consist of:

- Greater outdoor sports recreation opportunities for Hawai'i residents;
- Lessened demand for other sports facilities;
- Providing an opportunity for expanding sports tourism;
- Possible irritants for nearby communities from noise and traffic;
- New customers for businesses along Farrington Highway;
- Assisting in developing a community focus; and
- Potential problems of public safety, with a large unlighted parking area.

Community Issues and Concerns. The project has been developed by the City and County as a community facility, and its design responds to considerable input from citizens. It is planned to increase the number and types of fields on the island, not only for soccer but also for rugby, cricket, or other field sports. Considering the nature of the project, SMS Research did not conduct an extensive series of interviews to learn of community sentiments. Instead, calls and interviews dealt with local community impacts, and with lessons that could be learned from US Mainland venues. We are not able to assess whether the community at large supports or opposes the project. (However, we heard support even from those who had concerns about plans for the project.)

Concerns with the proposal for a major Soccer Park include:

Site: The site for the proposed Soccer Park is viewed positively by most. However, some expressed concern regarding the ongoing maintenance of the fields. They cite the experience at the nearby Ted Makalena Golf Course with the problem of keeping the grass alive. Salt seeping through the coral lying beneath the site has had the effect of making grass hard to maintain. The proposed complex could experience the same problem. If the grass is not maintained properly, the safety of play on the fields is questionable. Such a situation would work against attracting quality tournaments to the site. Current plans call for bringing in substantial amounts of topsoil to the site in constructing the fields. This and irrigating the fields are likely to assist in alleviating this potential problem.

Another closely associated concern involves the environmental safety of the site as a place for the community's youth. In the past, much of the site has been planted in sugar cane. The training center will be located in a rehabilitated municipal incinerator. It is important that past uses of the site will not pose future environmental safety risks.

Family members and friends attending practices and games of soccer players often include young children. It is important that recreation equipment be available for them while they are at the project site.

Lighting: A police officer raised the concern that the large unlit parking lots could become a place for drinking and fights by young people.

Neighborhood Impacts: Neighbors are reported to be concerned that activities at the complex would lead to traffic congestion and parking in residential areas.

Cumulative Impact of Project and Waipahu High School Traffic: Waipahu High School uses Waipi'o Access Road to get to both the school and its football fields. (The fields are located east of the school buildings, near the H-1 highway, but still reached by way of the Access Road.) Scheduling of a major event at the field when a high school football game is held could presumably lead to major problems of traffic congestion. (This concern is under study by the Traffic Consultant for the project.)

4.2 ISLANDWIDE AND REGIONAL IMPACTS

Growth in Soccer Participation. Development of the Waipi'o Peninsula Soccer Park will add substantially to the island inventory of fields for soccer. With such a facility devoted primarily to this sport, there are greater opportunities for the sport to develop further.

The Department of Parks and Recreation reports some 30 fields for soccer. Based on our experience, we expect that figure represents about half the fields actually in use for soccer. Phase I of the project amounts, then, to a 30% increase in fields over current conditions, while the entire project amounts to more than a 50% increase by 2020. (This calculation fails to consider withdrawal of fields at Kapi'olani Park and development of new fields elsewhere, notably at schools.)

Interest in soccer is estimated as growing at an estimated 5% rate annually. At that rate, the ratio of players to fields will be much improved when the project opens, then increase quickly. By the sixth year after opening, conditions would be much like those before opening. Nine years after opening – presumably the time when Phase II will be completed – the ratio of soccer players to fields on the island could well be higher than in 2000. Accordingly, the project can be seen as a measured response to local demand, which will not fully meet demand if interest in soccer continues to grow for more than ten years.

Demand is strong in the region surrounding the Waipi'o site. Pearl City, to the east, and Mililani, to the north, are active centers of soccer in Hawai'i, and home to many of Hawai'i's leading high school and college players. Soccer organizers in 'Ewa, to the west, and the new Waipahu subdivisions have stressed the need for more play fields to meet demand from their communities. As of 1990, Central O'ahu and 'Ewa were home to 20.8% of the island population. This share is expected to climb to 29.1% by 2020 (according to City plans). This suggests that local demand will climb by at least 40% over the next few years.

This rough estimate of demand could be conservative:

- Interest in soccer among adults has been limited by lack of lighted fields for evening games. Only one is now available on O'ahu, while the project will add three more fields and the tournament field.

- The project is located near major centers of youth soccer, but in a town, Waipahu, where soccer has been peripheral. Arguably, the project could stimulate major increases in participation among Waipahu youth. It will certainly make it easier for Waipahu schools to run soccer programs (personal communications, Pat Pedersen, Principal and Keith Morioka, Athletic Director, Waipahu High School, April 1998).

- Tournaments are now played in Kapi'olani Park, on fields used for many different purposes. Creation of a new Soccer Park will allow much larger tournaments to be held, increasing the level of participation of many young people.

- Youth soccer involves many children, age 5 to 10 or so, and fewer youths. The decline in participation is understandable so long as soccer is seen as less important than baseball and football. As interest grows, and support for soccer among teenagers increases (both in leagues and in school athletic programs), players will likely remain active in the sport longer.

Support for Other Sports and Entertainment. Next, the complex will support games and tournaments in other field sports, such as rugby and cricket. These now are held at Kapi'olani Park (as are soccer tournaments). Currently, there is much demand for the few fields available at Kapi'olani Park, and questions arise as to whether particular competitions or events are appropriate in terms of the trust that established the park.

The grouping of fields at the Soccer Park is intended to allow small tournaments (involving four to eight fields) to be held while the rest of the complex is used for soccer.

The complex will also be able to serve as a new venue for entertainment, hosting events similar to those currently held at the Waikiki Shell. After buildout, the project could fill a gap in island entertainment venues, hosting events which might be too big for the Waikiki Shell but too small for Aloha Stadium. Such events would attract an audience from around the island.

New Visitors. The Soccer Park envisioned by the facility's planners could assist with ongoing efforts to promote Hawai'i and O'ahu as a sports tourism destination. Soccer enjoys a worldwide following. By offering soccer players and their families new reasons to visit in the form of expanded tournaments, camps and clinics, Hawai'i would presumably appeal to new markets and increase its appeal to others. The number of new visitors was estimated in the last chapter. Here it is worth stressing that the project helps to diversify O'ahu's tourist mix.

4.3 IMPACTS ON THE LOCAL COMMUNITY

Immediately adjoining the project site are public facilities. Between the project and the closest residential community are the public Ted Makalena Golf Course, and the City and County's Police Training Academy. A few residential areas are nearby and south of Farrington Highway, but the bulk of Waipahu Town is well over a mile away from the project. This location lowers the impact of noise and activity at the project site.

4.3.1 Relations with Immediately Adjacent Land Uses

Of the adjoining land uses, the Police Training Academy and Ted Makalena Golf Course will be most affected by project development. (Mitigation of potential adverse impacts is discussed in the next chapter.)

The Training Academy is currently isolated. The Honolulu Police Department uses it for security activities that it considers confidential. The secrecy of training activity could be compromised because it would be visible from the berm surrounding the tournament field and from the training center. Conversely, some of the activities at the academy in which flashing lights and sirens are used could cause distraction for those attending events at the complex. (Activities include training on an Emergency Vehicles Operators Course, with lights on high poles shining towards the incinerator as well as on the Training Academy grounds.)

A portion of the project site will adjoin the Ted Makalena Golf Course. Golfers on the 12th fairway could hit balls over existing barriers, potentially hitting people on the lighted fields or near the stadium.

The project supports agriculture lower in the peninsula, and hence will increase slightly the number of people in the area. Little interaction between the project and the agricultural area is expected.

On-site, two distinct public safety issues must be acknowledged. First, part of the Soccer Park is at the outer edge of a Navy-designated Explosives Safety Quantity Distance (ESQD) arc, a blast zone surrounding ammunition wharves at West Loch Branch, NAVMAG Lualualei. This designation means that no structures can be built in the southern portion of the site. A majority of the playing fields at the Soccer Park are located within the blast zone. It is very unlikely that a major explosion will occur. Risks arise only when a loaded ammunition ship is at the wharf or ammunition is being staged on the wharf. However, the possibility is clearly recognized in Navy planning, and set distances are established between sites with explosives and buildings or public roads.

The Department of Defense Explosives Safety Board is responsible for establishing safety standards for operations involving ammunition and explosives. The board has reviewed and approved the plan to site the soccer park within the outer portion of the ESQD arc. The board found that the proposed site provides adeauate safety for the proposed recreational use as long as no structures other than firmly anchored soccer goals are built in the arc. According to the Navy, in the event of an accidental detonation, soccer park users are unlikely to be seriously injured directly by the explosion, although some injuries may occur.

Next, because of the restrictions placed on the installation of structures in this area, the parking lots will be lighted only by low bollard-type fixtures. If these serve as little more than row markers, concerns arise about physical safety and police supervision of the site. Currently, problems have been reported with youths from nearby communities congregating after hours near the existing military gate, south of the Ted Makalena Golf Course. The new project would tend to increase the area in which young people could hang out, increasing the difficulty of policing.

4.3.2 Areas along Access Roads

A traffic study (Wilbur Smith and Associates, 1998) will specify the volume of traffic expected with project development. In this section, social impacts potentially associated with new traffic volumes are underlined.

The small communities on the makai side of Farrington Highway are now relatively isolated. Locating the project south of these communities on the Waipi'o Peninsula means that these communities will see increased traffic and they could be affected by parking or the noise associated with large events at the project site. For communities accustomed to relative isolation, even occasional congestion and noise would be a notable change in their local conditions. (The few blocks of houses near the Waipi'o Access Road already experience occasional traffic increases when Waipahu High School holds major events. The homes on Waipahu Depot Road are more isolated, since that area rarely, if ever, sees much traffic.)

Waipahu High School is located at the intersection of Farrington Highway and Waipi'o Point Access Road. As with the nearby residential communities, it enjoys an isolation that works to its benefit. The Soccer Park, because of its close proximity to the high school, would offer additional sports fields and allow it to develop its soccer program. Waipahu also has a football program and its own football field, access to which is from Waipi'o Point Access Road. Traffic congestion associated with events at the High School could be worsened if events occur at the same time at the Soccer Park.

4.3.3 Waipahu

Historically, Waipahu has been strongly identified with the sports of baseball and football. Soccer has had only a limited following in Waipahu, and that has mainly been in the newer subdivisions to the north and west of the town. Few fields could be used, if demand arose within the older parts of Waipahu.

Having the Soccer Park within the community of Waipahu could serve as a stimulus to encourage greater participation in sports among the residents of the older areas near the site. It could have the further impact of bringing together the

older and new areas of Waipahu in a common activity, helping to establish a common identity for residents of the community. Furthermore, the Soccer Park, along with community facilities being developed in the mill area, is a relatively desirable public use. The City's willingness to locate desirable uses in Waipahu contrasts with the feeling among some residents that public agencies are likely to dump unwanted uses — the incinerator and halfway houses, for example — in Waipahu and other working-class communities. Hence, development of the Soccer Park can help to reinforce both community identity and cooperation between community residents and the City and County.

4.4 COMMUNITY SERVICES AND FACILITIES

4.4.1 Police

The proposed Soccer Park will be located within District 3 of the City and County of Honolulu Police Department. District Three covers the area from Red Hill to Village Park and Waipahu and includes the major residential areas of Pearl City, Aiea, Waipi'o, Waikele, Village Park and Waipahu. The main station is located at 1100 Waimano Home Road in Pearl City, approximately three miles from the project site. There is a storefront facility in the Waipahu Shopping Center (94-144 Farrington Highway) which also houses the department's Alternative Call Servicing Program.

The Soccer Park will not bring new residents to the area. At full development, though, it will draw a substantial number of people into the area to attend events held at the complex. Overall, it is not anticipated that the Soccer Park will have a negative impact on police operations for the district (personal communication, Sgt. Farias, Honolulu Police Department, Community Policing Team, May 1998). It could, though, increase the number of calls to the police department from nearby residents complaining of traffic and parking problems.

With the Soccer Park, there could be a need for five additional officers for patrol purposes, not including officers called on duty for special events (personal communication, Sgt. Farias, May, 1998).

4.4.2 Fire

Neither phase of the project should have a material impact on the ability of the fire department to respond to emergencies. The nearest fire department facility is the Waipahu station on Leonui Street. It is approximately three miles from the project site. A new station in Waikele (at the corner of Lumiaina Street and Lumiaina Place) will be operational no later than February 1999 and would also respond to emergencies at the project site. Back up for these stations would come from the station in Pearl City.

4.4.3 Medical Care

Hospitals. The nearest hospitals to the project site are Pali Momi Medical Center in Pearl City, approximately four to five miles away, and the St. Francis Medical Center West, also approximately four to five miles away. Both facilities provide a full range of hospital services including emergency care, outpatient treatment, and laboratory and X-ray facilities. It is not expected that activities at the project site will materially affect the operations of these two medical facilities.

Emergency Ambulance Services. The Emergency Medical Services Division (EMS) of the City and County's Department of Health, under contract with the State Department of Health, would have primary responsibility to respond to medical emergencies at the project site. Responses to such emergencies would generally be dispatched from either the Waipahu unit, co-located with the Waipahu Fire Company at 94-121 Leonui Street, or from the Makakilo unit, located at St. Francis Medical Center West in 'Ewa. By the time Phase II of the project is complete, it is likely that there will be two additional units capable of responding to emergencies at the site, one in Kapolei and another possibly in Nanakuli.

Response times could vary, but on average it is estimated that it would take between 6.5 and 7 minutes to respond to an emergency at the project site. EMS has arrangements with the Honolulu Fire Department to provide backup for quicker response if necessary. The HFD has increasing capability to respond to medical emergencies and provide stabilization prior to the arrival of the ambulance. They are able to respond in 3 to 4 minutes.

Presumably, emergency calls from the project site will be mostly for sporting injuries, not medical emergencies such as a heart attack. Hence timely response is not a critical factor.

For the largest events planned to occur after completion of Phase II, with some 15,000 attendees, insurance carriers usually require that an ambulance located on site. In these situations, EMS generally would catch the overflow for emergency calls. (personal communication, Robin McCulloch, City and County EMS, May,1998)

5.0: MITIGATIONS

In this section, SMS Research identifies ways to mitigate possible adverse socio-economic impacts of the project. It is an independent assessment, implying no commitment on the part of the City and County of Honolulu to undertake any of the steps mentioned. Community benefits are noted without implying in any way that provision of these benefits is necessary or obligatory.

Many impacts are by no means inevitable and necessary consequences of development. Many can be avoided through planning and community action. Hence the listing of impacts in this chapter must be understood as part of the process of mitigation, not as counts against the project.

5.1 MITIGATION MEASURES

The project helps fulfill an islandwide need for more playing fields for soccer. It fits with the government's policy of developing recreational facilities that meet the needs of residents. Several impacts of the project have been identified in Chapter 3 and Chapter 4.

5.1.1 Economic Impact

The project could potentially have a negative fiscal impact on the City and County of Honolulu, if the City must shoulder the cost of operations. This potential needs to be approached with two points in mind.

1. The scenario used in this report does not involve an exhaustive attempt to raise revenues and cut costs. There may be other sources of revenue, not included in the accepted assumptions, which could further mitigate the negative impact that might exist if the facility were to be operated by the City and County of Honolulu.
2. As a local government, the City and County of Honolulu is in the business of developing and operating recreation facilities for its residents. In most instances these facilities are operated at a loss. In this light, potential losses from operating the sports facility could be treated simply as an instance of the City and County providing expanded recreational services and opportunities for island resident.

5.1.2 Social Impacts

In Chapter 4, two adjoining land users — the Police Training Academy and Ted Makalena Golf Course — and the small residential communities mauka of the project site were identified as potentially suffering from adverse impacts from construction of the proposed Waipi'o Peninsula Soccer Park.

Security of activities at the Police Training Academy. To limit visibility of activities at the Training Academy, architects and landscapers for the project could work with Honolulu Police Department officials to (a) specify privacy requirements; and (b) identify effective ways to place fencing and trees. If confidentiality is of critical importance to the Police, it will likely be necessary to place fences or new trees on the Training Academy site itself, i.e., where Soccer Park visitors cannot climb the new barriers. It should be noted, though, that the Training Academy requested the bushes/trees along the boundary between the Academy and the Ted Makalena Golf Course be removed as a measure to decrease the possibility that police officers in the vicinity would be hit by stray golf balls.

Stray golf balls from the Ted Makalena Golf Course. This public golf course immediately adjoins the project site in the area where the tournament and other lighted fields are planned. Attention to fencing and plantings will be needed during planning to minimize the chance of injury to users of the Soccer Park.

Public safety in dark areas. With much of the project open yet not lighted, the existing problem of policing the end of the road will become greater. To assure public safety in a City facility, increased police patrols will be needed. Communication with user groups could help to limit the times and areas that patrols are needed.

Traffic and parking in nearby residential communities. The relatively isolated small residential communities makai of Farrington Highway and mauka of the project site could potentially be affected by increased traffic and congestion from special events held at the proposed project site. This could be further aggravated if events at the project site are held simultaneously with special sporting events at Waipahu High School.

The project has large parking lots, and is at some distance from the neighborhoods in question. Hence the chance of overflow parking in residential areas seems low, at least before Phase II is built. Cooperation among the future operator of the Soccer Park, local police and high school officials, as well as community leaders will be helpful to monitor and limit potential congestion. Advance planning by high school and facility officials could also help to limit occasions when major events take place at both facilities at the same time.

5.2 MITIGATION PROCESS

The effectiveness of any mitigation measure depends on the degree to which the developer and operator of the project communicate with those who will be most affected by such development. The mitigation measures mentioned with respect to the present project are largely a matter of design and operations scheduling. Measures involving scheduling will not only depend on communication but can be improved over time as those involved team to work together. Again, communication between the operator and users should lead to simple solutions – involving timing or parking locations – that may decrease the need to police the parking lots at night.

It is important, then, that mitigation of the potential adverse impacts be viewed as an ongoing process, from the planning phase through the operations of the Soccer Park.

APPENDIX

Appendix A
1. DEMOGRAPHIC CHARACTERISTICS, SELECTED DP AREAS, 1990

	Honolulu	SELECTED DP AREAS		
	County	Ewa (1)	Central (1)	Waianae
POPULATION	836,231	42,960	130,474	37,411
ETHNICITY				
Caucasian	32%	40%	30%	23%
Japanese	23%	9%	20%	6%
Filipino	14%	28%	24%	16%
Hawaiian	11%	10%	8%	41%
Other	20%	13%	18%	15%
AGE				
Less than 5 years	7%	10%	10%	10%
5 to 17 years	17%	21%	20%	26%
18 to 34 years	31%	35%	34%	27%
35 to 64 years	34%	29%	29%	30%
65 or more years	11%	5%	6%	7%
Median age (years)	32.2	N/A	N/A	26.3
EDUCATION OF PERSONS AGED 25 & OVER (2)				
High School Diploma (3)	81%	80%	82%	69%
College Degree (4)	33%	25%	29%	15%
PERSONS AGED 5 & OVER WHO SPEAK A LANGUAGE OTHER THAN ENGLISH AT HOME (2)	26%	24%	26%	19%
PERSONS WITH MOBILITY OR SELF-CARE LIMITATIONS (2)				
% of persons aged 16 to 64	4%	5%	4%	6%
% of persons aged 65 or more	18%	20%	20%	26%

NOTES: (1) See Appendix A-6 for a detailed list of equivalent Census regions for these Development Plan Areas.
(2) Based on 15% sample; hence, figures represent estimates only.
(3) All persons with a high school diploma, including those with college education.
(4) Includes Associate, Bachelor's, and graduate degrees.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A
2. GEOGRAPHIC MOBILITY, SELECTED DP AREAS, 1990 (1)

	Honolulu County	SELECTED DP AREAS		
		Ewa	Central	Waianae
PERSONS (2)				
PLACE OF BIRTH				
Born in Hawaii	54%	46%	51%	74%
Other U.S.-born (3)	30%	38%	35%	18%
Foreign-born	16%	16%	15%	8%
RESIDENCE 5 YEARS PREVIOUS FOR PERSONS AGED 5 & OVER				
Same house	50%	38%	43%	55%
Same county, different house	26%	29%	27%	33%
Same state, different county	1%	1%	1%	1%
Different state	17%	26%	24%	9%
Lived abroad	5%	6%	6%	2%
HOUSEHOLDERS (2)				
WHEN HOUSEHOLDER MOVED INTO UNIT				
In the last 5 years	53%	66%	62%	52%
6 to 20 years ago	29%	26%	26%	35%
21 to 30 years ago	10%	6%	8%	7%
31 years ago or more	8%	3%	4%	6%

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Base figures used in calculating these data may be different than in 100% count.
(3) Includes persons born in U.S. territories, and persons born abroad or at sea to American parents.

SOURCE: U.S. Bureau of the Census, 1992.

Appendix A
3. HOUSING CHARACTERISTICS, SELECTED DP AREAS, 1990

	Honolulu County	SELECTED DP AREAS		
		Ewa	Central	Waianae
HOUSING UNITS	281,683	11,734	36,260	10,680
TOTAL VACANT UNITS	6%	3%	2%	12%
Seasonal/recreational	2%	0%	0%	4%
AGE OF STRUCTURE (1)				
1 year	2%	7%	3%	1%
2 to 10 to years	14%	15%	28%	13%
11 to 20 years	30%	29%	29%	42%
21 years or more	54%	48%	40%	44%
UNITS IN STRUCTURE				
1 unit	55%	80%	65%	70%
2 to 4 units	7%	7%	9%	5%
5 or more units	36%	11%	24%	23%
Trailer, other	1%	1%	1%	2%
NOT COMPLETE PLUMBING (1)	1%	0%	0%	1%
HOUSEHOLDS	265,304	11,434	35,443	9,417
HOUSEHOLD TYPE				
1 or more non-relatives	12%	12%	10%	15%
No non-relatives	88%	88%	90%	85%
TENURE				
Owner-occupied	52%	53%	55%	52%
Renter-occupied	48%	47%	45%	48%
PERSONS PER HOUSEHOLD	3.02	3.66	3.49	3.93
CROWDED HOUSEHOLDS				
Mildly crowded (2)	8%	11%	10%	16%
Very crowded (3)	8%	9%	8%	18%
MEAN VALUE (4)	$312,624	$232,270	$265,169	$168,784

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Indicated by households with 1.00 to 1.50 persons per room.
(3) Indicated by households with 1.51 or more persons per room.
(4) For owner-occupied, non-condominium housing units.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A

4. INCOME CHARACTERISTICS, SELECTED DP AREAS, 1990 (1)

	Honolulu County	SELECTED DP AREAS		
		Ewa	Central	Waianae
HOUSEHOLDS (2)				
INCOME LEVEL				
Lowest (3)	13%	9%	11%	22%
Highest (4)	17%	12%	15%	9%
Mean Income (5)	$49,959	$44,759	$47,540	$38,310
Interquartile Range (6)	$43,154	$36,073	$39,906	$35,239
WITH SELECTED INCOME SOURCES				
Social Security Income	24%	15%	17%	23%
Retirement Income	20%	17%	17%	21%
Public Assistance Income	6%	6%	8%	22%
OWNER HOUSING COSTS (7)				
35% or more of Household Income	15%	21%	20%	14%
Mean Monthly Costs	$909	$958	$1,041	$607
RENTER HOUSING COSTS (8)				
35% or more of Household Income	34%	36%	37%	44%
Mean Gross Rent	$711	$810	$717	$617
Mean Contract Rent (9)	$655	$738	$652	$551
POPULATION (2)				
PERSONS BELOW POVERTY LEVEL	7%	5%	7%	19%
% of persons aged 18 to 64	6%	4%	5%	15%
% of persons aged 65 or more	8%	4%	9%	14%
% of related children aged less than 18	10%	5%	10%	26%
% of unrelated individuals	19%	17%	18%	33%

NOTES: (1) Based on 15% sample (except "Mean Contract Rent"); hence, figures represent estimates only.
(2) Base figures used in calculating this data may be different than in 100% count.
(3) Incomes of less than $15,000 (based on lowest 14.8% of incomes statewide).
(4) Incomes of $75,000 or more (based on highest 15.8% of incomes statewide).
(5) In 1989 dollars.
(6) A smaller range means less difference between rich and poor, while a larger range means a greater difference between rich and poor.
(7) Owner costs include (but are not limited to) mortgage, real property tax, property insurance, utilities, and fuels.
(8) Renter costs include (but are not limited to) rent, utilities, and fuels.
(9) Monthly cash rent only. Does not include other costs.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A

5. LABOR FORCE CHARACTERISTICS, SELECTED DP AREAS, 1990 (1)

	Honolulu County	SELECTED DP AREAS		
		Ewa	Central	Waianae
POPULATION AGED 16 & OVER	651,920	30,788	94,346	24,973
In Armed Forces	8%	17%	16%	2%
POTENTIAL CIVILIAN LABOR FORCE	598,371	25,556	78,949	24,377
In Civilian Labor Force	69%	71%	72%	62%
CIVILIAN LABOR FORCE	410,023	18,061	57,071	15,107
MALE				
Labor force participation (2)	75%	79%	79%	71%
Unemployed	4%	5%	4%	6%
FEMALE				
Labor force participation (2)	63%	64%	67%	53%
Unemployed	3%	5%	4%	8%
EMPLOYED CIVILIAN LABOR FORCE	395,811	17,120	54,571	13,901
BY SELECTED INDUSTRY				
Agriculture, forestry, fisheries, mining	2%	2%	2%	4%
Construction	7%	8%	8%	12%
Manufacturing	6%	9%	8%	6%
Transportation	7%	7%	7%	7%
Retail trade	19%	20%	19%	17%
Finance, insurance, real estate	8%	7%	7%	4%
Personal, entertainment, recreation	8%	6%	7%	7%
Health, education, professional	22%	17%	19%	19%
Public administration	9%	11%	12%	9%
BY OCCUPATION				
Managerial, professional	28%	18%	23%	17%
Technical, sales, support	35%	35%	35%	27%
Service	17%	18%	17%	18%
Farming, forestry, fishing	2%	2%	2%	4%
Precision, craft, repair	10%	13%	12%	14%
Operators, cleaners, laborers	9%	14%	11%	20%
COMMUTE TO WORK				
More than 45 minutes	16%	21%	20%	40%
Mean travel time (minutes)	25	N/A	N/A	36

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Calculated by dividing "Civilian Labor Force" by "Potential Civilian Labor Force."

SOURCE: U.S. Bureau of the Census, 1992.

Appendix A
6. 'EWA AND CENTRAL DP AREAS IN CENSUS TERMS

Region	1990 Population
'EWA DP AREA	42,983
APPROXIMATE CENSUS AREAS	42,960
Tract 83.01	5,786
Tract 83.02	6,699
Tract 87.98 (BG 9 only)	826
Tract 84	9,677
Tract 85	4,529
Tract 86.03 (all except BG 1)	5,907
Tract 86.04	4,015
Tract 86.98	5,521
DIFFERENCE	23
CENTRAL DP AREA	130,474
APPROXIMATE CENSUS AREAS	130,474
Tract 82	0
Tract 86.03 (BG 1 only)	602
Tract 87.01	7,598
Tract 87.02	4,161
Tract 87.98 (all except BG 9)	3,645
Tract 88	6,172
Tract 89.01	8,064
Tract 89.04	5,183
Tract 89.05	7,581
Tract 89.06	4,025
Tract 89.07	4,560
Tract 89.08	6,688
Tract 89.09	3,779
Tract 89.10	10,444
Tract 89.11	11,893
Tract 89.12	2,193
Wahiawa Division (1)	43,886
DIFFERENCE	0

NOTE: (1) Comprised of Tracts 90, 91, 92, 93, 94, 95.01, 95.02, 95.03, 95.04, and 95.05

SOURCES: U.S. Bureau of the Census, 1992.
Steve Young, City & County Planning Department ('Ewa DP — 2/13/92; Central DP — 8/8/94).

Appendix A
7. DEMOGRAPHIC CHARACTERISTICS, SELECTED 'EWA AREAS, 1990

	Honolulu County	Barber's Point	'Ewa Beach	'Ewa Villages	Makakilo	'Ewa Gentry
POPULATION	836,231	2,218	14,315	3,780	9,828	1,992
ETHNICITY						
Caucasian	32%	78%	23%	8%	47%	31%
Japanese	23%	1%	9%	14%	10%	18%
Filipino	14%	8%	39%	67%	18%	29%
Hawaiian	11%	1%	17%	5%	13%	7%
Other	20%	15%	12%	5%	14%	15%
AGE						
Less than 5 years	7%	19%	7%	7%	8%	10%
5 to 17 years	17%	10%	23%	21%	18%	15%
18 to 34 years	31%	61%	30%	27%	34%	46%
35 to 64 years	34%	9%	33%	30%	36%	27%
65 or more years	11%	0%	7%	15%	3%	3%
Median age (years)	32.2	24.7	26.8	32.4	29.8	28.4
EDUCATION OF PERSONS AGED 25 & OVER (1)						
High School Diploma (2)	81%	90%	71%	55%	90%	88%
College Degree (3)	33%	15%	17%	12%	37%	37%
PERSONS AGED 5 & OVER WHO SPEAK A LANGUAGE OTHER THAN ENGLISH AT HOME (1)	26%	15%	29%	48%	18%	24%
PERSONS WITH MOBILITY OR SELF-CARE LIMITATIONS (1)						
% of persons aged 16 to 64	4%	2%	6%	4%	5%	3%
% of persons aged 65 or more	18%	0%	18%	22%	15%	0%

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) All persons with a high school diploma, including those with college education.
(3) Includes Associate, Bachelor's, and graduate degrees.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A
8. GEOGRAPHIC MOBILITY, SELECTED 'EWA AREAS, 1990 (1)

	Honolulu County	Barber's Point	'Ewa Beach	'Ewa Villages	Makakilo	'Ewa Gentry
PERSONS (2)						
PLACE OF BIRTH						
Born in Hawaii	54%	13%	63%	62%	45%	52%
Other U.S.-born (3)	30%	78%	18%	5%	43%	31%
Foreign-born	16%	9%	20%	33%	12%	17%
RESIDENCE 5 YEARS PREVIOUS FOR PERSONS AGED 5 & OVER						
Same house	50%	2%	61%	43%	40%	2%
Same county, different house	28%	5%	29%	50%	29%	78%
Same state, different county	1%	0%	1%	1%	1%	2%
Different state	17%	78%	6%	3%	25%	16%
Lived abroad	5%	14%	3%	4%	6%	3%
HOUSEHOLDERS (2)						
WHEN HOUSEHOLDER MOVED INTO UNIT						
In the last 5 years	53%	99%	39%	58%	64%	100%
6 to 20 years ago	29%	1%	49%	23%	26%	0%
21 to 30 years ago	10%	0%	8%	3%	10%	0%
31 years ago or more	8%	0%	3%	16%	0%	0%

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Base figures used in calculating these data may be different than in 100% count.
(3) Includes persons born in U.S. territories, and persons born abroad or at sea to American parents.

SOURCE: U.S. Bureau of the Census, 1992.

Appendix A
9. HOUSING CHARACTERISTICS, SELECTED 'EWA AREAS, 1990

	Honolulu County	Barber's Point	'Ewa Beach	'Ewa Villages	Makakilo	'Ewa Gentry
HOUSING UNITS	281,683	866	3,426	939	3,050	752
TOTAL VACANT UNITS	6%	1%	2%	4%	2%	6%
Seasonal/recreational	2%	0%	0%	0%	0%	0%
AGE OF STRUCTURE (1)						
1 year	2%	1%	1%	5%	1%	71%
2 to 10 to years	14%	1%	7%	43%	28%	29%
11 to 20 years	30%	5%	41%	1%	44%	0%
21 years or more	54%	93%	52%	51%	27%	0%
UNITS IN STRUCTURE						
1 unit	55%	49%	86%	95%	79%	50%
2 to 4 units	7%	19%	4%	2%	7%	5%
5 or more units	36%	30%	9%	1%	13%	44%
Trailer, other	1%	2%	1%	3%	1%	1%
NOT COMPLETE PLUMBING (1)	1%	0%	1%	0%	0%	0%
HOUSEHOLDS	265,304	854	3,355	902	2,978	708
HOUSEHOLD TYPE						
1 or more non-relatives	12%	2%	15%	8%	16%	17%
No non-relatives	88%	98%	85%	92%	84%	83%
TENURE						
Owner-occupied	52%	0%	69%	66%	74%	80%
Renter-occupied	48%	100%	31%	34%	26%	20%
PERSONS PER HOUSEHOLD	3.02	2.52	4.26	4.19	3.30	2.81
CROWDED HOUSEHOLDS						
Mildly crowded (2)	8%	4%	17%	21%	7%	10%
Very crowded (3)	8%	1%	15%	21%	5%	7%
MEDIAN VALUE (4)	$283,800	$275,000	$218,900	$118,500	$248,600	$277,800

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Indicated by households with 1.00 to 1.50 persons per room.
(3) Indicated by households with 1.51 or more persons per room.
(4) For owner-occupied, non-condominium housing units.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A
10. INCOME CHARACTERISTICS, SELECTED 'EWA AREAS, 1990 (1)

	Honolulu County	Barber's Point	'Ewa Beach	'Ewa Villages	Makakilo	'Ewa Gentry
HOUSEHOLDS (2)						
INCOME LEVEL						
Lowest (3)	13%	14%	11%	13%	3%	5%
Highest (4)	17%	1%	18%	8%	20%	8%
Median Income (5)	$40,581	$23,908	$45,184	$40,824	$50,284	$45,624
Interquartile Range (6)	$43,154	$13,490	$37,872	$37,023	$34,317	$33,156
WITH SELECTED INCOME SOURCES						
Social Security Income	24%	3%	23%	47%	10%	7%
Retirement Income	20%	3%	28%	32%	17%	8%
Public Assistance Income	6%	1%	14%	5%	3%	3%
OWNER HOUSING COSTS (7)						
35% or more of Household Income	15%	N/A	18%	12%	24%	38%
Median Monthly Costs	$1,121	N/A	$910	$710	$1,288	$1,393
RENTER HOUSING COSTS (8)						
35% or more of Household Income	34%	15%	31%	5%	48%	78%
Median Gross Rent	$883	$664	$755	$127	$971	$923
Median Contract Rent (9)	$815	$644	$701	$89	$960	$907
POPULATION (2)						
PERSONS BELOW POVERTY LEVEL	7%	1%	7%	1%	3%	6%
% of persons aged 18 to 64	6%	1%	8%	1%	3%	4%
% of persons aged 65 or more	8%	0%	4%	3%	4%	0%
% of related children aged less than 18	10%	2%	7%	1%	4%	8%
% of unrelated individuals	19%	0%	29%	20%	6%	8%

NOTES:
(1) Based on 15% sample (except "Median Contract Rent"); hence, figures represent estimates only.
(2) Base figures used in calculating this data may be different than in 100% count.
(3) Incomes of less than $15,000 (based on lowest 14.8% of incomes statewide).
(4) Incomes of $75,000 or more (based on highest 15.8% of incomes statewide).
(5) In 1989 dollars.
(6) A smaller range means less difference between rich and poor, while a larger range means a greater difference between ric
(7) Owner costs include (but are not limited to) mortgage, real property tax, property insurance, utilities, and fuels.
(8) Renter costs include (but are not limited to) rent, utilities, and fuels.
(9) Monthly cash rent only. Does not include other costs.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

Appendix A
11. LABOR FORCE CHARACTERISTICS, SELECTED 'EWA AREAS, 1990 (1)

	Honolulu County	Barber's Point	'Ewa Beach	'Ewa Villages	Makakilo	'Ewa Gentry
POPULATION AGED 16 & OVER	651,920	1,681	10,499	2,855	7,296	1,634
In Armed Forces	8%	52%	3%	1%	13%	12%
POTENTIAL CIVILIAN LABOR FORCE	596,371	802	10,221	2,831	6,306	1,443
In Civilian Labor Force	69%	73%	70%	67%	76%	87%
CIVILIAN LABOR FORCE	410,023	589	7,129	1,899	4,768	1,255
MALE						
Labor force participation (2)	75%	82%	78%	72%	84%	94%
Unemployed	4%	21%	6%	5%	5%	1%
FEMALE						
Labor force participation (2)	63%	71%	63%	62%	67%	81%
Unemployed	3%	21%	4%	5%	4%	1%
EMPLOYED CIVILIAN LABOR FORCE	395,811	466	6,773	1,808	4,541	1,243
BY SELECTED INDUSTRY						
Agriculture, forestry, fisheries, mining	2%	1%	1%	11%	1%	0%
Construction	7%	9%	9%	6%	8%	7%
Manufacturing	6%	3%	8%	13%	9%	10%
Transportation	7%	4%	7%	7%	8%	7%
Retail trade	19%	29%	24%	20%	16%	16%
Finance, insurance, real estate	8%	7%	7%	5%	6%	11%
Personal, entertainment, recreation	8%	4%	7%	8%	4%	7%
Health, education, professional	22%	20%	15%	10%	20%	16%
Public administration	9%	19%	7%	9%	15%	15%
BY OCCUPATION						
Managerial, professional	28%	15%	12%	9%	26%	26%
Technical, sales, support	35%	39%	34%	27%	38%	36%
Service	17%	28%	22%	20%	13%	14%
Farming, forestry, fishing	2%	0%	1%	8%	1%	0%
Precision, craft, repair	10%	13%	14%	13%	13%	11%
Operators, cleaners, laborers	9%	5%	17%	23%	10%	12%
COMMUTE TO WORK						
More than 45 minutes	18%	5%	31%	22%	19%	30%
Mean travel time (minutes)	25	13	34	29	29	33

NOTES:
(1) Based on 15% sample; hence, figures represent estimates only.
(2) Calculated by dividing "Civilian Labor Force" by "Potential Civilian Labor Force."

SOURCE: U.S. Bureau of the Census, 1992.

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APPENDIX F

ARCHAEOLOGICAL, HISTORICAL, AND CULTURAL RESOURCES SURVEY, WAIPIO PENINSULA SPORTS COMPLEX SITE

ARCHAEOLOGICAL INVENTORY SURVEY
FOR THE
PROPOSED WAIPIO SPORTS COMPLEX
WAIKELE AND WAIPIO AHUPUA'A
WAIPIO PENNINSULA
E'WA, O'AHU

(TMK 9-3-002, 030-034 & Pors. 001, 009, 028, 032; Portion TMK 9-4-008; TMK 9-4-011: Pors. 003, 046, 104; and TMK 9-4-010: Pors. 008, 027, 057)

by

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June 1998
98-379

ABSTRACT

An archaeological inventory survey has been conducted on approximately 200 acres of land on the Waipio Peninsula in the Pearl Harbor region on the island of O'ahu. The project area is located within the *ahupua'a* of Waikele and Waipio in the district of E'wa. Archival research indicated that the area was important traditionally for aquacultural and agricultural pursuits. Aquacultural pursuits were evidenced by numerous fishponds along the shoreline, several of which were present within the boundaries of the project area. These fishponds were for raising fish for chiefly consumption. Irrigated agricultural activities were probably taking place inland of the project area. Historical research indicated that the project area had been extensively modified in historic times for sugar cane cultivation. Based on the results of the archival and historical research it was predicted that there was little likelihood any surface archaeological sites would be present in the project area. However, it was thought that subsurface deposits associated with fishponds that once existed here may be present.

Three surface archaeological sites were encountered: a stone wall along the northern boundary of the project area; a historic pumping station complex associated with sugar cane cultivation; and the right-of-way and railroad foundation for a spur of the Oahu Rail and Land Company (OR&L). Recommendations for the treatment of these resources are presented.

Subsurface testing with a backhoe failed to reveal any deposits associated with traditional Hawaiian use of the area. It appears that the entire project area has been buried with up to 3 m of fill.

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1.0 INTRODUCTION

Under contract to Belt Collins Hawai'i, *Pacific Legacy, Inc.* conducted an archaeological surface and subsurface inventory of approximately 200 acres in the Waipio Peninsula, E'wa, Oahu, between 1 - 8 May 1998. The City and County of Honolulu is planning to develop a sports complex in this area. This land is controlled by the US Navy. As such, Section 106 requirements under the National Historic Preservation Act (NHPA) of 1969, as amended will need to be fulfilled. The current report will be used to support an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) and an Environmental Impact Statement (EIS) under Chapter 343, Hawaii Revised Statutes. Information contained in this report will also assist the Federal Agency in complying with Section 106 requirements.

The project area lies at the northern or inland (*mauka*) end of the peninsula. It is bounded on the north by the FCC radio directional finding and monitoring antennae, the Ted Makalena Public Golf Course, the City and County of Honolulu Waste Incinerator, and the Police Training Academy. It is bounded on the east by the Waipio Access Road, and on the west by West Lock, Pearl Harbor. The southern boundary of the project area is defined by an imaginary line marking the 75% Explosive Safety Quantity Distance (ESQD) boundary for the Lualualei Naval Magazine Blast Zone (Figure 1).

After presenting the environmental setting of th project area below, the report presents the results of the archival research (Section 2.0) as a means of establishing the cultural context of the area. The field methods followed are then presented (Section 3.0), followed by a description of the results of fieldwork (Section 4.0). This is followed by a discussion of the findings (Section 5.0), an assessment of the significance of the resources recorded Section 6.0), and finally recommendations are presented for the management of the historic resources (Section 7.0).

1.1 Environmental Setting

The following soil descriptions and agricultural use viability are drawn from Foote et al. (1972). Four major soil associations are found within the project area (Foote et al. 1972: maps 53 and 54). The Lualualei Series, Keaau Series, Honouliuli Series, and the Pearl Harbor Series comprise the soils in the *mauka* end of the Waipio Peninsula. The Lualualei Series occurs on alluvial fans, and is characterized by "deep nearly level to moderately sloping, well-drained soils that have fine-textured or moderately fine

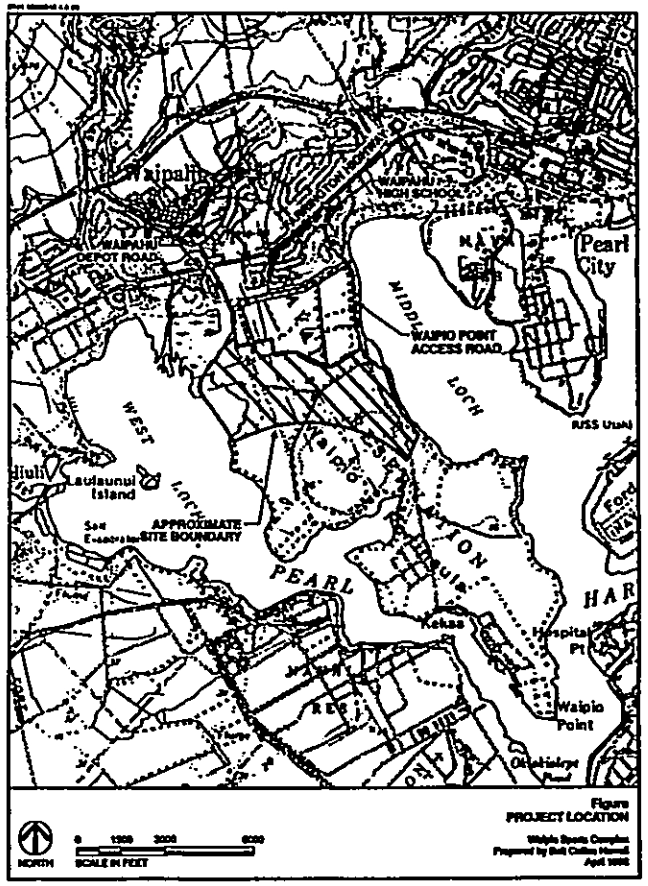

Figure 1. Location of Project Area

textured subsoil" (Foote et al. 1972:84). Over half of the project area consists of agricultural land built up from fill. Fill land refers to "areas filed with material from dredging, excavation from adjacent uplands, garbage, and slurry from sugar mills" (Foote et al. 1972:31).

Soils characteristic of fishpond embayments consist of Keaau Series clay and Honouliuli Series clay. Keaau Series clays are characterized as "poorly drained soils on coastal plains, . . . [which] developed in alluvium, deposited over reef limestone or consolidated coral sand. They are nearly level and gently sloping" (Foote et al. 1972:64). All three series are identified as being useful for truck agriculture and sugar cane. The Pearl Harbor series can be found in the seaward portion of Loko Eo Fishpond (State Site No. 50-80-09-123) in the northeastern portion of the peninsula between Waipio Access Rd. and East Loch of Pearl Harbor. These soils are Pearl Harbor clay described as "very poorly drained soils found on nearly level coastal plains, developing in alluvium overlying organic material" (Foote et al. 1972:112). Found in association with Keaau Series clays, these soils are suitable for sugar cane, taro, bananas, or pastureland.

Topographically, the Waipio Peninsula is nearly level (Figure 2), ranging from 0 to 9 feet above mean sea level, gently grading *makai* toward the southern boundary of the project area. Changes to the topography include the infilling of Loko Ulumoko (State Site No. 50-80-09-126), Loko Hanaloa (State Site No. 50-80-13-125), and Loko Eo Fishponds, resulting in raised surfaces to the present height of the surrounding property. The Ted Makalena Public Golf Course occupies all of Loko Eo Fishpond, with the exception of a small portion located directly north and outside the project area. Loko Ulumoku Fishpond has been infilled with ash and debris from the Waipahu sugar mill, and Loko Hanaloa Fishpond has been infilled with agricultural fill for sugar cane cultivation.

The *makai* end of the peninsula is drained by Kapakahi Stream, which has formed a delta in West Loch. Except for the report of a single inland freshwater pond, historically the peninsula has been watered by numerous springs and seeps recorded in the immediate upland *mauka* of the peninsula (Handy 1940).

The highly modified landscape within the project area provides the perfect environment for opportunistic plants that thrive in disturbed soils. Introduced short dry grasses, feral cane (*Saccarum officinarum*), *koa haole* (*Leucaena leucocephala*), lantana (*Lantana camara L.*), and *kiawe* (*Prosopis pallida*) dominate the artificial plateau constructed of debris within Loko Ulumoku fishpond. The seaward edges of the project area are dominated by Christmasberry (*Schinus terebinthifolius*) and thick stands of mangrove (*Rhizophora mangle L.*). The remainder of the project area is dominated by feral cane, lantana (*Lantana camara L.*), koa haole, banana poka (*Passiflora* sp.), and sparse *kiawe*.

No indigenous fauna was recorded. The dominant fauna observed were chicken, mongoose, feral dog, cattle egret, and peacock. A barn owl was observed flying in the southeastern portion of the project area.

Figure 2. Overview of Waipio Peninsula with Waipahu Mill in Background

2.0 THE WAIPIO PENINSULA IN THE CULTURAL CONTEXT

2.1 Historical and Archival Research

This section provides a chronology of prehistoric and historic land use in the Waikele and Waipio *ahupua'a* within the project area. Sources consulted include maps, photographs, ethnographies, early newspaper accounts, court records, and land commission awards (LCA) archived at the Bernice P. Bishop Museum, the Hawaiian Land Claims Division, the Oahu Sugar Company archives at the University of Hawaii, and previous archaeological reports at the State Historic Preservation Division. Mr. Hugh Morita, formerly of Oahu Sugar Company Engineering Department provided informant information regarding the Hawaiian Irrigation System and modern landform changes on the peninsula. The chronology of settlement on the Waipio Peninsula and its significance in prehistory and during the historic period can be traced via legend, ethnographies, Land Commission Award records, and through a series of maps which diachronically track fishpond construction during the historic period. Each *ahupua'a* will be addressed separately.

2.1.1 Prehistoric Land Use

Waipio Peninsula lies in the District of E'wa, O'ahu, and extends from the *kula* lands at Waipahu east-southeast into Pearl Harbor. *Kula* lands are defined as dry areas generally used for dryland agriculture or as pasture (Pukui and Elbert 1973:164). The peninsula is bisected by two *ahupua'a*: Waikele on the west and Waipio on the east. An *ahupua'a* is defined as a prehistoric Hawaiian socio-political land division system incorporating the major ecological zones between the ocean to the mountains.

The low elevation and relatively flat topography of the peninsula combined with its location on the shores of sheltered Pearl Harbor made the peninsula attractive for wet and dry agriculture and for aquaculture in the form of numerous fishponds. Irrigated pondfield agriculture, common throughout Hawai'i prehistorically and historically, dominated the *mauka* end of the peninsula. Three large fishponds or *Loko*: Loko Eo, Loko Hanaloa, and Loko Ulumoku, all filled in, were located in the project area (Figure 3).

As evinced by legends and historic accounts, fishponds were valuable features of the Hawaiian agricultural complex. A recent study by Dr. Ross Cordy of the State Historic Preservation Division places the number of fishponds in the Waikele *ahupua'a* at twenty-three (Cordy ms. in prep.). Kamakau describes fishponds as an important

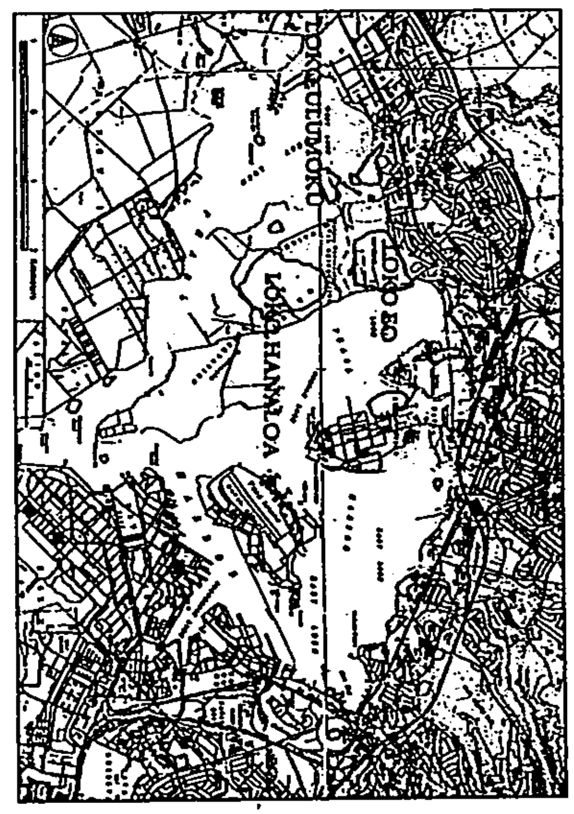

Figure 3. Traditional Hawaiian Fishponds in the Vicinity of the Project Area (Map produced by the State Historic Preservation Division).

economic aspect of the land (Kamakau 1994). The production of these ponds was reserved for consumption by *ali'i*, thereby enriching the wealth of the local *konohiki* (minor *ali'i*, who served as overseer or overlord) responsible for their building and maintenance, and of the *ahupua'a ali'i* in general. The importance of fishponds is reflected historically by the number that were awarded during the Great Mahele.

Constructed of coral boulders and cobbles, fishponds required cooperative labor to build and maintain, and certain ritual sacrifices and special materials for *makaha* (sluice gates) to make them productive. Fish commonly found in fish ponds included *awa*, mullet, *awaawa*, *kaku*, *aholehole*, *oopu*, shrimp, eel and other quiet water species (Wyban 1992). As these ponds silted in through shoreline progradation, other fishponds were built onto the seaward walls resulting in multiple fish ponds with their accompanying plethora of names.

2.1.1.1 Waikele *Ahupua'a* McAllister recorded two *heiau*, reported to be destroyed, in the *mauka* portion of Waikele adjacent to the peninsula. Mokoula Heiau (Site 127) was located west of the main road in Waipahu at the edge of a 50-ft. bluff projecting into the rice fields. Hapupu Heiau (Site 129) lay further *mauka*, probably closer to Honouliuli. Early accounts suggest that Hapupu Heiau was the scene of the massacre of Chief Hao, his priests, and attendants by the order of the paramount chief of O'ahu (Sterling and Summers 1978).

Waikele figures prominently in legends of water and springs, and the abundance of agricultural features on the otherwise dry E'wa Plain. The following two legends relate the naming of Waipahu Spring (*wai* - water, and *pahu* - burst, explode) (McAllister's Site 128) from the recovery of a tapa anvil lost in a spring located at Kapukanawai-o-Kahuku on the Windward side of O'ahu, which made its way to Waipahu Spring:

> "On the way down Lahilahi (Webb) pointed to Waipahu the outlet of a subterranean stream. Once its waters gushed forth and poured into Poniohua stream below. . ." (HEN 1258 in Sterling and Summers 1978).

> "...From that hole came a tapa anvil from Kahuku and found by a woman of Waikele. The woman who owned the anvil came from Kahuku to seek it and found it here. . ."(Ka Loea Kalaiaina 1899 in Sterling and Summers 1978).

The portion of Waikele *ahupua'a* located on the peninsula is also known for a legendary cave where a chiefess named Kaahupahau, in the form of a shark, came to bathe and be fed (Sterling and Summers 1978). Another legend recounts the tale of Kamaikaahui, a man with the mouth of a shark below his neck:

> "Kamaikaahui was driven from Maui when the people discovered it was he who was following the people to the water and killing them. He would take the form of a shark and catch them ...When he was driven from Maui he changed into a shark and swam to O'ahu where he landed at Waipahu in Waikele. . ."

Ali'i traveling the Waianae Trail (Hammatt 1988) across Waipio and Waikele to E'wa often stayed in Waikele near Honouliuli. The area was also known for the location of a chiefly burial cave (Sterling and Summers 1978). Additionally, the rich lands of the peninsula provided resources for the *konohiki* and to the *ali'i*:

> "Now, in those days, the people made tapas, mats, farmed and fished and brought some to the konohiki for himself and for the ruler. When the chiefs travelled (sic) there was no need to carry supplies, for when they came to the konohiki's place, they had all they needed and more...People did the tilling of the konohiki lands, a day each week was set apart for that purpose." (Pukui 1939, as cited in Sterling and Summers 1972:29).

Waikele *ahupua'a* was well known for its aquaculture pursuits, as evidenced by the numerous fishponds present in the area (Map William Wall 1889). Other fishponds in the vicinity of the project area include: Loko Ulumoku, Loko Manini, Loko Kupelo, Loko Kealialia, and Loko Auiole (LCA Awards). Additionally, the northern edge of Loko Hanaloa, which is bisected by the Waikele/Waipio *ahupua'a* boundary, is located within the project area. These fishponds figured prominently in the legends and historical accounts of the area:

> "...let us go to Puhilaka (Tame Eel Point). The point was named for the feeding of a certain eel...The hole where it was fed was in at Hanaloa... Hanaloa was their native land..." (Ka Loea Kalaiaina 1899 in Sterling and Summers 1978).

> "After resting we decided to go down to Lahilahi's (Webb) old house near Pouhala, an important fishpond in the olden days...What a wonderful place it must have been with a fishpond and the sea in front and taro patches at the back door." (Pukui 1939, as cited in Sterling and Summers 1972:29).

2.1.1.2 Waipio *Ahupua'a* Waipio *ahupua'a* is also quite prominent in legends and historical accounts as a place of abundance:

> "From Waipio in E'wa and from some lands in Hawai'i came tapas made from Mamaki bark and 'ouholowai tapas from Olaa and soforth (sic)." (Ii 1959).

> "We rode and reached Waipio...the bubbling waters of the pond of Eo rippled on the left. There a recollection came of the bundles of

fat eel from that place and the delicious mullet of Makahanaloa. It was delicious clean..." (Kuokoa, 1899 in Sterling and Summers 1978).

"Eo-large fishpond in E'wa, well known for superior flavor of fishes." (Sterling and Summers 1978).

A *heiau* recorded by McAllister (Site 122-destroyed) was located in Halaulani, just *mauka* of the peninsula. Another site (Site 124) was recorded as a dwelling place for *ali'i* formerly located on an east point of Waipio Peninsula, known as Lepau (McAllister 1933). This *ahupua'a* was popular with visiting *ali'i*, especially during the annual Makahiki procession, and as a point of departure for sea travel:

> "Many people followed the procession on it tour over the land, among them the boxers, and all partook of the foods that were contributed by the people of each place. Ii followed the procession of the gods as far as Waipio in E'wa, and thus learned the customs of the Makahiki period." (Sterling and Summers 1978).

> "...the king [King Kamehameha I] became sick while he was living with the chiefs at Halaulani, Waipio, E'wa. The king recovered under Papa's treatment and went home by canoe. He boarded the canoe at Miki in Waikele (so it was said) and returned to Honolulu." (Ii 1959).

A large area of the *mauka* portion of the peninsula was awarded to Papa Ii during the Great Mahele. An attendant to King Kamehameha, it was said he received his property directly from Kamehameha. It is the birthplace his son, John Papa Ii, a well-known chronicler of Hawaiian history:

> "He (John Ii) was born in Kumelewai, Waipio in E'wa on the 3rd of August or H'ilinehu in the Hawai'i calendar, I 1800. It was on the land of Papa Ii, owner of the pond of Hanaloa. He received his property from Kamehameha as did others who lived on the *ahupua'a* from the time of Nu'uanu..." (Ii 1959).

2.1.2 Historic Land Use

2.1.2.1 Land Ownership and Use The Land Commission Awards (LCA's) for Waikele and Waipio *ahupua'a* have been extensively reviewed by Cordy (ms. in prep.; McDermott 1992). This research is discussed below the awards for the portions of the *ahupua'a*'s within the project area, and to discuss the general land use prior to sugar cane cultivation.

During the land division (the Great Mahele) of the 1840's, several parcels located at the *mauka* end of the peninsula were awarded as *'ili* for homesteads and agricultural *mo'o*

with their integral *lo'i*. These lands were generally claimed by commoners, and often included *mo'o* (wetlands) on the floodplain and *kula* (drylands) for houselots in upland areas within the *ahupua'a*. *Mo'o* plots ranged in size from 1 to 4 acres, with spring fed canals as the main source of irrigation. One of these canals is extant north of the project area, extending east to west between the City and County Incinerator facility and Awanei Street.

Only commoner awards were granted on the floodplain. Four awards located within two *'ili* of the Waikele *ahupua'a* are found within the project area (LCA 10184, 1712-C, 127, and 1597). The awards to Nu'uanu (1712-C) are not contiguous, but lie in two *'ili* - Auiole and Kaeleku (LCA:5:22, Ap. 1, Ap. 2). The award to Namahana (10184) is also located within the *'ili* of Auiole (LCA 10:647). Another award (1597) is located in the *'ili* of Mapuna [Kapuna] (LCA 5:14, Ap.1, Ap. 2). The *'ili* of Auiole covers a large area in northwestern portion of the project area. It includes a large *kula* area extending to the coast of the peninsula (the *kula* o Miki), *mo'o* and a large fishpond, which may be a portion of Loko Ulumoku, though this cannot be verified.

The *'ili* of Auiole was one of six held by Namakeha, a member of the Council of Nobles in 1845. He controlled more *'ili* than any other chief in Waikele (Cf. Barrere 1994:470-1). One of the Nu'uanu awards in this *'ili* is for a houselot (Kula o Kahiena in Kapima) identified as a "garden in pasture" by the Native Testimonies (9:274-5). The Namahana award also lies in the *'ili* of Auiole. It is described as containing a large *kula* called Kula o Miki and may have included a fishpond, though this is unclear from the grant maps. The last grant within the project area is a fishpond, Loko Kahakuohia (LCA 127) granted to William Jones.

The *'ili* of Kaeleku contains the second Nu'uanu grant described as irrigated taro lands, or *mookalo*, containing four taro patches, and the Kaihumua award (LCA 5:14, Ap.1: Ap.2) consisting of a houselot (*kahuahale*) on the edge of Kula o Miki and *mo'oaina* (similar to *'ili*) in pastureland. Namakeha also owned this *'ili*.

Commoners were awarded *mo'o* and houselots on the floodplain of Waipio *ahupua'a*. *Mo'o* were generally four acres in size, and houselots were separated from taro lands, sometimes in separate *'ili*. There are four awards in the Waipio *ahupua'a* within the project area (LCA's 8241-E, 6076, 5606, and 10613). The award to Kapule no Kaipo (LCA 8241:5:24) consists of a houselot located near the shores of Loko Eo. The award to Humehume (LCA 6076:4:106) is described as containing a houselot, *mo'o*, and sand dunes. The grant to Kapela no Kamoikehuali'i (LCA 5606:4:99) is a houselot adjacent to the Humehume houselot. The last grant located within the project area is that awarded to A. Paki (LCA 10613:). All of these awards lie within the *'ili* of Hanaloa owned by Papa Ii, attendant to King Kamehameha I.

2.1.2.2 The Sugar Cane Industry in Hawai'i The sugar cane industry has been recognized as having a profound historical, environmental, and social impact on the economic and cultural development of Hawai'i. The growing, harvesting, and processing of sugar cane resulted in large plantations and plantation towns populated by immigrants from a variety of ethnic and cultural backgrounds. This cultural diversity is the basis for the multi-cultural milieu of modern Hawai'i. With the recent abandonment of cane lands and conversion to urban development and housing, the study of the "culture of cane" has been recognized as archaeologically and historically significant to the history of the islands. Recent archaeological, ethnographical, and historical work has been directed at recording this aspect of Hawaiian history (Barrera 1986; Riford 1986; Goodman et al 1991).

Eight thousand tons of sugar from the Oahu Sugar Company (OSC) fields at E'wa were harvested in 1899 (Yardley 1981). Parcels on Waipio Peninsula were leased by OSC early in the 20th century for sugar cultivation. An excerpt of the leasing agreement with landowners on the peninsula is offered below:

<u>The Lands of The Oahu Sugar Co.</u>

> "When this company was formed in 1897 negotiations were entered into with the Oahu Railroad & Land Co...the Robinson Estate (owning the lands Hoaeae and Aulii except Hanohano and Koalipea belonging to M.P. Robinson privately);and the John Ii Estate (owning the land Waipio), all of which agreed to lease their lands...jointly as an undivided interest at a rent of 1 ½%. . . Any other lands controlled by the Oahu Railroad and Land Co. situated outside of the sphere of interest are subject to special leases...such lands belonging to the John Ii Estate are the Fields #6 and #7. . . the Peninsula (Fields #32, 33, and 34)." (Oahu Sugar Co. Water and Land Lease)

The John Ii Estate leased a total of 885 acres for a term of 20 years from October 24,1899 to October 24, 1919 for $10,725 per year (Lease #2, Schedule 8, Oahu Sugar Co. Lease Agreement, 1904). Additionally, the Ii Estate leased all the water rights under it control for a period of 58 years, beginning March 31, 1899 to March 31, 1957 for $8,000 per year (Lease #3, Schedule 10, Oahu Sugar Lease Agreement, 1904). By the end of World War II all lands on O'ahu available to sugar were in cultivation. In the following 35 years, production increased from 40,000 tons in 1922 to 70,000 tons in 1947, the growth due entirely to improved agricultural practices (Simplich 1974). Oahu Sugar Company (AMFAC) ceased sugar cane operations in 1992.

In order to process sugar cane, the Oahu Sugar Company constructed a large processing plant around which the town of Waipahu grew. The land for the plant was also leased from the Ii Estate for a term of 60 years "for 1 ½% of net return of all sugar and

molasses production from cane grown on these lands; the rent not to be less than $5,000 per year..." (Schedule 19, Oahu Sugar Company Lease Agreement, 1904). The Waipahu Mill processed sugar cane grown on the Dillingham and Campbell estates land of the E'wa plain, and from the *mauka* plateaus of the Waikele, Waipio, and Waiawa *ahupua'a's* (Riford 1986; Goodman et. al 1991).

2.1.2.3 The Hawaiian Sugar Irrigation System A complete description of the components of the Hawaiian Sugar Irrigation System as it applies to upland cultivation has been described in Goodman et al. 1991. In the *mauka* fields, pressure needed to be maintained in order to pump water up elevation to the reservoirs. This was achieved via an elaborate system of closed metal and wood siphons, large pumping stations, and large reservoirs which drew the water from artesian wells on the E'wa plain and from large ditches which tapped the Koolau dike aquifer such as the Waiahole and Ahrens Ditches. Water was then distributed to the fields gravitationally through watercourses, which lay perpendicular to the slope (Goodman et al 1991). Additionally, a complex transportation network of narrow gauge railroads, mule cars, dirt roads for wagons, and open flumes across gulches were used to get the harvested cane to the Waipahu mill.

> "...In general water was supplied to the lines by "watercourses" drawn at right angles...to the cane rows. These watercourses...secured their supply of water from larger ditches, which crossed the fields on flat grades..." (Maxwell 1923).

2.1.2.3 Sugar Cultivation in the Waipio Peninsula The components of the Hawaiian Sugar Irrigation System used in the upland *mauka* areas of E'wa Plantation include the following:

- Main Ditches
- Straight ditches
- Level Ditches
- Watercourses
- Furrows

Successful cultivation of sugar cane on the Waipio peninsula and the lower *kula* lands of E'wa below the 200' elevation was quite different than the cultivation practices utilized on the plateaus in the *mauka* portions of the *ahupua'a's*. First, these fields were irrigated with wastewater from the Waipahu Mill (see Figure 2 for the relationship of the Waipio Mill to the project area). Wastewater not used in irrigation was dumped into Pearl Harbor, and artesian water was used during those periods when the mill was not processing (Hugh Morita, personal communication 1998). Second, the peninsula fields were situated closer and at a lower elevation to the mill, therefore the forced pumping strategy necessary in the uplands (and the accompanying infrastructure to distribute water) was unnecessary on the peninsula. Wastewater was distributed to lowland fields via a gravity system aided by small pumping stations located near small, strategically placed reservoirs and settling ponds. Finally, because lowland fields were laid out on flat topography, water was delivered gravitationally directly from the distribution ditches to furrowed fields. This delivery system did not require straight ditches, level ditches, or water courses designed to overcome sloping topography.

A brief description of the components of the irrigation complex on Waipio is presented below, including a general description of the component, construction technique, and the function or purpose within the system.

- Pipelines
- Distribution ditches
- Outlet ditches
- Settling ponds
- Mud ponds
- Chutes
- Furrows

Pipelines. Pipelines conveyed wastewater from the mill, distributing it to smaller pipelines for each field. The primary wastewater pipeline is a 36" concrete siphon pipeline connecting Waipahu Pump #7, located at the mill, to the field pumping stations.

Distribution Ditches. These are lined and unlined "open" ditches constructed atop raised berms. Other ditches are lined with 36" half round iron and wooden siphons, or constructed of worked basalt blocks and mortar. They are "C" shaped in cross section, and extend from reservoirs and pumping stations on raised berms or along dirt cane hauling roads.

Outlet Ditches. Unlined ditches approximately 20 ft. wide by 10 ft. deep to convey settled wastewater to booster pumps and fields located *makai* of the project area.

Settling Ponds. These ponds were constructed by building high dikes around reservoirs or in fallow fields. Approximately 7 to 10 acres in size, they range in depth from 10 to 15 feet. These ponds have been named, and include Thompson Pond, Triangle Ponds, Opala Ponds, and Duck Ponds.

Mud Ponds. These ponds are similar to settling ponds. They are used to store and dry exceptionally muddy or organically saturated wastewater. Because of the high nitrogen

content, soil from these ponds was not used in sugar cultivation, but excavated and removed from the pond.

Chutes. Chutes are outlet controls to regulate outflow from settling ponds and regulat the depth if mud in mud ponds. Generally constructed of wood, with wooden flow gates, they could be operated by hand from wooden platforms that extended over the ponds near the outlets.

Furrows. Furrows are the smallest distributionary unit in the field system. Unlike upland fields, where furrows crossed the fields at right angles following the fall of the slope, furrows in the lowland fields are plowed linearly following the length of a flat field.

Miscellaneous Components. There are two pumping stations still extant in the northwest portion of the project area near a complex of fields, settling ponds, and mud ponds. Unlike the massive stations used to pump water uphill, these small stations were used to distribute water through the system either to the ponds or to the main distribution ditch.

2.1.2.4 Phases of Sugar Cultivation on Waipio Peninsula

Sugar cultivation on the Waipio peninsula can be divided into two distinct phases. Phase I occurred during the late 19th century through 1976. Phase II occurred from 1976 until abandonment of the property in 1992.

Phase I sugar cultivation reflects the traditional method of cultivation for most lowland fields on the E'wa Plain, though the fields on Waipio Peninsula utilized wastewater rather than artesian water for irrigation. Former *lo'i* fields in the *mauka* portion of the peninsula were filled, plowed, and planted in sugar cane using wastewater pumped directly from the mill to small reservoirs, though artesian well water was used during those periods when the mill was not processing (Hugh Morita, personal communication 1998). The water was then released directly into the furrowed fields via gravitational flow.

Phase II cultivation began in 1976 as a result of compliance with the Clean Water Act. Prior to passage of this legislation, wastewater not applied to the fields was dumped directly into Pearl Harbor. Clean water standards curtailed all dumping of waste products into the harbor. In order to utilize this water resource, and comply with the clean water standards, mud ponds and settling ponds were constructed in the western half of the project area (Map OSC document). Prior to distribution to the fields, wastewater was directed into settling ponds, and heavier organic wastewater was directed to mud ponds. Clean or "clarified" water was drawn from the tops of the ponds and from small reservoirs and transported an outlet ditch system to open lined ditches for distribution to the fields. Once a pond had filled with mud, the wastewater was diverted to nearby ponds. This resulted in the landforms present in the project area today (Oahu Sugar Company ms). Many of the ponds and fields were constructed atop filled in fishponds.

Mill wastewater contained high amounts of sugar, runoff, organics, and mud associated with processing, resulting in a high nitrogen content. A steady application of nitrogen spurs rapid growth but prevents ripening, thus sugar cane grown in these fields post-1976 was used as seed cane for other parts of the plantation. Had cultivation continued on the Waipio Peninsula the next phase of irrigation would have been a drip irrigation system (Hugh Morita, personal communication 1998).

The area was also utilized by the Waipahu mill to dump dry waste, primarliy ash and slag from processing. Loko Ulumoku Fishpond was used for this purpose, and later by the City and County of Honolulu as a landfill for waste from the nearby incinerator (Oahu Sugar Company ms).

2.1.2.5 The OR&L Railroad [State Site 50-80-12-9714]
In the 1870's Benjamin F. Dillingham proposed building a narrow gauge railroad to open up areas of O'ahu to agriculture, to transport agricultural products from these plantation to market, and to carry passengers from Honolulu to the northern and western shores of O'ahu. To meet this goal, the Oahu Railway and Land Company was organized on February 4, 1889. Designed by Charles H. Kluegel, the first track was laid in August 1889, extending from Honolulu to Kahuku by January 1, 1899. The OR&L carried the first sugar crop of 2,849 tons harvested from Dillingham's E'wa Plantation. By 1922 the OR&L carried 1,400,000 passengers annually.

By 1934, the OR&L boasted a total of 174.96 miles of active track. The post world War II influx of automobiles, buses, and trucks drastically reduced the need for passenger transportation, and on December 12, 1947 all operations outside Honolulu ceased. A 6.5 mile spur extending from the Waipahu sugar mill down the Waipio Peninsula was initially used to haul harvested cane, but was purchased by the U.S. Navy to haul munitions and supplies to the facilities at Waipio Point. This segment was ceded to the State of Hawai'i after a heavy flood in 1954. The right of way for the OR&L was placed on the National Register of Historic Places in 1984 (National Register of Historic Places Inventory Form).

2.1.2.6 Military Use
Parcels on the Waipio Peninsula were condemned by the U.S. Navy beginning in 1909 and continuing through the early 1950's (personal communication R. Darlington,

Properties Division, NAVPACFACENGCOM, 1998). During World War II the *makai* portion, including Waipio Point, was used as an amphibious training base with the accompanying facilities, LST's, and infrastructure to support the base. The remainder of the property was leased to OSC for sugar cultivation. Today, the Navy maintains a reservation on the peninsula closed to public access as a buffer for the blast zone for the Lualualei Naval Magazine located at Puuloa on the E'wa Plain (personal communication R. Darlington 1998).

2.1.2.7 State, City, and County Use
In the 1960's, the Ted Makalena Golf course was constructed atop Loko Eo Fishpond. A City of Honolulu Waste Incinerator was constructed on the site of the OR&L Waipahu Station. A City of Honolulu waste incinerator, and a Honolulu Police Department training facility were constructed west of the golf course on the northern portion of the peninsula. The Federal Communication Commission (FCC) occupies a parcel between the golf course and the waste incinerator, where it maintains a radar array designed to intercept, track, and record signal anomalies not associated with regular signal traffic.

2.2 PREVIOUS ARCHAEOLOGICAL RESEARCH

There is a dearth of previous archaeological investigations on the peninsula or immediately *mauka* adjacent to the project area. A reconnaissance survey and monitoring of the construction of 7.93 acre Pupu'ole Park (TMK 9-4-01) was conducted in 1989 by Nagaoka and Davis (1989). The project area lay between the Waipahu Intermediate School and the raised railroad right-of-way (ROW) for the historic OR&L railroad (State Site 50-80-12-9714) within the filled area of Loko Pouhala fishpond. No sites were recorded.

The remainder of archaeological work has been conducted in nearby Honouliuli *ahupua'a*, and in the upland gulches and plateaus of Waikele and Waipio above Waipahu town, where access and isolation due to topography and military ownership has facilitated preservation (Barrera 1985; Corbin et al, 1996; Dicks et al, 1987; Riford 1986; Spear 1993; Wolforth et al, 1998). Briefly, two habitation sites (Sites 3318 and 3320) and two fishponds (Sites 3322 and 3323) were recorded on the Honouliuli peninsula on the shores of West Lock at the West Lock Estates and Golf Course project area (Wolforth et al 1998).

3.0 METHODS

Two archaeological reconnaissance techniques were used during the Phase I survey: pedestrian and windshield survey, and subsurface survey via mechanized trenching. Two archaeologists performed the pedestrian and windshield surface survey and three archaeologists performed the subsurface reconnaissance.

A single parcel containing Loko Ulumoku Fishpond was surveyed using pedestrian survey. Areas where extant fishpond walls might still be accessible were walked,, primarily around the shoreline of West Loch. General transects across the fishpond area were unnecessary due to total burial of the historic surface by up to 3 m. of ash and debris from the Waipahu mill. Cultural features were flagged for consultation with the Principal Investigator.

Two parcels of land were surveyed from the vehicle. The first parcel was an area east of but adjacent to Loko Ulumoku where other fishpond have been recorded (Cordy ms. in prep). The remainder of the project area constituted the second parcel. This was examined via windshield reconnaissance from the many historic and recent dirt roads present in the area. Cultural remnants and anomalies were visually inspected, flagged, photographed in black-and-white, mapped where necessary, and described. These remnants consisted of features related to the cultivation of sugar cane in the 19^{th} and 20^{th} centuries. Features whose function or cultural affiliation was not immediately evident were flagged for inspection by the Principal Investigator.

The remnant right-of-way of the 6.5 mile spur of the OR&L railroad was also surveyed. Only one short portion of the original raised ROW is extant. This is located on the grounds of the Oahu Sugar Company Cultural Park. Where accessible the former location of the ROW and other features related to the railroad were documented with black-and-white photographs. This mauka portion of the peninsula has been heavily modified by urban development. Residences, businesses, schools, churches, city services in the form of an incinerator, a police training facility, and a wildlife preserve, and the Oahu Sugar Company Cultural Park all impact on this portion of the historic railway.

Finally the alignments of the Waipio Point Access Road and the Waipahu Depot Road were also inspected for archaeological resources and the potential of containing subsurface archaeological deposits.

A program of subsurface testing was also conducted in the project area with the aim of locating and sampling prehistoric cultural deposits, including fishpond deposits. This subsurface testing was accomplished with a mechanical backhoe (CASE 540-K), which was operated by Paul Cleghorn.

Representative stratigraphic profiles were drawn and a detailed black-and-white photographic record was made. Stratigraphic descriptions were made in conformance with U.S. Soil Conservation Service and Munsell Color Notation references.

No excavation units were left open at the end of the work day, so no safety hazards were presented to non-project personnel.

4.0 FIELD RESULTS OF RECONNAISSANCE SURVEY

4.1 PEDESTRIAN AND WINDSHIELD SURVEY (Figure 4)

Pedestrian and windshield survey of the portion of the project area that contains Ulumoku Fishpond, Miki Fishpond, Kuaalau Fishpond, Aielole Fishpond, and Maaha Fishpond, and historic homesteads registered on the LCA's revealed no cultural remains. Loko Ulumoku Fishpond has been buried to a depth of 3 meters in ash, fill, and slag from the OSC mill. The remaining fishponds (Loko Eo and Loko Hanaloa)have been filled in and obliterated by the construction of reservoirs, cane fields, mud ponds, roads, and raised ditches related to Phase I and Phase II OSC operations. The southern wall of Loko Eo is extant, however, it forms a portion of the northern boundary of the project area (Figure 4).

Remnants of two small pumping stations associated with sugar plantation activities in the area were recorded in the western portion of the project area and the iron bridge, associated with the historic Oahu Rail and Land Company (OR&L), that spans Kapakahi Stream was inspected and photo-documented.

4.1.1 Stone Wall (Figure 5)

This feature consists of a wall of large to small rounded and sub-rounded corral boulders, cobbles and rocks mixed with fill from the cane fields. It forms a segment of the northern boundary of the project area extending east from the edge of the FCC property to the Waipio Access Road. The wall remnant stands approximately 1 m in height, and 2 m in width; the base of the wall is at the ca. 5.5 m elevation. This wall appears to be a recent wall, that is less than 50 years old.

4.1.2 State Site 50-80-13-5597 Sugar Irrigation Complex

Feature 1 1937 Pumping Station (Figure 6)

This feature is a pumping station located on the N/S trending dirt road near the settling and mud pond area. The base of the structure is constructed of formed concrete poured upon a foundation of worked basalt cobbles mortared into place. A small wooden three sided shed tops the foundation. A concrete plaque with the date "May 1937" is located on the southern side of the foundation. Mr. Hugh Morita informed us that this pump station injected deodorants into the waste water to counteract the pungent smell of the decomposing organic matter (personal communication May 1998).

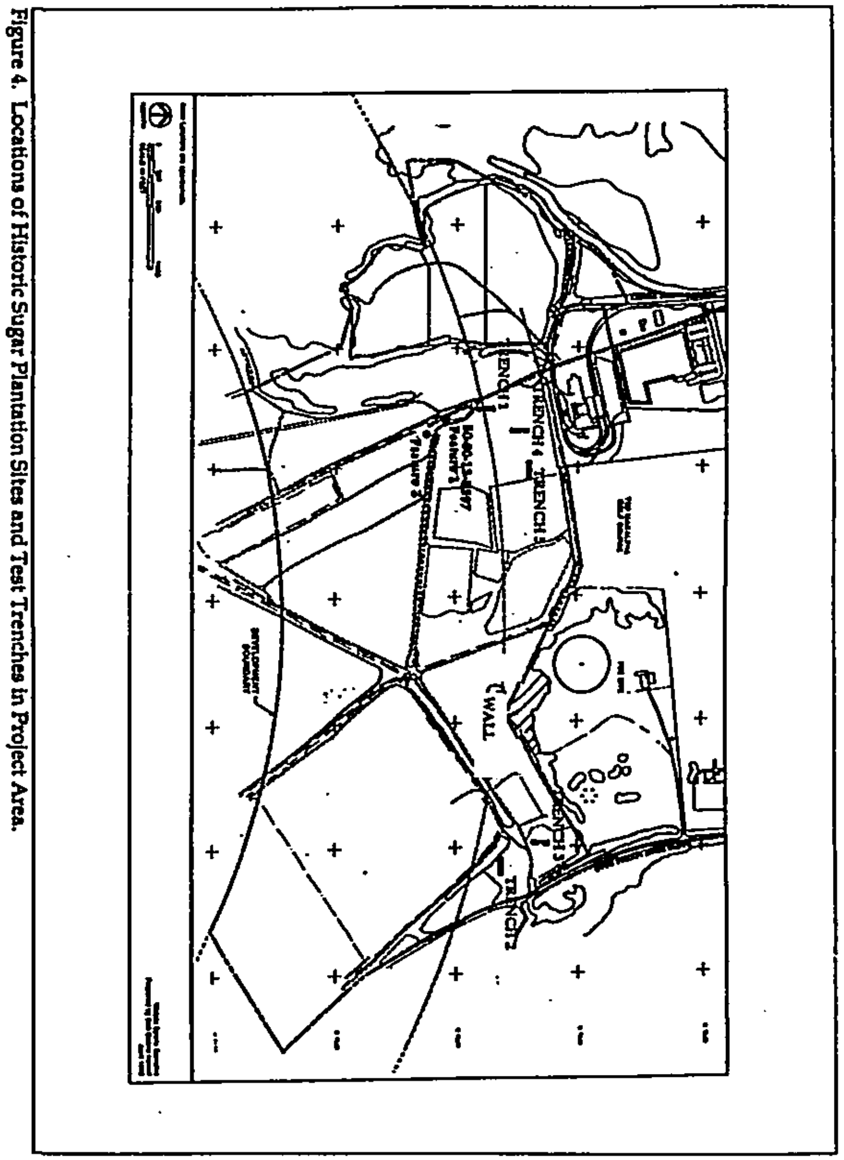

Figure 4. Locations of Historic Sugar Plantation Sites and Test Trenches in Project Area.

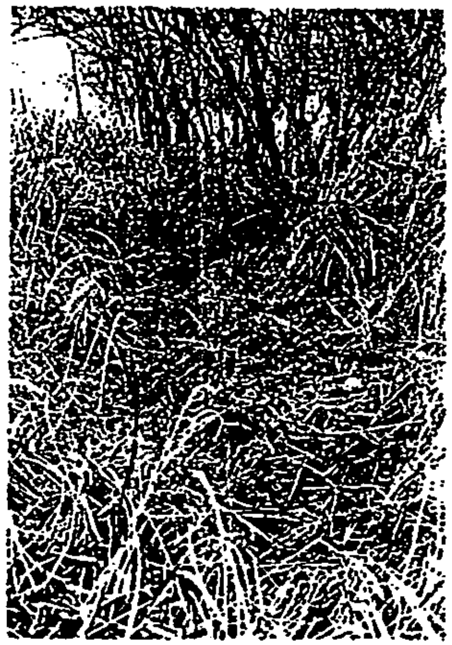

Figure 5. Stone Wall (Site 50-80-09-123).

A system of lined ditches connected to two pipes which lay beneath this feature extend N/S from the northern side of the feature. These lined ditches are constructed of three courses of worked basalt with mortar topped by poured concrete. Notches in the flume walls immediately beyond the pit and pipes mark the seats for the two wooden gates, which controlled the amount and pressure of water flow.

Feature 2 1919 Pumping Station (Fig. 6)
This feature is located approximately 30 m. south of the 1937 structure at the northern tip of Thompson Pond. The structure is square, built of hand pressed red brick laid in Flemish courses. The structure has been extensively modified by two concrete additions placed against the northern side of the feature. The larger concrete addition provides support for the large pipe extending from Feature 2. The other addition holds a vertical remnant of metal siphon. The name "Elia Crabbe" is inscribed in the cement atop this addition. The top of the structure is roofless, and the tops of the walls are finished with mortared worked basalt overlying a layer of rebar. A concrete plaque near the top of the feature is imprinted with January 19, 1919.

The structure is the terminus for a complex of metal and concrete pipes and lined distribution ditches. The largest pipe is a 36" concrete pipe extending from Feature 1 to the north and terminating at one of the concrete additions to the structure. Two 6" metal pipes bypass the structure immediately south. A complex of lined ditches constructed of formed concrete overlying two courses of mortared worked basalt join the large ditch which extends N/NW under the 36" concrete pipe. This ditch terminates at a pipe which extends east under the road. An outlet junction lies approximately 5 m. to the west and upslope from the structure. This ditch is lined with a metal half round siphon, and extends south to the Opala Mudponds and Duck Ponds settling ponds.

4.1.3 State Site 50-80-12-9714 OR&L Spur Right-of-Way (ROW)
Information regarding this historic railroad system can be found in the National Historic Register Form on file at the Hawai'i State Historic Preservation Division. The ROW for the spur is within an existing easement and extends from the site of the former Waipahu Station to the Waipahu processing mill, however only one short portion of the original raised ROW is extant. This is located on the grounds of the Oahu Sugar Company Cultural Park. The majority of the former ROW lies in the back yards and beneath housing in a small subdivision between Farrington Highway and the Incinerator facility. A single iron bridge spanning Kapakahi Stream, and an access tunnel extending under Farrington Highway are the only remaining features of the railroad. Figure 8 shows the locations of these two OR&L features.

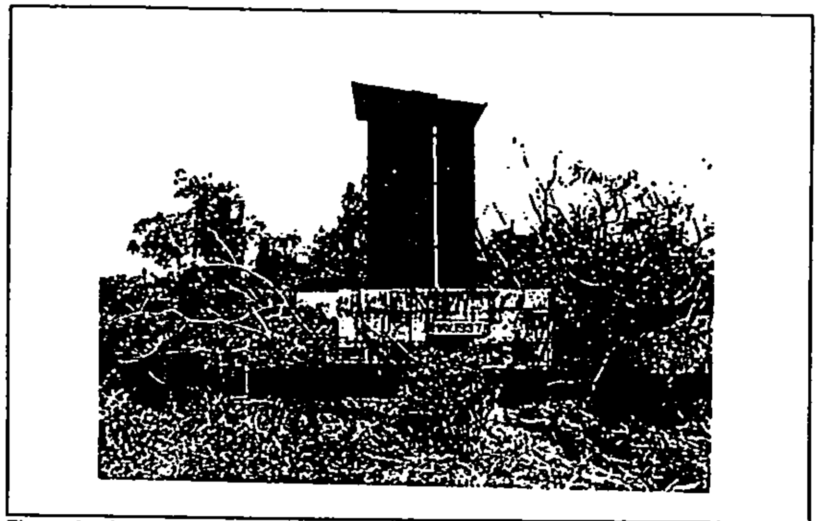

Figure 6. 1937 Pumping Station (Site 50-80-13-5597, Feature 1).

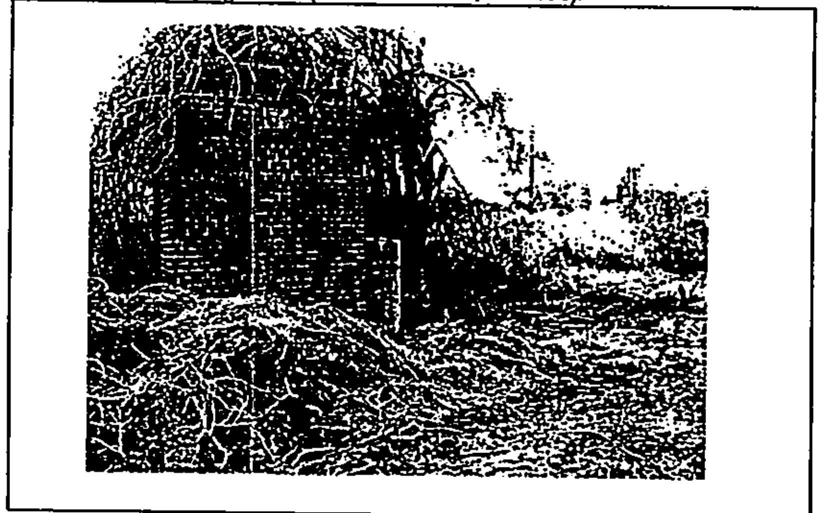

Figure 7. 1919 Pumping Station (Site 50-80-13-5597, Feature 2)

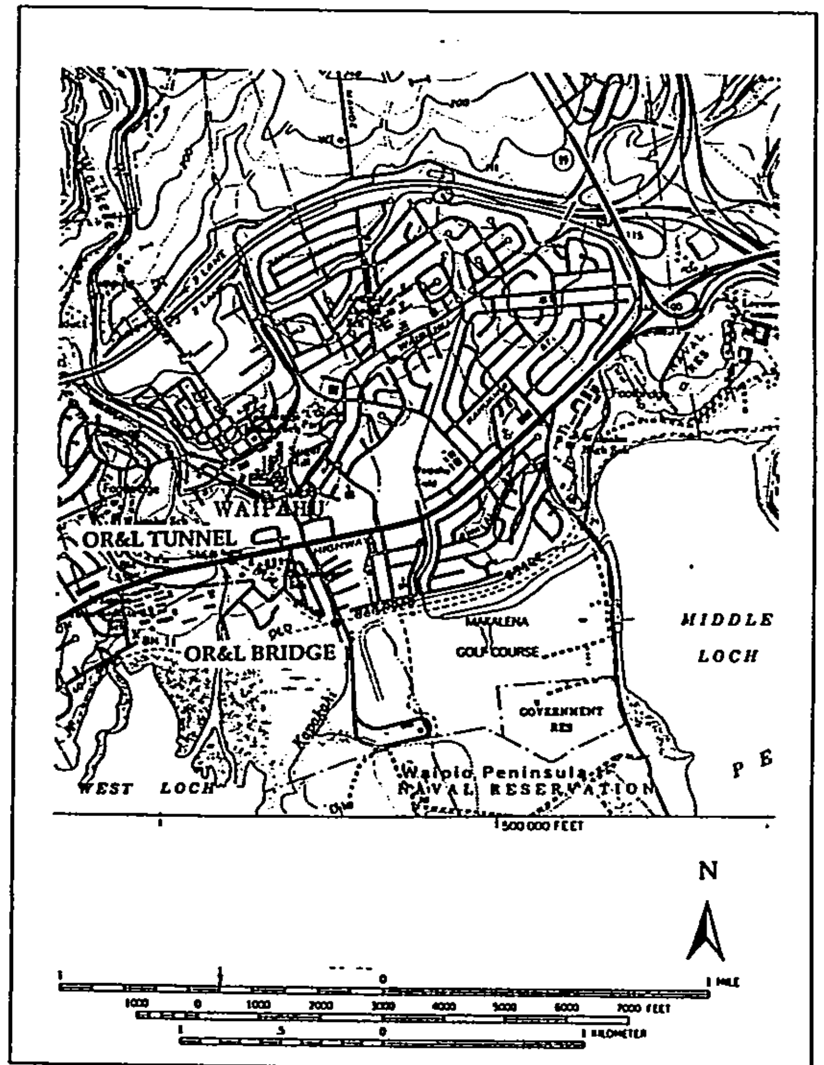

Figure 8. Location of OR&L Tunnel and Bridge Features

The iron bridge that spans Kapakahi bridge was photo-documented (Figures 9 - 12). The bridge is in poor condition and its integrity has been severely compromised by the addition of numerous utility lines.

4.2 SUBSURFACE SURVEY

One purpose of the archaeological investigations in the Waikele Sports Complex project area was to attempt to locate the edges and/or interiors of the prehistoric fishponds that existed in the area. Due to the extensive historic landform changes for sugar cultivation only one surface remnant is extant, that of Loko Eo Fishpond. A series of 5 trenches were excavated using a backhoe in areas believed to have the highest probability of having remnant fishpond walls or soils (Figure 4). The results of this survey are presented below.

Trench 1 (TR1)
TR 1 was excavated north of the 1937 pumping station, perpendicular to the lined ditch that extends north from the station. Oriented 173 degrees north, the trench measured 6.0 m. in length by 1.2 m. in width. At 1.0 m. depth the 36" mill wastewater supply pipe was encountered at 1 m. and the trench was terminated. No stratigraphic profile was drawn of this trench because the soil appeared to be recent fill.

Trench 2 (TR2)
TR 2 was excavated in the eastern portion of the project area east of the main distribution ditch extending E/W across the southern end of the project area. The main distribution ditch roughly follows the former edge of Loko Hanaloa Fishpond, in an area not modified for Phase II cultivation. Oriented 32 degrees east, the trench measured 3.0 m. in length by 2.1 m. in depth. This trench was culturally sterile and revealed no deposits indicative of a fishpond. Five stratigraphic layers were recorded (Figure 13):

Layer I	Dark brown (7.5 YR 3/4) to dark reddish brown (5 YR 3/4) clay loam. Sticky and plastic. Very compacted with abundant rootletts. Abrupt, smooth boundary.
Layer II	Dark greyish brown (10 YR 3/2) clay. Sticky and plastic. Blocky. Contains abundant coral pebbles and small cobbles. Abrupt, smooth boundary.
Layer III	Dark yellowish brown (10 YR 3/4) sandy loam. Slightly sticky and slightly plastic. Blocky. Contains flecks of coral and limestone. Abrupt smooth boundary.

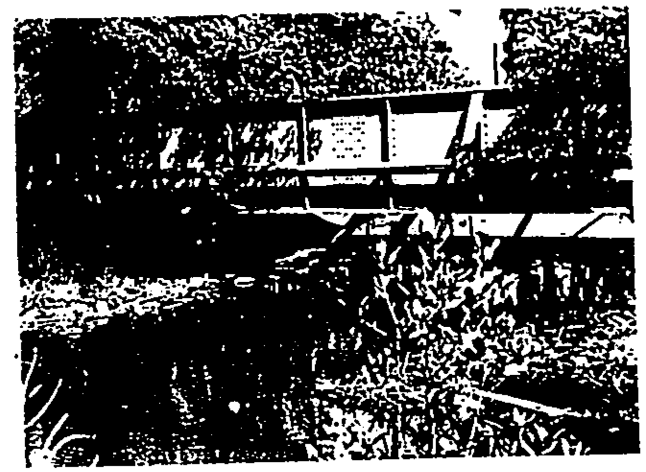

Figure 9. Kapakahi Stream Iron Bridge, view to the north (*mauka*)

Figure 10. Kapakahi Stream Iron Bridge, view to the south (*makai*)

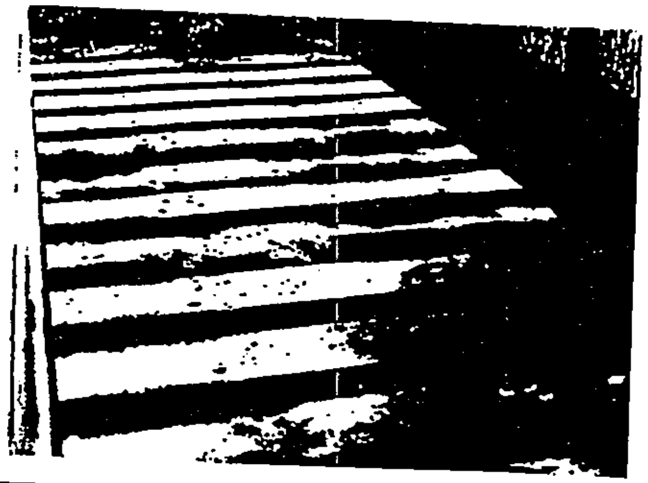

Figure 11. Kapakahi Stream Iron Bridge, Detail of Decking

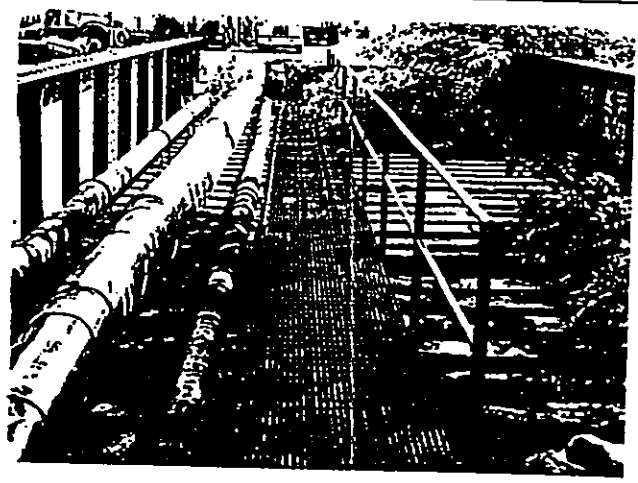

Figure 12. Kapakahi Stream Iron Bridge, Showing Utility Lines

Layer IV	Dark brown (10 YR 3/3) loam. Sticky and plastic. Blocky. Contains flecks of limestone. Abrupt, smooth boundary.
Layer V	Dark olive brown (2.5 Y 3/3) clay loam. Sticky and plastic. Blocky. Contains lenses of decomposing limestone. Base of layer not encountered.

Trench 3 (TR3)
TR 3 was excavated between the access road that extends E/W across the southern portion of the project area and the remnant wall of Loko Eo. Oriented 171 degrees north, the trench was 3.0 m. in length and 2.3 m. in depth. This trench was culturally sterile. Three stratigraphic layers were recorded (Figure 14):

Layer I	Dusky red (2.5 YR 3/4) to very dusky red (2.5 YR 2.5/3) clay loam. Sticky and plastic. Very compacted with abundant rootletts. Abrupt, smooth boundary.
Layer II	Yellowish brown (10 YR 5/4) loam. Slightly sticky and slightly plastic. Blocky. Contains coral and limestone, as well as pockets of organic material. Abrupt, smooth boundary.
Layer III	Light brownish grey (10 YR 6/2) clay. Sticky and plastic. Extremely hard and compacted. Contains limestone.

Trench 4 (TR4)
TR 4 was excavated on the floor of the Triangle Pond. Oriented 165 degrees north, the trench measured 3.0 m. in length, 0.8 m. in width, and 1.0 m. in depth. The karst substrate of the peninsula was encountered at 1.0 m. and the trench was terminated. This trench was culturally sterile and no stratigraphic profile was drawn.

Trench 5 (TR5)
This trench was excavated east of Trench 4 against the berm of the same Triangle Pond. Oriented 65 degrees east, the trench measured 3.0 m. in length, 0.8 m. in width, and 0.75 m. in depth. The karst substrate was encountered here at 0.75 m. and the trench was terminated. This trench was culturally sterile and no stratigraphic profile was drawn.

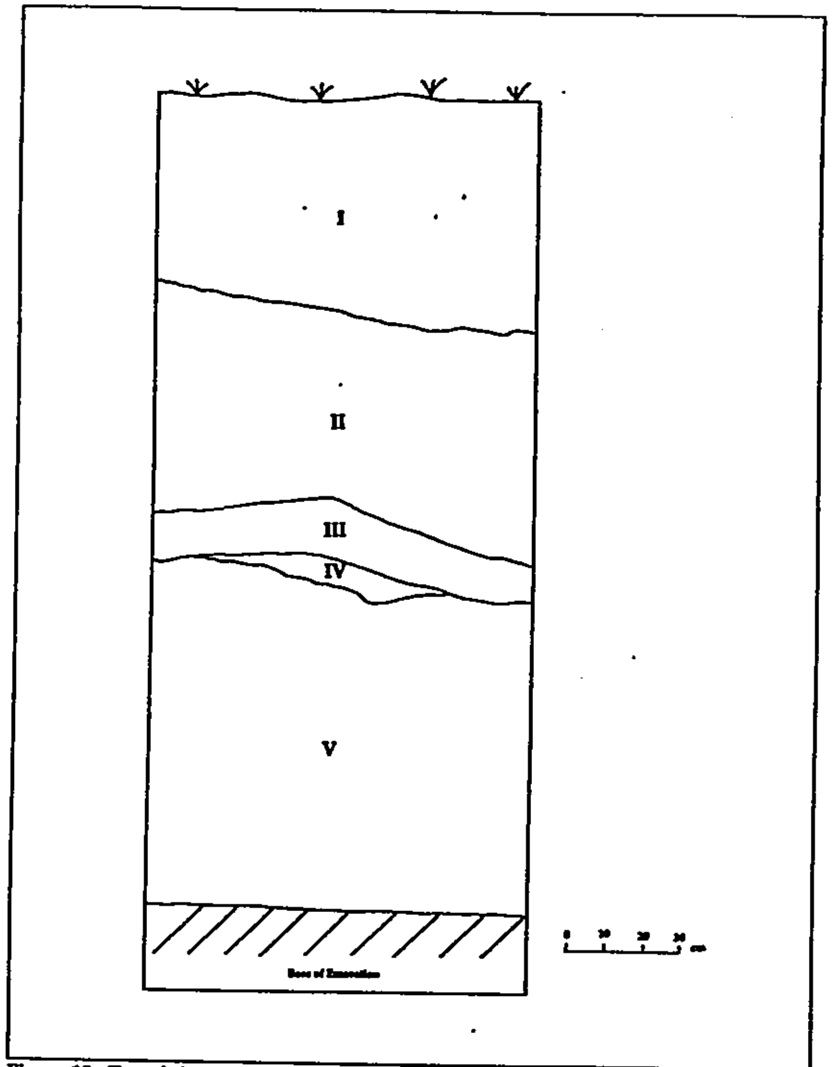

Figure 13. Trench 2 Stratigraphic Profile

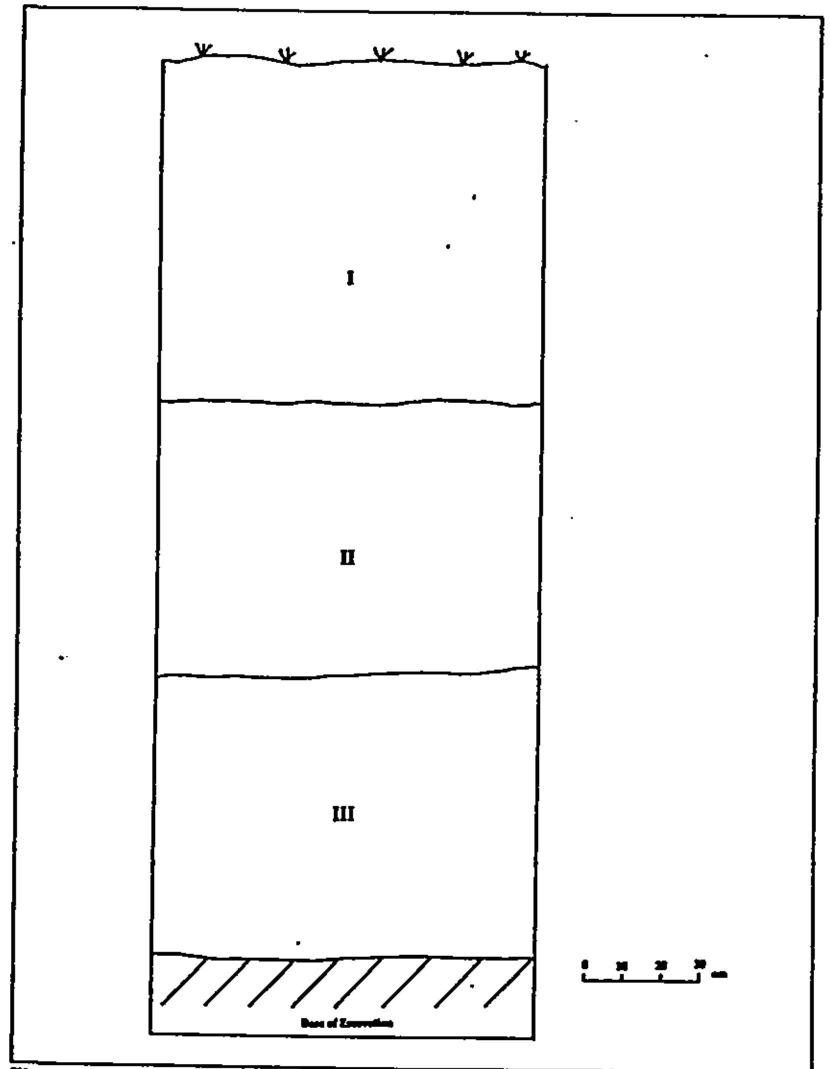

Figure 14. Trench 3 Stratigraphic Profile

5.0 DISCUSSION

Traditional information, from legendary sources and ethnographies, about the Waipio Peninsula, suggested that the area was rich in resources and attractive to the *ali'i*. The area had been modified considerably in traditional times by the creation of irrigated agricultural pond fields (*lo'i*) in the *mauka* portions of the peninsula, and the construction of numerous fishponds (*loko*) along the shore line. These fishponds were for raising fish that were reserved for the *ali'i* of the area. It was predicted at the onset of research that remains of these fishponds in the form diagnostic soils and remnant walls might be found buried beneath the more recent sugar cane plantation soils.

Archival research indicated that this area has been in sugar cane cultivation for about 100 years, and these activities involved massive land disturbances. These activities also changed traditional access to the area. Trails, if present, were probably obliterated and access was probably restricted. Access was further limited beginning in the early part of the 20th century when the U.S. Navy condemned much of the peninsula and used areas for training.

Research on the historic activities on the peninsula indicated that the area had been extensively modified and that there was little likelihood of any surface traditional archaeological features being present. However, it was still predicted that subsurface evidence of fishponds and possibly other cultural use of the peninsula may be present.

The surface survey of the project area confirmed the predictions that there would be little or no evidence of traditional Hawaiian use of the peninsula. However, the surface survey revealed abundant evidence of sugar cane cultivation practices on the peninsula, which have been documented in the present report.

The surface survey also found a coral wall along the northern boundary of the project area adjacent to the FCC property. We initially interpreted this wall to be a remnant of the Loko Eo fishpond because it was the only wall feature observed and it is located in the approximate location of where the Loko Eo wall should be. However, this interpretation has been re-evaluated because of two lines of evidence:

1) topographic survey data indicate that the base of this wall is located at the 15 to 18 foot elevation above mean sea level (amsl) and the top of the wall is at the 20 foot amsl elevation; and

2) the wall is located precisely on the northern boundary of the project area, with the *mauka* edge exactly on the property line between the former Oahu Sugar Company property and the FCC property.

These two lines of evidence suggest that this wall is a recent feature, that may have been constructed by Oahu Sugar Company. While it is improbable that this site is a remnant of the Loko Eo wall, that possibility still exists.

Subsurface testing with the aid of a backhoe proved futile. No cultural deposits were encountered and no remains of the fishponds that once existed here were encountered. It appears that the peninsula has at least 3.0 m of fill on it effectively burying any evidence of prehistoric use.

No resources that would appear to be Traditional Cultural Properties (as discussed in the National Preservation Act of 1966, as amended, Section 101) were identified in the project area. The likelihood of such properties is very low because traditional access to the peninsula has been so extensively restricted for the last 100 years.

6.0 SIGNIFICANCE ASSESSMENTS

The National Historic Preservation Act of 1966 (as amended) authorizes the Secretary of Interior to expand and maintain a National Register of Historic Places (NRHP) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. A property may be listed in the NRHP if it meets criteria for evaluation defined at 36 CFR 60.4:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) That have yielded, or may be likely to yield, information important in prehistory or history.

Three archaeological sites are present in the project area:

Stone wall

This site does not appear to be significant based on the data collected.

50-80-12-9714 (OR&L Spur Right-of-Way)

While this site has been listed on the National Register of Historic Places, the spur that is in the project area is not part of the National Register Site. The spur in the project area has been modified and no track remains. However, the berm is still present. This site appears to be significant for its information content and thus meets criterion "d" above.

The iron bridge that spans Kapakahi Stream is a remnant of the historic railroad. This bridge is in poor condition and has been modified over the years to facilitate

utility lines in the area. Because of its poor condition and lack of integrity, it no longer appears to be significant. The current condition of the feature has been documented by the current investigations.

50-80-13-5597 (Sugar Cane Irrigation Complex)

This site appears to meet criterial "a" and "d" above. This complex comprises important features of the Sugar Cane industry, which was a very important period in Hawaii's history. This complex also has the potential to yield information that is important to our history.

7.0 RECOMMENDATIONS

Three sites will be impacted by the development of the Sports Complex:

The stone wall appears to be a recent site. However, there is a possibility that this may be a remnant of the Loko Eo fishpond wall. It is recommended that if any land altering activities (e.g., trenching) taking place in the vicinity of this site ,that these activities be archaeologically monitored and that appropriate stratigraphic and construction information is recorded, and samples for specialized analyses (e.g., radiocarbon dating) be collected. The data collected from these investigations can be used to test the hypothesis that this wall is of recent origin.

The Sugar Irrigation Complex (Site 5597) is a remnant of an important industry that helped shape modern Hawai'i. Because the significance of these features is limited to their informational content, and that they have been adequately recorded, it is recommended that no further work is necessary for these sites. Construction plans call for this portion of the project area to be graded in excess of nine feet. Preservation of these sites does not appear to be warranted or feasible.

The spur of the OR&L railroad that is in the project area appears to be significant for its informational content only. Project plans call for trenching of the Right-of-Way for the placement of a water line. It is recommended that trenching activities be archaeologically monitored, so that constructional details of the railroad foundation can be recorded. This information recording will mitigate any adverse effect the construction activities would have on this site.

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APPENDIX G

WAIPIO PENINSULA SOCCER PARK
TRAFFIC IMPACT STUDY

WAIPIO PENINSULA SOCCER PARK

TRAFFIC IMPACT STUDY

Prepared for

Belt Collins Hawaii

Prepared by

WSA

July 1998

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ILLUSTRATIONS

TABULATIONS

Chapter 1
INTRODUCTION

The City and County of Honolulu plans to develop a soccer sports complex on the Waipio Peninsula adjacent to the Waipahu community. The Project site, as depicted in Figure 1-1, is located south of the Ted Makalena Golf Course. Most of the site is primarily Navy lands (232 acres), with some additional area provided from City and County of Honolulu lands formerly used by as a landfill for incinerator output.

DESCRIPTION OF THE PROJECT

An initial Phase 1 development is planned for completion in year 2001. Phase 1 is planned to include 18 soccer fields, with 4 fields illuminated for night use. Restrooms and about 3,000 parking spaces would also be provided for Phase 1.

Full development of the master plan of facilities, referred to herein as Project Buildout, is anticipated by year 2010 (see Figure 1-2). At completion, a total of 33 soccer fields are planned with 11 fields planned for illumination to allow nighttime use. The Master Plan also includes a soccer stadium and a training center. Approximately 5,000 parking spaces are planned at Buildout.

The facilities will be used for practice, games, and tournaments by local youth and adult soccer teams. The facilities may also be used to host national or international soccer tournaments. Local or visitor tournaments may occur 4 to 6 times a year. Other special events, such as professional sports or community events, could be held at the facility. For the purpose of this analysis, it is assumed that the special events could have up to 3,000 attendees at completion of Phase 1 and up to 15,000 attendees at Buildout. Such events could occur up to 12 times a year for smaller events (up to 3,000 attendees) and up to 6 times a year for the larger events (3,000 to 15,000).

The Waipio Point Access Road will be used to access the site for normal use of the facilities. Waipahu Depot Street may be used to provide additional access for tournaments and special events.

PROJECT USE SCENARIOS FOR ANALYSES

The soccer fields are expected to be used by youth teams primarily on weekday afternoons (3:00 - 6:30 PM) and Saturdays during the daytime. Adult teams are expected to primarily use the fields during weekday and Saturday evenings, and on Sundays.

The analyses of typical use for soccer play was made for a weekday and for a Saturday. Saturday was selected for analyses of weekend use since youth games are likely to generate more vehicle trips per participant than adult games. Most youth team participants are driven to the game by relatives or friends, with many of the drivers dropping off the participants and then departing to

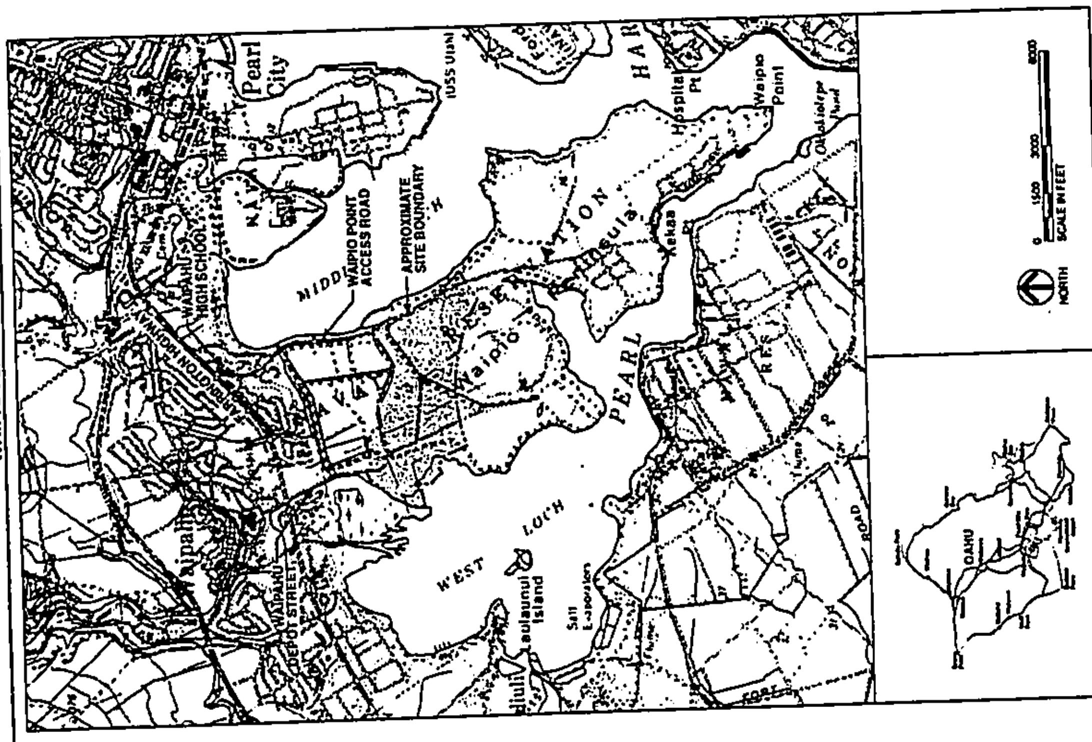

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Figure 1-1
PROJECT LOCATION MAP

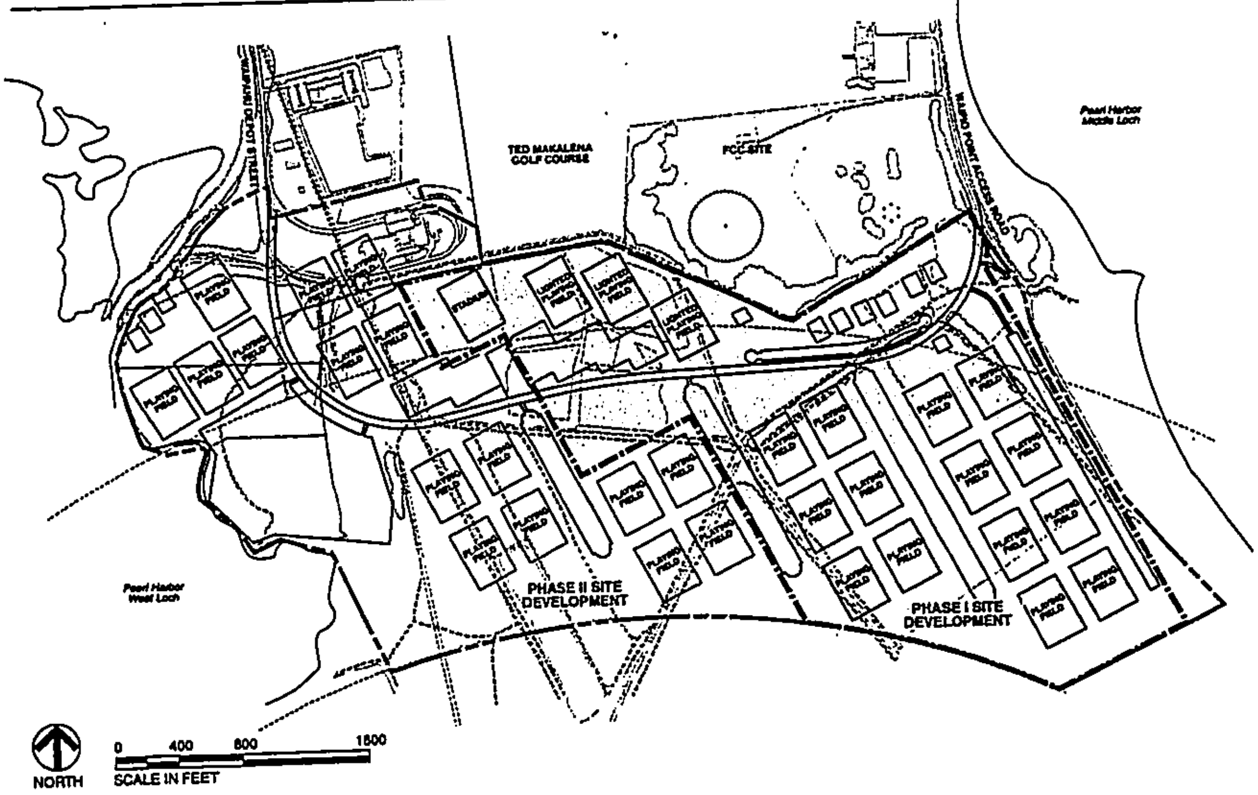

Figure 1-2
CONCEPTUAL SITE PLAN

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run errands, shop, or do other things during the practice or game. The driver later returns to pick up the youth, thus increasing the numbers of vehicle trips to/from the site.

The following scenarios were selected to develop traffic forecasts and analyze traffic conditions for the Phase 1 level of development and for Project Buildout:

Weekday Practice/Games
- Afternoon Peak Roadway Traffic Hour - This would add youth usage levels to the highest nonproject traffic volumes.
- Early Evening (6:00-7:00 PM) Hour - This period represents the departure of most youth participants and the arrival of nighttime adult users of the facilities. This period would also represent the peak arrival period for any special events held at night, or the departure period for any weekday tournament play.
- Late Evening (8:30-9:30 PM) Hour - This period represents the departure of most nighttime users from the site.

Saturday Practice/Games
- Midday Peak Roadway Traffic Hour - This would add youth usage levels to the highest nonproject traffic volumes.
- Early Evening (6:30-7:30 PM) Hour - This period represents the departure of most youth participants and the arrival of nighttime adult users of the facilities. This period would also represent the peak arrival period for any special events held at night, or the departure period for any weekend tournament play.
- Late Evening (9:00-10:00 PM) Hour - This period represents the departure of most nighttime users from the site.

All six hours were analyzed for existing conditions. For normal soccer use, only the afternoon and early evening hours were analyzed since the roadways have low levels of use during the late evening. Forecast volumes are provided for the late evening hour.

The numbers of vehicle trips were estimated for a peak hour during a local tournament for both the Phase 1 and Buildout levels of facilities. A limited analyses was made of tournament play since this scenario would occur only several times per year. Mitigation of tournament traffic impacts would likely be through special traffic management measures.

The numbers of vehicle trips were estimated for a peak arrival and departure hour of a special event for both the Phase 1 and Buildout levels of facilities. A limited analyses was made of the special event scenario since this scenario would occur only several times per year. Mitigation of traffic impacts would likely be through special traffic management measures.

STUDY SCOPE OF WORK

The purpose of this study is to assess the potential traffic impacts as a result of the activities at the Waipio Peninsula Soccer Park. The study identifies potential problem locations and mitigation

actions for normal use at the facility, both at the Phase 1 (2001) and Buildout (2010) levels of development. The intersections analyzed in the study include the following:

- Waipio Point Access Road at Farrington Highway
- Waipio Point Access Road at Awalai Street/Waipahu High School Driveway
- Waipio Point Access Road at Poailani Street
- Farrington Highway at Paiwa/Awanui Streets
- Farrington Highway at Waipahu Depot Street

The Farrington Highway at Waipahu Depot Street intersection was analyzed only for Saturday time periods since the higher levels of weekend use would be more likely to necessitate use of Waipahu Depot Street as a second access route to/from the site.

The study work tasks include the following:

1. Count existing traffic volumes and analyze existing conditions at each of the key intersections for each of the six analyses hours.
2. Estimate the numbers of vehicle trips generated by normal use of the facilities on weekdays and Saturdays, and by large special events at the site.
3. Assess the traffic impacts of normal use and identify mitigation actions appropriate for any potential traffic problem locations.
4. Assess the level of traffic needs for tournaments and special events. Identify the types of mitigation actions that may be appropriate for these types of events.

The identification of mitigation measures focuses on roadway improvements for typical weekly levels of use, and on traffic management measures for the large tournament and special events that may occur only several times a year and thus not warrant major capital improvements.

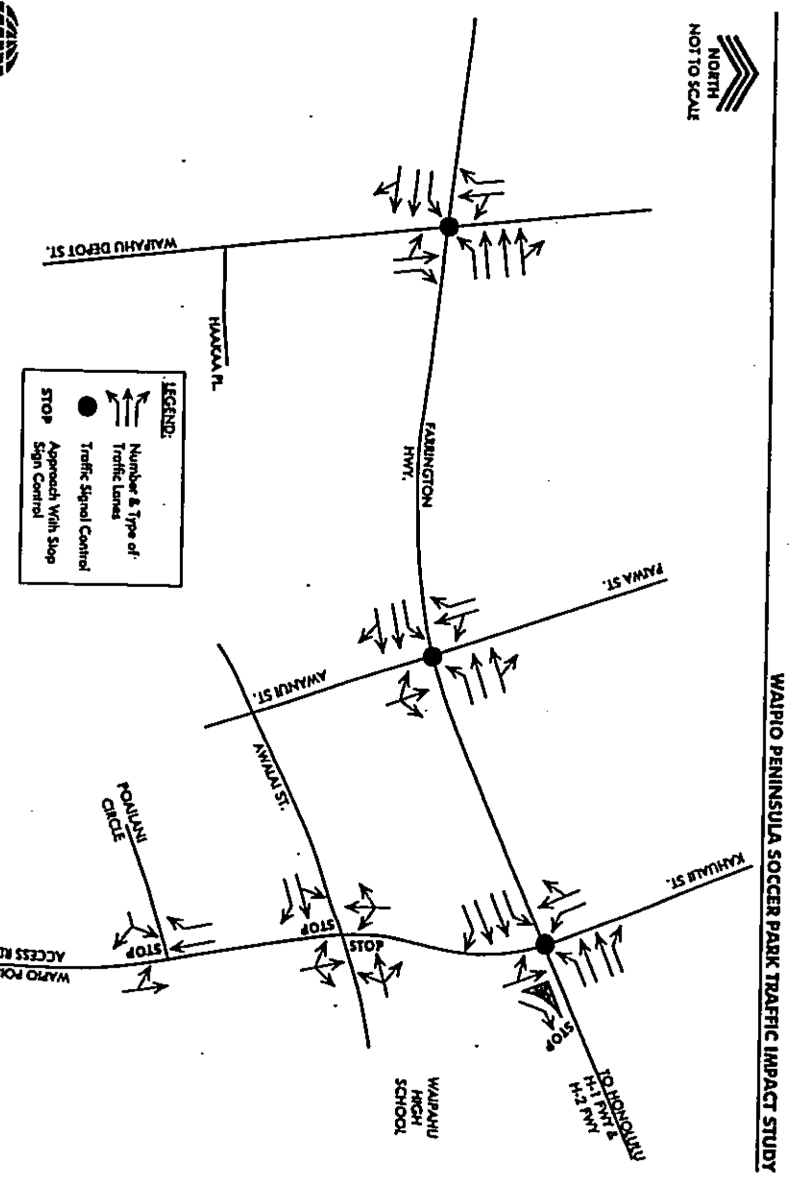

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Figure 2-1
EXISTING TRAFFIC CONTROLS AND LANES AT KEY INTERSECTIONS

Chapter 2
EXISTING CONDITIONS

The Waipio Peninsula Soccer Park is planned for the area south of the existing Ted Makalena Golf Course and the Police Training Center. The site is presently vacant.

The Ted Makalena Golf Course is a municipal course open seven days a week, with access provided via the Waipio Point Access Road. The Police Training Center is used during both daytime and evening hours, with access provided by Waipahu Depot Street.

Waipahu High School is located adjacent to Farrington Highway on the east side of Waipio Point Access Road. Access to the school grounds and parking areas is provided via a driveway connection at the Awalai Street intersection with Waipio Point Access Road. Awalai Street provides access to the residential area south of Farrington Highway. In addition to Waipio Point Access Road, this area also has direct access to Farrington Highway at Awanui Street (Paiwa Street) and Awamoku Street,. Waipio Point Access Road also provides access to a smaller residential area at Poailani Circle, with Waipio Point Access Road the only roadway connection for this development.

There is a Navy operation center for the inactive fleet anchored in West Loch of Pearl Harbor, with the facility located across Waipio Point Access Road from the golf course. The area south of the site is also Navy lands that are used for storage and safety zone for ordnance.

Waipahu Depot Street provides access to a mix of residential, commercial and light industrial uses south of Farrington Highway. Most of the residential units are located along Haakoa Place.

EXISTING ROADWAY SYSTEM

The key roadways and intersections near the Project site are depicted in Figure 2-1, with the type of traffic controls and number of lanes indicated at the key intersections.

Farrington Highway - This State highway serves east-west travel through Waipahu and extends westward through the Ewa District and Waianae Coast areas. Farrington Highway connects to Kamehameha Highway, the H-1 Freeway, and the H-2 Freeway in the Waiawa interchange complex, located approximately ¾-mile east of the Waipio Point Access Road intersection. These roadways provide access to the site from the areas of Oahu east and north of the Waipahu area. In the study area, Farrington Highway is a four-lane median-divided roadway with left-turn lanes provided at cross streets. The westbound direction widens to provide three through lanes through the Waipahu Depot Street intersection. Traffic signal controls are provided at most key cross streets.

Waipio Point Access Road - This two-lane collector street provides access to the Waipahu High School, the residential areas along the west side of the street, the Golf Course, and the Navy operation. The roadway intersects Farrington Highway opposite of Kahualii Street to form a standard four-leg intersection. Channelized right-turn lanes are provided for traffic turning to or from the Waipio Point Access Road.

Waipahu Depot Street - South of Farrington, this two-lane street provides access to the adjacent land uses. The segment north of the highway provides access to the central commercial area of Old Waipahu Town.

Paiwa Street - This two- to four-lane street connects Farrington Highway to the H-1 Freeway via the Paiwa interchange, and to the Waikele commercial center and residential areas north of the H-1 Freeway. Awanui Street intersects Farrington Highway opposite Paiwa Street to form a four-leg intersection.

EXISTING TRAFFIC VOLUMES

Traffic counts were made by Wilbur Smith Associates (WSA) during the afternoon and evening hours on a weekday (Tuesday April 21, 1998) and a Saturday (April 18, 1998). These traffic turning movement counts were made at each of the key intersections on the Saturday and all but the Waipahu Depot Street intersections on the weekday. The counts were recorded by 15-minute periods.

For the weekday afternoon and evening, the traffic counts were summarized for three one-hour periods:

- Afternoon Peak Hour, which represents the highest hourly traffic volumes at most of the intersections. This peak hour occurred between 3:45 and 4:45 PM at the highest volume locations.
- Early Evening 6:00 to 7:00 PM period, which would reflect conditions during the changeover between the afternoon users and evening users of the Project. This period would also represent conditions during the arrival period for any special evening events.
- Late Evening 8:30 to 9:30 PM period, which would reflect conditions at the departure time for most of those using the sports fields or attending a weekday event.

For the Saturday afternoon and evening, the traffic counts were summarized for three one-hour periods:

- Midday Peak Hour, which represents the highest hourly traffic volumes at most of the intersections. This peak hour occurred between Noon and 1:00 PM at the highest volume locations.
- Early Evening 6:30 to 7:30 PM period, which would reflect conditions during the changeover between the afternoon users and evening users of the Project. This period would also represent conditions during the arrival period for any special evening events.
- Late Evening 9:00 to 10:00 PM period, which would reflect conditions at the departure time for most of those using the sports fields or attending a weekend event.

Weekday Traffic Volumes

The afternoon peak hour traffic movements are depicted for the key intersections in Figure 2-2. The highest traffic volumes along Farrington Highway occur east of the Waipio Point Access Road intersection, with a total of about 1,500 vehicles westbound and 1,200 vehicles eastbound.

The peak hour traffic volumes along Waipio Point Access Road decrease from a total of about 430 vehicles at Farrington Highway to 170 vehicles south of Poailani Circle. Slightly more vehicles travel southbound during the peak hour. Approximately one-half of the vehicles enter or exit the road at the intersection with the High School Driveway and Awalai Street. The School traffic includes both staff and student trips, as well as persons using the School's athletic facilities.

The traffic volumes decrease considerably between the peak hour and the 6:00-7:00 PM period (Figure 2-3). The total volume on Farrington Highway east of Waipio Point Access Road decreases to about 2,060 vehicles, or about 75% of the peak hour volume. On Waipio Point Access Road, the southbound volume declines to about 65% of the peak hour but the northbound volume remains similar to the peak hour volumes. The high northbound volume appears to reflect vehicles leaving the Golf Course.

The traffic volumes during the 8:30-9:30 PM period (Figure 2-4) amount to about 30 to 40% of the afternoon peak hour volumes. Very little traffic uses Waipio Point Access Road south of Poailani Circle.

Saturday Traffic Volumes

As depicted in Figure 2-5, the midday peak hour traffic volumes at the eastern end of Farrington Highway (2,450 vehicles) are approximately 90% of those during the weekday afternoon peak hour (Figure 2-1). The traffic volumes at Waipahu Depot Street total about 2,250 vehicles, or slightly less than those at the eastern end of the study area.

The midday peak hour volumes along Waipio Point Access Road approximate 85% of the weekday afternoon peak hour volumes. The traffic decreases by more than half between south of Farrington Highway (367 vehicles) and south of Poailani Circle (158 vehicles).

Most of the Saturday traffic volumes during the 6:30-7:30 PM period (Figure 2-6) are about 40% lower than those in the midday peak hour. The exception is the volume along Farrington Highway at the western end of the study area, which are about 25% below those of the midday peak hour.

Traffic volumes during the late Saturday evening period (Figure 2-7) are similar to and slightly lower than those for the weekday late evening period.

EXISTING TRAFFIC CONDITIONS AT KEY INTERSECTIONS

Traffic conditions were analyzed for each of the three one-hour periods for the weekday and Saturday.

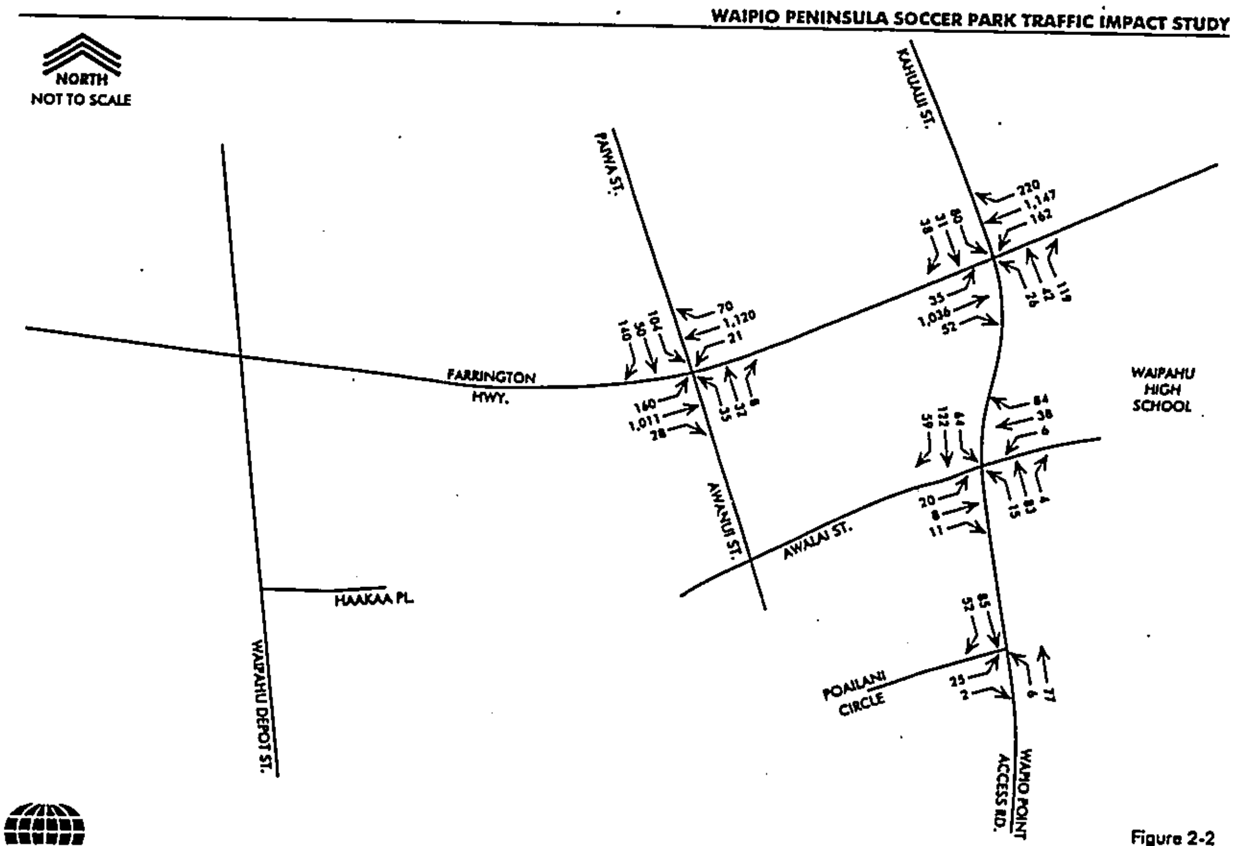

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Figure 2-2
1998 WEEKDAY AFTERNOON PEAK HOUR TRAFFIC

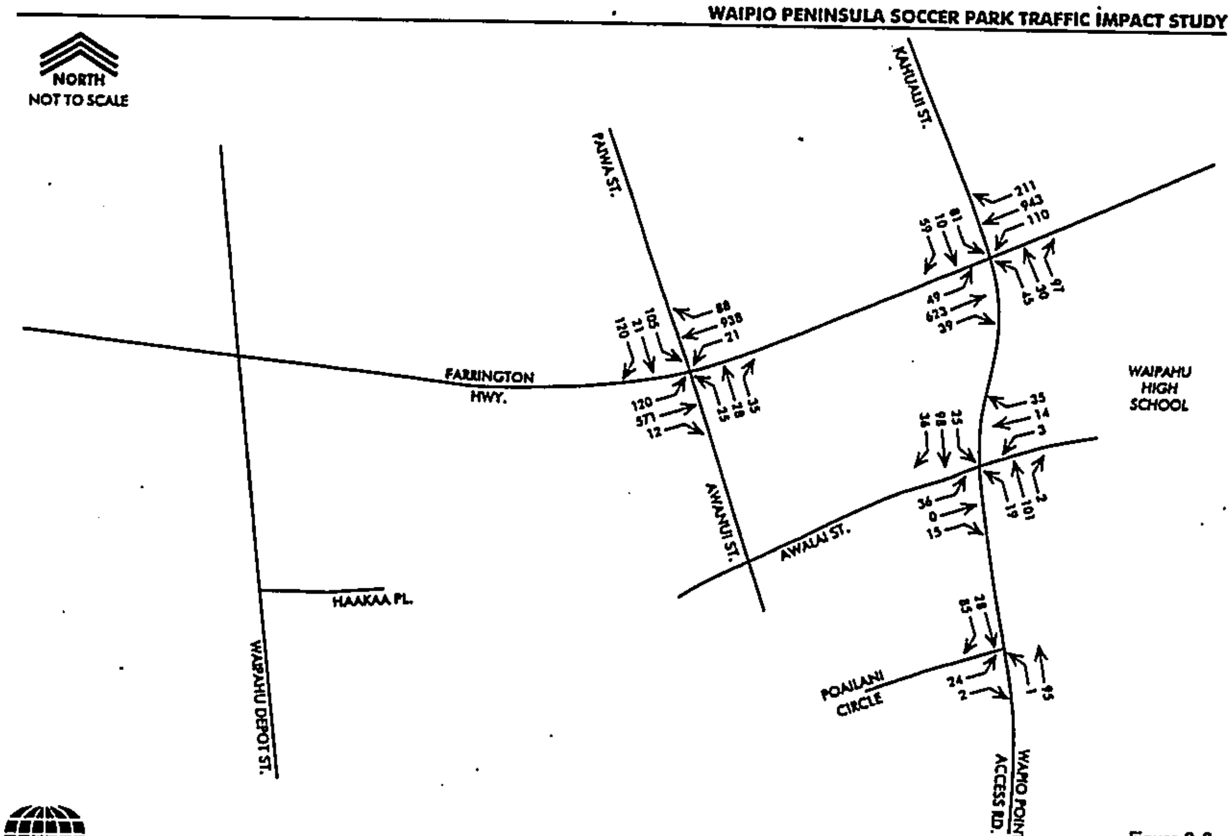

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Figure 2-3
1998 WEEKDAY TRAFFIC 6:00 - 7:00 PM

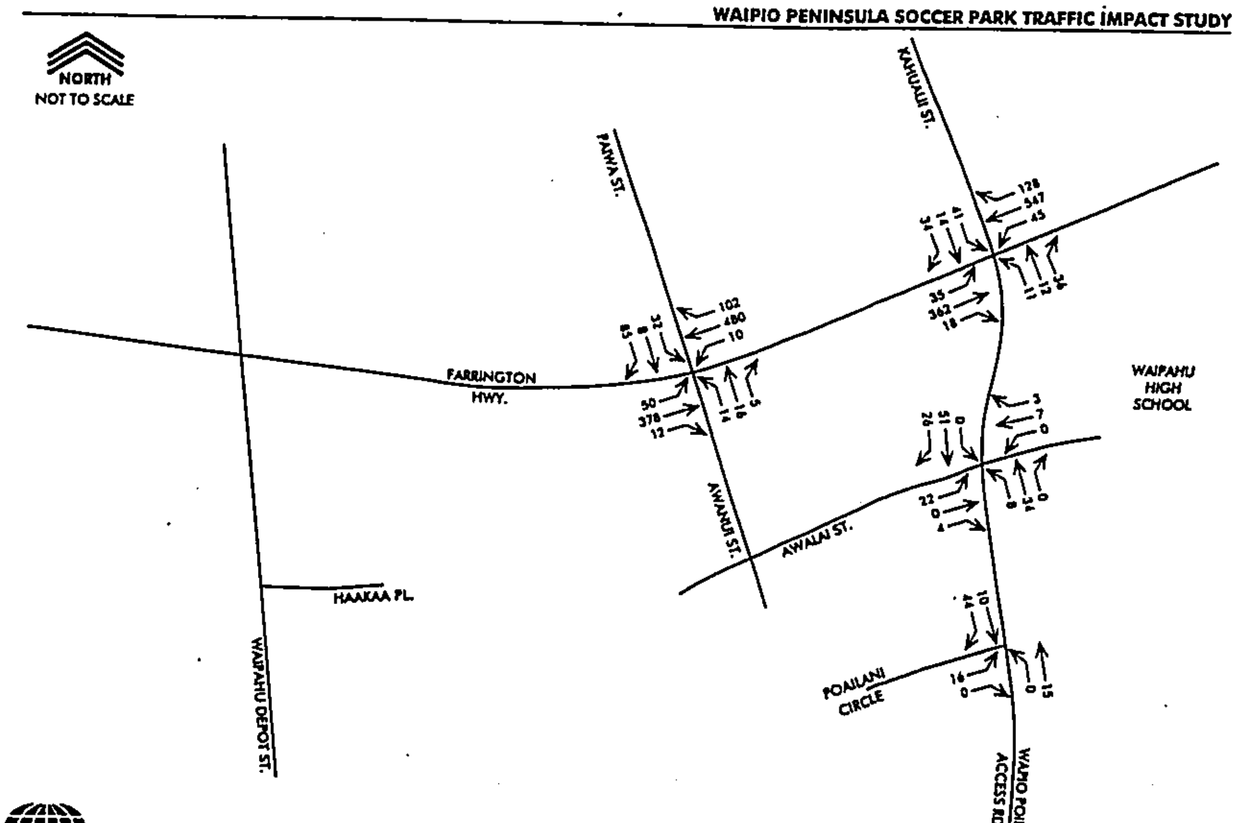

Figure 2-4
1998 WEEKDAY TRAFFIC
8:30 - 9:30 PM

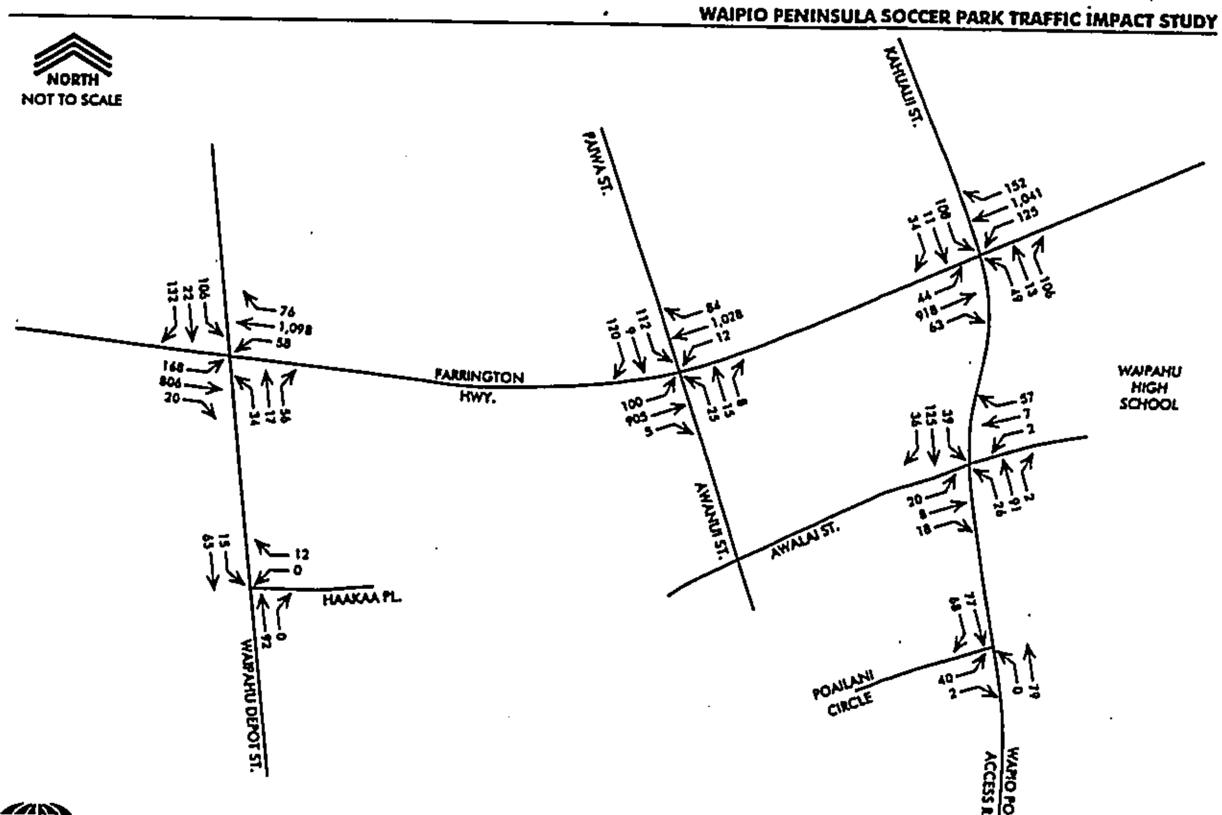

Figure 2-5
1998 SATURDAY MIDDAY
PEAK HOUR TRAFFIC

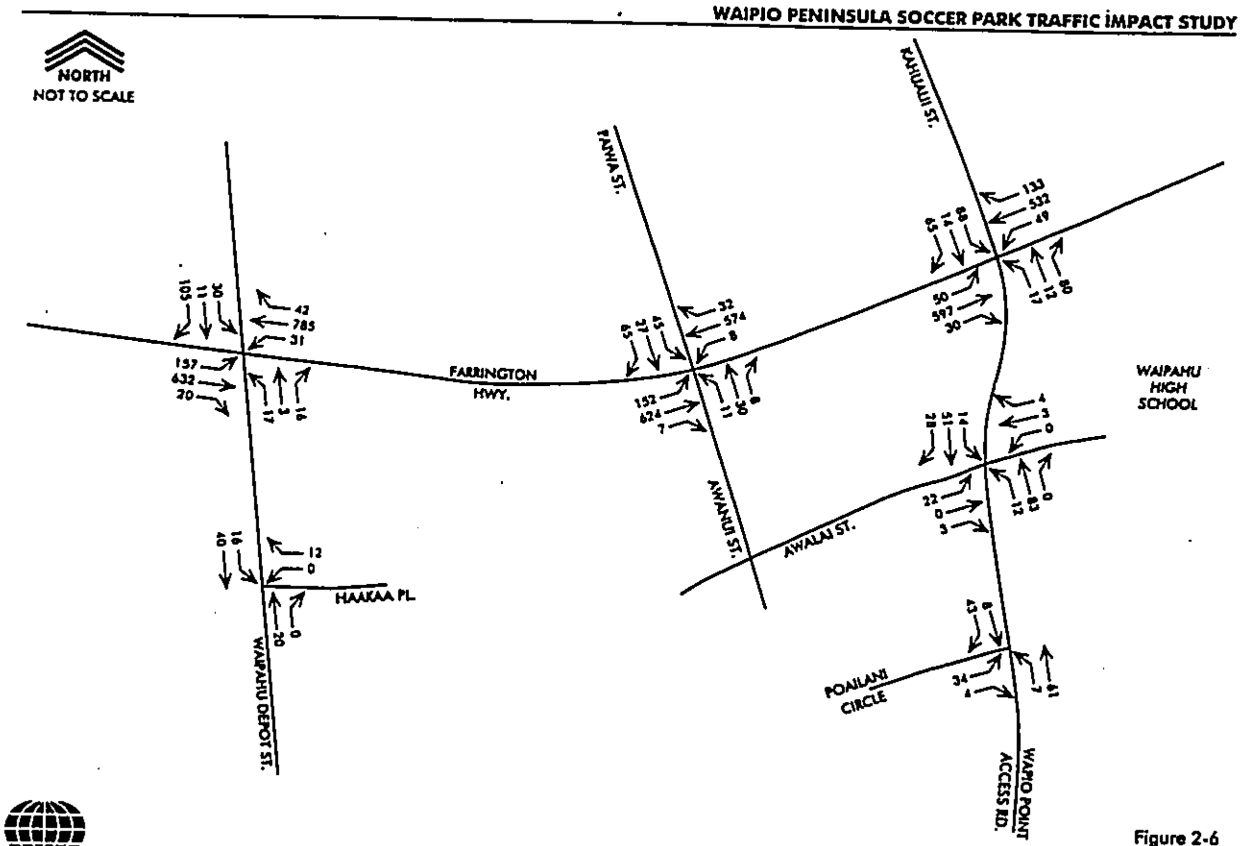

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Figure 2-6
1998 SATURDAY EARLY EVENING PEAK HOUR TRAFFIC (6:30-7:30PM)

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WAIPIO PENINSULA SOCCER PARK TRAFFIC IMPACT STUDY

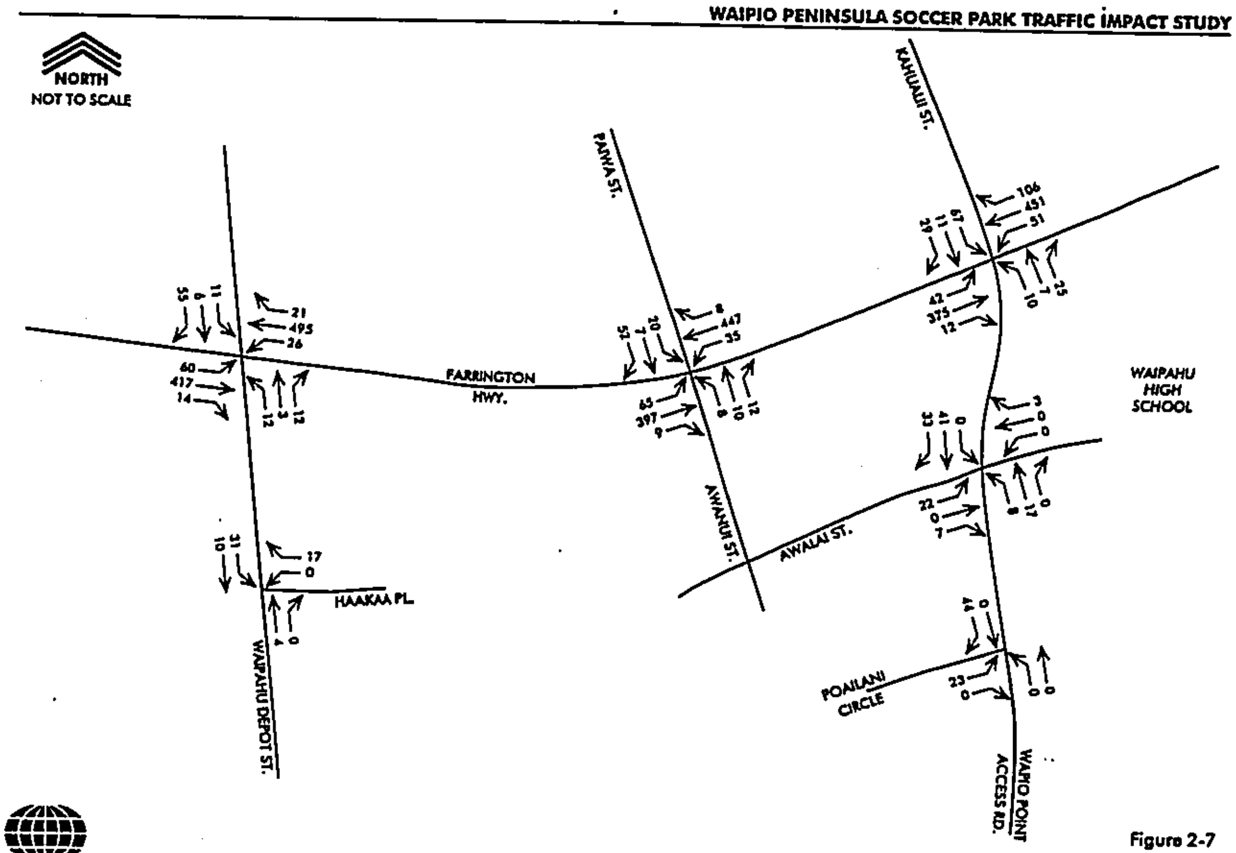

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Figure 2-7
1998 SATURDAY LATE EVENING TRAFFIC (9:00 - 10:00 PM)

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Methodology for Analyzing Levels of Service

The Transportation Research Board (TRB), a division of the National Science Foundation, has developed standardized methods for use in evaluating the effectiveness and quality of service for roadways and streets. Different methodologies are available for analyzing traffic signal-controlled intersections and other types of roadways.

The TRB evaluation methods use a concept known as level-of-service (LOS). This concept describes facility operations on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively. The methods generally compare traffic volumes on a facility to the facility's theoretical capacity. Capacity is estimated based on the facility's physical characteristics (e.g. number and widths of lanes), traffic characteristics (e.g. types of vehicles), and type of traffic controls. The comparisons are frequently referred to as the volume-to-capacity ratio (V/C). The methodologies are described in the *1994 Highway Capacity Manual* (1994 HCM)[1].

Signal-Controlled Intersections--Traffic conditions at traffic signal-controlled intersections were evaluated using the Operations Analysis methodology described in the 1994 HCM. Using this method, the level-of-service is based on the average delay time per vehicle passing through the intersection. The delay time, calculated in seconds, is the result of the phasing and timing of the traffic signal as well as the intersection's physical layout and the composition of the traffic. Average delay time and level-of-service are estimated for the entire intersection, for each roadway approach, and for each traffic movement or lane group. A description of the characteristics and criteria associated with LOS A through LOS F is provided in Figure 2-8.

The methodology also calculates a ratio of actual or estimated peak hour traffic volumes to the theoretical capacity of the intersection. This ratio indicates the proportion of available capacity being used by traffic volumes and where there is unused capacity available for future traffic increases. This volume-to-capacity ratio (V/C) reflects the physical characteristics of the intersection and the traffic characteristics, and is somewhat independent of the efficiency of the traffic signal phasing/timing.

Unsignalized Intersections—At intersections with STOP sign controls, the level of service was calculated using the 1994 HCM procedures for intersections with STOP or YIELD signs. In this methodology, the six levels of service, A through F, are used to describe traffic conditions for those movements that must yield to other movements:

- Left-turn out of the side street or driveway;
- Through movement from the side street,
- Right-turn out of the side street or driveway; and
- Left-turn into the side street.

Through vehicles on the major streets are not required to yield to other movements at two-way STOP controlled intersections.

[1] *Highway Capacity Manual*, Special Report 209, Transportation Research Board, Third Edition. 1994.

The **OPERATIONS LEVEL METHODOLOGY**, which is described in the Transportation Research Board's Highway Capacity Manual, defines Level of Service (LOS) for signalized intersections in terms of delay. Technically, delay is the amount of time an average vehicle must wait at an intersection before being able to pass through the intersection. For signalized intersections, the relationship between LOS and delay is based on the average stopped delay per vehicle for a fifteen minute period.

LEVEL OF SERVICE 'A' - Delay 0.0 to 5.0 seconds
Describes operations with very low delay, i.e., less than 5 seconds per vehicle. This occurs when signal progression is extremely favorable. Most vehicles arrive during the green phase and are not required to stop at all.
Corresponding V/C ratios usually range from 0.00 to 0.60.

LEVEL OF SERVICE 'B' - Delay 5.1 to 15.0 seconds
Describes operations with delay in the range of 5 to 15 seconds per vehicle generally characterized by good signal progression and/or short cycle lengths. More vehicles are required to stop than for LOS 'A' causing higher levels of average delay.
Corresponding V/C ratios usually range from 0.61 to 0.70.

LEVEL OF SERVICE 'C' - Delay 15.1 to 25.0 seconds
Describes operations with delay in the range of 15 to 25 seconds per vehicle. Occasionally, vehicles may be required to wait more than one red signal phase. The number of vehicles stopping at this level is significant although many still pass through the intersection without stopping.
Corresponding V/C ratios usually range from 0.71 to 0.80.

LEVEL OF SERVICE 'D' - Delay 25.1 to 40.0 seconds
Describes operations with delay in the range of 25 of 40 seconds per vehicle. At LOS 'D', the influence of congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines. The number of vehicles failing to clear the signal during the first green phase is noticeable.
Corresponding V/C ratios usually range from 0.81 to 0.90.

LEVEL OF SERVICE 'E' - Delay 40.1 to 60.0 seconds
Describes operations with delay in the range of 40 to 60 seconds per vehicle. These high delay values generally indicate poor signal progression, long cycle lengths and high V/C ratios. Vehicles frequently fail to clear the intersection during the first green phase.
Corresponding V/C ratios usually range from 0.91 to 1.00.

LEVEL OF SERVICE 'F' - Delay 60.1 seconds plus
Describes operations with delay in excess of 60 seconds per vehicle. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection.
Corresponding V/C ratios of over 1.00 are usually associated.

SOURCE: Transportation Research Board, "Operations Level Methodology-Signalized Intersections", Highway Capacity Manual, Special Report 209, 1985.

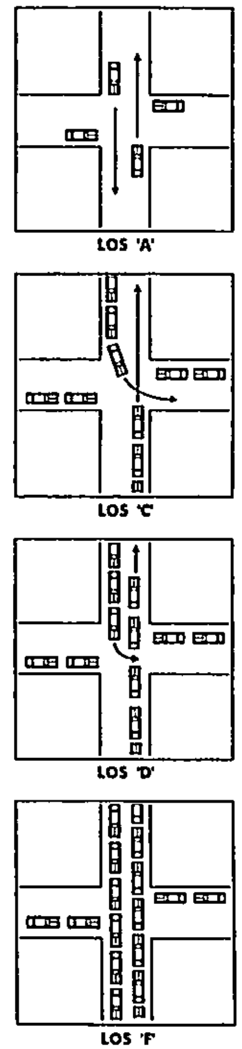

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Figure 2-8
LEVEL OF SERVICE DIAGRAM
LOS-HCS

The general indicator of intersection delay is determined by calculating the one-hour capacity for each key movement, based on the conflicting traffic volumes, and then comparing the number of vehicles making that maneuver to the calculated capacity. The unused or "reserve" capacity for the movement is then used to identify a delay time and a level-of-service for that movement. Unlike analysis at signalized intersections, an overall intersection level-of-service is not calculated, but a level-of-service is calculated for each lane group subject to the STOP or YIELD condition.

The level-of-service criteria for unsignalized intersections with STOP or YIELD controls is defined in Table 2-1.

Table 2-1

LEVEL-OF-SERVICE CRITERIA
FOR UNSIGNALIZED INTERSECTIONS
Waipio Peninsula Soccer Park Traffic Impact Study

LOS	Average Stopped Delay (seconds/vehicle)
A	<5.0
B	5.1 - 10.0
C	10.1 - 20.0
D	20.1 - 30.0
E	30.1 - 45.0
F	>45

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Chapter 10, 1994.

Weekday Intersection Conditions

The traffic conditions for the weekday afternoon and early evening periods are summarized in Table 2-2. Although not included in Table 2-2, the conditions for the late evening hour were analyzed and the results are discussed in the following paragraphs.

The Farrington Highway intersections with Waipio Point Access Road and Paiwa Street each operate at very acceptable levels of service during the weekday hours. Present afternoon peak hour traffic uses approximately 55% of the capacity of the Waipio Point Access Road intersection and 68% of the Paiwa Street intersection capacity. The level of capacity use is slightly lower in the early evening period. Vehicle delays are at LOS B at both intersections.

Table 2-2

EXISTING TRAFFIC CONDITIONS AT KEY INTERSECTIONS
Waipio Peninsula Soccer Park Traffic Impact Study

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.551	13.3	B	0.487	12.7	B
Waipio Point Access Rd. at Awalai St./School Dwy.	•	7.2	B	•	6.1	B
Waipio Point Access Rd. at Poailani St.	•	4.7	A	•	4.5	A
Farrington Hwy. at Paiwa St./Awanui St.	0.679	13.9	B	0.630	14.4	B
Farrington Hwy. at Waipahu Depot St.		NA			NA	
SATURDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.508	10.1	B	0.333	10.2	B
Waipio Point Access Rd. at Awalai St./School Dwy.	•	6.3	B	•	4.7	A
Waipio Point Access Rd. at Poailani St.	•	4.8	A	•	4.1	A
Farrington Hwy. at Paiwa St./Awanui St.	0.546	11.2	B	0.391	11.6	B
Farrington Hwy. at Waipahu Depot St.	0.522	15.4	C	0.408	13.8	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
• V/C is not calculated for intersections with STOP sign controls.
•• Delay not calculated since unreliable where traffic substantially exceeds capacity.
NA Not Analyzed.

Wilbur Smith Associates; May 12, 1998.

In the late evening hour (8:30-9:30 PM), traffic uses 24.3% and 29.2% of the estimated capacity of the Waipio Point Access Road and Paiwa Street intersections, respectively. The intersections operate at LOS B with average delays of about 10 seconds per vehicle.

The conditions at the Awalai Street/School Driveway intersection with Wapio Point Access Road are for the left-turn movement out of Awalai Street; the conditions shown for the Poailani Street are for the left-turn from Poailani Street. Both left-turn movements operate at very acceptable conditions due to the low traffic volumes along Waipio Point Access Road and the low volume of turning vehicles. In the late evening period, both intersections operate at LOS A.

Field observations during the traffic counts confirm the results of the analyses, with no long delays or queuing of vehicles at the intersections.

Saturday Intersection Conditions

The traffic conditions for the Saturday afternoon and early evening periods are also summarized in Table 2-2. Although not included in Table 2-2, the conditions for the late evening hour were analyzed and the results are discussed in the following paragraphs.

Each of the three intersections along Farrington Highway operate at very acceptable conditions on Saturdays. During the midday peak hour, the existing traffic amounts to 50 to 55% of the capacity of the intersections, with conditions at LOS B or C. The lower traffic volumes in the early evening uses only 33 to 41% of capacity at each intersection, with conditions at LOS B. During the late evening period, the traffic approximates 22 to 23% of the capacity at each of the three intersections with average delays per vehicle of 9 to 12 seconds (LOS B).

The average delays for vehicles turning left from Awalai and Poailani Streets on Saturday are similar to those during the weekday hours, with conditions at LOS A or B.

Chapter 3
2001 WITHOUT PROJECT

Phase 1 of the Project is planned for completion and beginning of use in year 2001. This chapter provides the traffic forecasts and analyses of conditions in 2001 without the Project to serve as a baseline from which to identify the impacts of the Project Phase 1.

ROADWAY IMPROVEMENTS

No roadway improvements were identified for the key intersections and roadway segments by 2001, other than those included as part of the Project.

The State has discussed the construction of a roadway connection between Waipio Point Access Road and the Leeward Community College campus to provide an additional access route for traffic traveling to/from the campus. This roadway, if constructed, would connect to Waipio Point Access Road south of Poailani Circle and would increase the traffic through each of the intersections along Waipio Point Access Road that were analyzed for this study. This potential roadway connection has not been included in the traffic forecasts and analyses for this study since the analyses for this study were completed prior to the proposal.

TRAFFIC GROWTH WITHOUT THE PROJECT

Traffic volumes are expected to increase at the study intersections primarily as a result of general increases in area economic activity and development outside the study area. There are several potential development sites along Waipio Point Access Road. However, no development is expected by 2001.

General area traffic increases were estimated through the development of a traffic growth factor based on traffic increases recorded in the area in recent years. These increases were developed from historic traffic count data recorded at the State Department of Transportation count station #8-C, located at the intersection of Farrington Highway and Waipahu Depot Street. Traffic volumes at this station have increased an average of about 0.6% per year between 1992 and 1996. This average annual growth rate was assumed to continue through year 2001 and apply to all roadways in the study area.

This annual growth rate would result in a 2.1% increase in traffic volumes by late 2001. The traffic volumes at each intersection and for each time period were increased by this amount to represent traffic volumes without the Project.

INTERSECTION CONDITIONS

As summarized in Table 3-1, the forecast traffic increases would result in small increases in the proportion of the intersection capacity used and the average delay times at the intersections

Table 3-1

2001 TRAFFIC CONDITIONS AT KEY INTERSECTIONS WITHOUT PROJECT
Waipio Peninsula Soccer Park Traffic Impact Study

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.566	16.8	C	0.499	12.8	B
Waipio Point Access Rd. at Awalai St./School Dwy.	*	7.3	B	*	6.2	B
Waipio Point Access Rd. at Poailani St.	*	4.8	A	*	4.6	A
Farrington Hwy. at Paiwa St./Awanui St.	0.698	14.4	B	0.651	15.1	C
SATURDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.520	10.2	B	0.343	11.0	B
Waipio Point Access Rd. at Awalai St./School Dwy.	*	6.4	B	*	4.7	A
Waipio Point Access Rd. at Poailani St.	*	4.9	A	*	4.2	A
Farrington Hwy. at Paiwa St./Awanui St.	0.566	11.4	B	0.401	11.7	B
Farrington Hwy. at Waipahu Depot St.	0.536	15.5	C	0.417	13.9	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
* V/C is not calculated for intersections with STOP sign controls.
NA Not Analyzed.

Wilbur Smith Associates; May 15, 1998.

controlled by traffic signals. The small increase in average delay time at the Farrington Highway intersection with Waipio Point Access Road for the weekday afternoon peak hour, from existing 13.3 seconds per vehicle to 16.8 seconds estimated for 2001, would change the LOS from B to C, still a very acceptable condition.

Conditions at the two STOP sign controlled intersections would be similar to existing conditions.

Chapter 4
2001 WITH PROJECT PHASE 1

The traffic forecasts and analyses reflect conditions near yearend 2001 when Phase 1 of the Project is expected to be completed and fully operational.

PROJECT DESCRIPTION

The Master Plan of facilities for the Project is depicted in Figure 1-2, which indicates the portion of the Project that is planned for development in Phase 1.

Project Facilities

Phase 1 of the Project would include the following facilities:

- A tournament field and 3 other fields with illumination to permit nighttime use.
- 14 other fields, for a total of 18 available for daytime use.
- Restrooms and change facilities.
- A parking area with about 3,000 surfaced stalls.

Roadway Improvements

Phase 1 would include the extension of Waipio Point Access Road to the parking area from its present terminus near the Golf Course. The extension would be constructed as a two-lane roadway.

There may be some minor improvements to the existing Waipio Point Access Road. These are expected to be modifications to drainage, addition of sidewalks along some sections, or other modifications to the roadside area. These changes are not expected to significantly increase capacity of the roadway.

PROJECT USE ASSUMPTIONS

The facilities are expected to be regularly used on both weekdays and weekends for soccer practice and games. Tournaments and special events may occur several times a year. Most of the information and assumptions concerning the levels of facility use and the frequency of special events are based on information provided by Stringer Tusher Architects[1] and Belt Collins Hawaii.[2]

Normal Practice and Game Use

The following information and assumptions was used to estimate usage of the Phase 1 facilities in year 2001.

[1] Memorandum to Soccer Committee Task Force from Stringer Tusher Architects, dated March 30, 1998.
[2] Memorandum to Wilbur Smith Associates from Belt Collins Hawaii, dated April 9, 1998.

- The soccer fields are expected to be used by youth teams primarily on weekday afternoons (3:00 -6:30 PM) and Saturdays during the daytime. Adult teams are expected to primarily use the fields during weekday and Saturday evenings, and on Sundays.
- Approximately a two-hour block of time would be used for a soccer game or practice.
- Most youth teams play in only one game or practice session per day.
- The estimated average level of use for the different times of the week is summarized in the following table.

Time of Week	Average Fields In Use	Average Population Per Field	Average Total Population At One Time
Weekday Afternoon	11	30	330
Weekday Evening	4	25	100
Weekend Daytime	16	30	480
Weekend Evening	4	25	100

Tournaments

Soccer tournaments usually occur on weekends, except some may start on a weekday during the Christmas or Spring Break holidays and end on a weekend day. Most tournaments would be for local teams although the new soccer complex could attract national or international tournaments. For this assessment, the following use characteristics were used:

- A local tournament is used for the analyses since these are likely to generate higher traffic volumes and to occur more frequently. Participants and a portion of the spectators in a national or international tournament are more likely to travel by groups in vans or buses and result in lower traffic volumes.
- A youth tournament on a Saturday is used for the analyses.
- The tournaments typically start at 9:00 AM and last through 4:00 PM.
- Most youth teams play only one game a day. The participants are assumed to leave after their game.
- A large tournament is likely to use all of the fields during the peak period of play. The estimated population for a large tournament is:
    - 18 fields in use
    - An average of 50 persons per field
    - A peak of 900 persons for the ongoing games at any one time.

Special Event

With the Phase 1 facilities, special events would likely be professional sports events or community events on a weekend. These events are expected to have 3,000 or fewer attendees. A sports match with 3,000 persons on a Saturday evening is used for this assessment.

VEHICLE TRIP GENERATION

The numbers of vehicle trips generated by the Phase 1 facilities were estimated for typical levels of use on weekdays and Saturdays, for a Saturday youth tournament, and for a special event.

Assumptions Used for the Estimated Trip Generation

A set of conservative assumptions was used to provide a <u>high estimate</u> of the numbers of vehicle trips for each of the analysis events and time periods.

Normal Practice and Games
- All participants are assumed to arrive and depart by private personnel transportation. (No vans or buses for team travel.)
- For adult soccer use, the trip generation is based on an average of 1.68 persons per vehicle. This is the average occupancy for home-based nonwork trips from the OMPO study.[3]
- For youth soccer activities, the trip generation is based on an average of 1.5 participants per vehicle. Approximately 50% of the vehicles are assumed to drop off the participants and depart. These vehicles would then return later to pick up the participants.
- The use of each the fields is assumed to begin and end at a similar time (simultaneous start times). Thus, almost all of the traffic occurs in the hour centered on the start time of each set of games and little or no traffic occurs in the hour during the middle of the game.

Tournaments
- All participants are assumed to arrive and depart by private personnel transportation. (No vans or buses for team travel.)
- For youth soccer activities, the trip generation is based on an average of 1.5 participants per vehicle. Approximately 50% of the vehicles are assumed to drop off the participants and depart. These vehicles would then return later to pick up the participants.
- The use of each the fields is assumed to begin and end at a similar time (simultaneous start times). Thus, almost all of the traffic occurs in the hour centered on the start time of each set of games and little or no traffic occurs in the hour during the middle of the game.

Special Events
- The trip generation is based on an average of 2.5 persons per vehicle.
- All attendees are assumed to arrive in a one-hour period prior to the start time and depart within one hour after the conclusion of the event.

[3] *Oahu Regional Transportation Plan*, prepared for the Oahu Metropolitan Planning Organization (OMPO) by Kaku Associates, November 1995.

- Approximately 5% of the vehicles would drop off attendees and return at the end of the event to pick up the attendees.

Estimated Numbers of Vehicle Trips

The estimated number of participants/attendees and the use characteristics were used to estimate the numbers of vehicle trips for each of the analysis periods and scenarios. The estimated numbers of vehicle trips are summarized in Table 4-1. Appendix Table A-1 provides additional information concerning the composition of the estimated numbers of vehicle trips.

For the weekday afternoon peak hour, the use of the Phase 1 facilities is estimated to generate a total of 660 vehicle trips ends, with one-half arriving at the site and one-half departing the site. This reflects the simultaneous completion of the preceding games/practice sessions and departure of those users with the arrival of the participants for the next set of games and practices.

Traffic generation during the early evening period amounts to about 60% of that generated in the afternoon peak hour. The lower number of vehicle trips results from fewer vehicles arriving for nighttime use. Nighttime use is constrained by the limited number of illuminated fields. In the late evening hour, the 60 departing vehicles represent the total population of nighttime users of the Phase 1 facilities. The Phase 1 facility is estimated to generate approximately 1,500 vehicle trips to or from the site on a typical weekday.

Daytime use for typical practice and games on a Saturday would generate about 50% more traffic during the peak traffic hour than the weekday use. The evening use would be similar to that for the weekday evening due to the limited number of fields with lighting. The total daily traffic generation on a typical Saturday (3,000 vehicle trips to or from site) would be twice that for the weekday due to the use during the Saturday morning and early afternoon hours, combined with the larger population at any one time during the day.

A capacity-size youth soccer tournament that extends from morning until late afternoon on a Saturday is estimated to generate approximately 5,400 vehicles trips to or from the site during the day. About 1,800 vehicle trips, or one-third of the total, could be generated during the peak one-hour period with simultaneous start times for the games on all of the fields.

A professional game or similar special event with 3,000 attendees could generate approximately 1,260 vehicle trip ends before the event and a similar number after the event.

2001 TRAFFIC VOLUMES DURING THE ANALYSIS HOURS

Since the Project will serve the entire island, the distribution and assignment of Project trips was based on the projected population distribution for Oahu in year 2005, as forecast by the City and County of Honolulu. The areas from the Waianae Coast to Aiea, including Central Oahu, were given a double weighting in the estimation of trip origins/destinations to reflect greater use that might be expected by those located closer to the site. Based on this procedure, the largest

Table 4-1

VEHICLE TRIP GENERATION BY PROJECT PHASE 1 IN 2001
Waipio Peninsula Soccer Park Traffic Impact Study

Event Type & Time Period	Average Site Population	Arriving Vehicles	Departing Vehicles	Total Trip Ends
Typical Weekday Play or Practice				
Afternoon Peak Hour	330	330	330	660
Early Evening Hour	330/100	170	220	390
Late Evening Hour	100	0	60	60
Daily	--	750	750	1,500
Typical Saturday Play or Practice				
Midday Peak Hour	480	480	480	960
Early Evening Hour	480/100	220	320	540
Late Evening Hour	100	0	60	60
Daily	--	1,500	1,500	3,000
Saturday Tournament				
Midday Peak Hour	900	900	900	1,800
Daily	--	2,700	2,700	5,400
Special Event				
Arrival Hour	3,000	1,200	60	1,260
Departure Hour	3,000	60	1,200	1,260

Wilbur Smith Associates; May 18, 1998

number of trips, over 70%, are expected to approach and depart the site via the Farrington Highway between Waipio Point Access Road and the Waiawa interchange.

Weekday Traffic

The resultant estimates of weekday traffic are depicted in Figure 4-1 for the afternoon peak hour, in Figure 4-2 for the early evening analyses hour, and in Figure 4-3 for the late evening analysis hour. The numbers of vehicles traveling to or from the Project site and the proportional increases above the forecast 2001 traffic volumes as a result of the Project are summarized in the following table for several key roadways providing access to the site.

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	466	16.5	276	8.3	42	3.5
Waipio Point Access Rd. South of Farrington Hwy.	654	147.6	386	113.5	59	41.5
Farrington Hwy. West of Paiwa St.	78	3.1	46	2.5	7	0.7
Paiwa St. North of Farrington Hwy.	90	15.8	53	10.7	8	2.6

The afternoon peak hour would experience both the largest numerical and proportional increase in traffic volumes due to the Project. During this peak hour, the Project would more than double the number of vehicles using the Waipio Point Access Road during the late afternoon period (approximately 4:00 to 5:00 PM). However, this would occur after the peak traffic associated with students and staff leaving the high school and would represent about 40% higher volumes as compared to the traffic volumes on Waipio Point Access Road during the peak hour for the school traffic.

The Project would also double traffic volumes on Waipio Point Access Road during the early evening hour (6:00-7:00 PM). The Project would result in much lower increases during the other afternoon and evening hours.

Note that these increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the table.

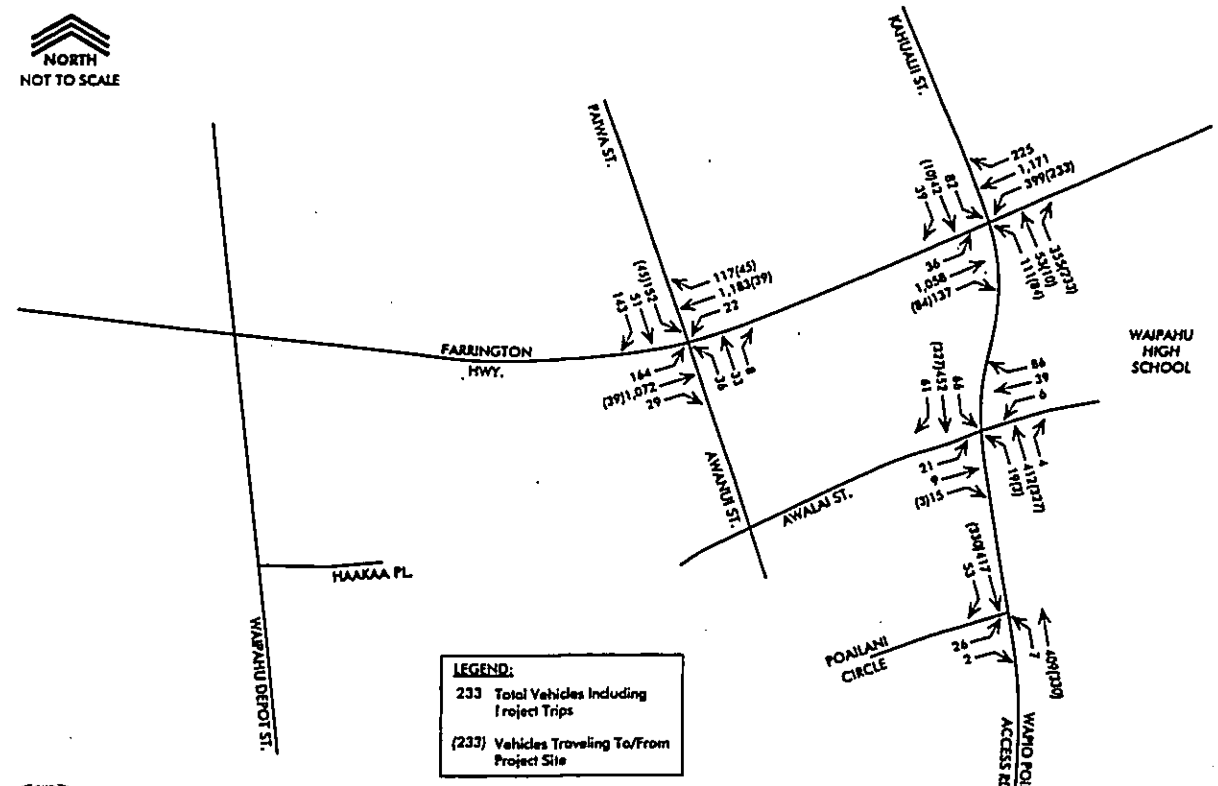


Figure 4-1
2001 WITH PROJECT PHASE 1
WEEKDAY AFTERNOON PEAK HOUR TRAFFIC

WSA WILBUR SMITH ASSOCIATES

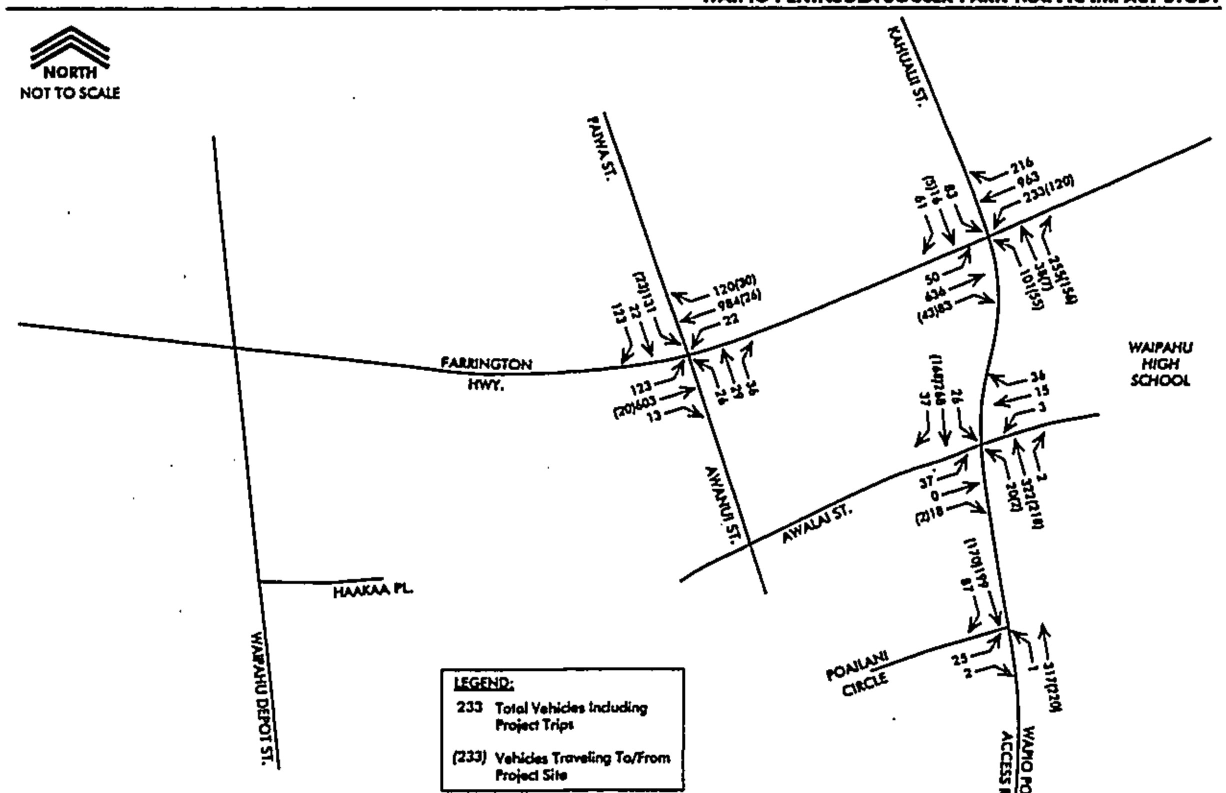
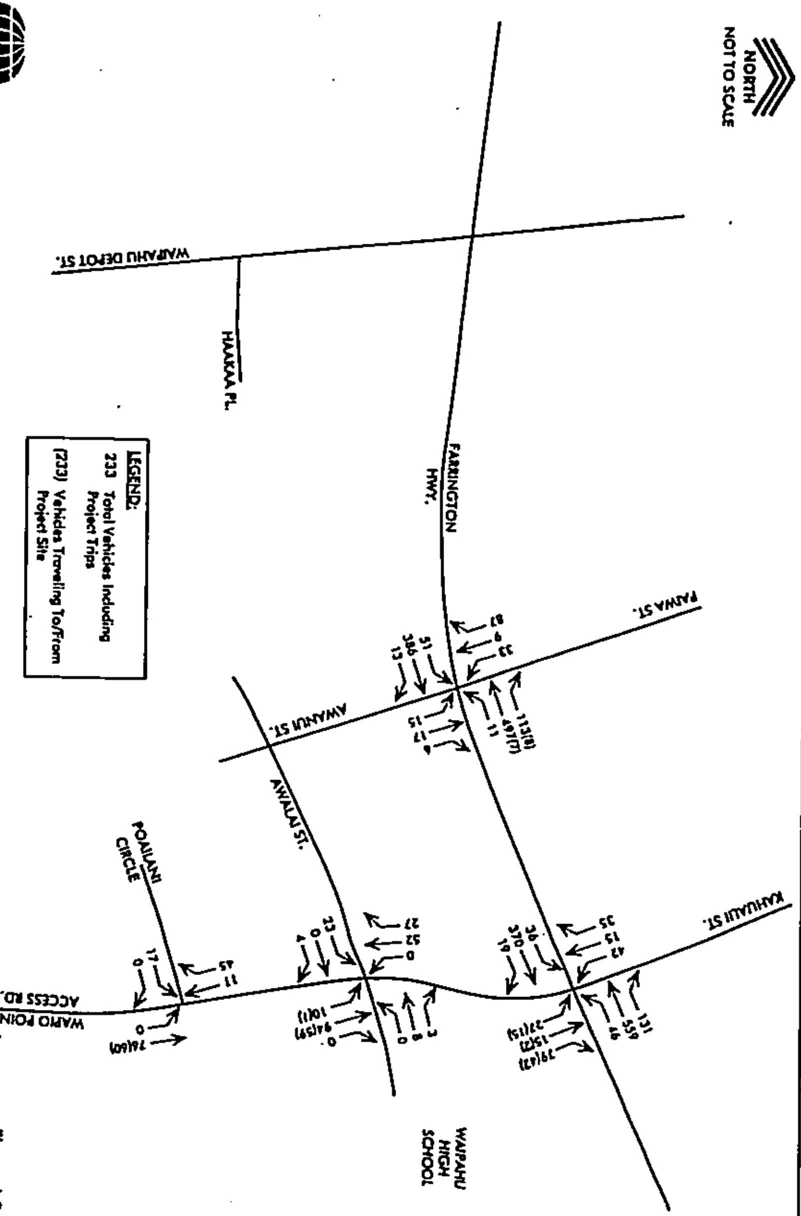


Figure 4-2
2001 WITH PROJECT PHASE 1
WEEKDAY TRAFFIC (6:00 - 7:00 PM)

WSA WILBUR SMITH ASSOCIATES



WILBUR SMITH ASSOCIATES

Figure 4-3
2001 WITH PROJECT PHASE 1
WEEKDAY TRAFFIC (8:30 - 9:30 PM)

Saturday Traffic

The resultant estimates of traffic volumes for typical Saturday use of the sports complex are depicted in Figure 4-4 for the midday peak hour, in Figure 4-5 for the early evening analyses hour, and in Figure 4-6 for the late evening analysis hour. The number of vehicles traveling to or from the Project and the proportional increase to the forecast 2001 traffic volumes without the Project are summarized in the following table for several key roadways providing access to the site.

Location	Midday Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	678	27.1	382	25.3	42	3.8
Waipio Point Access Rd. South of Farrington Hwy.	950	251.9	535	256.0	59	48.4
Farrington Hwy. West of Paiwa St.	112	5.0	62	4.2	7	0.7
Paiwa St. North of Farrington Hwy.	132	29.1	74	20.5	8	4.7

The proportional increases to midday and early evening Saturday traffic would be substantially greater than for the weekday. This results from both the higher volumes of Project traffic and the lower volumes of nonproject traffic on Saturdays. The smaller proportional increase in the late evening hour results from the lower Saturday nonproject traffic since the same level of use is anticipated for both weekdays and weekend evenings.

As with the weekday forecasts, these increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the table.

2001 TRAFFIC CONDITIONS AT KEY INTERSECTIONS

Traffic conditions were analyzed at the key intersections with the traffic volumes forecast for the afternoon and early evening hours for typical weekday and Saturday use. The analysis results are summarized in Table 4-2 for the key intersections for both the weekday and Saturday hours with typical practice and games at the sports complex.

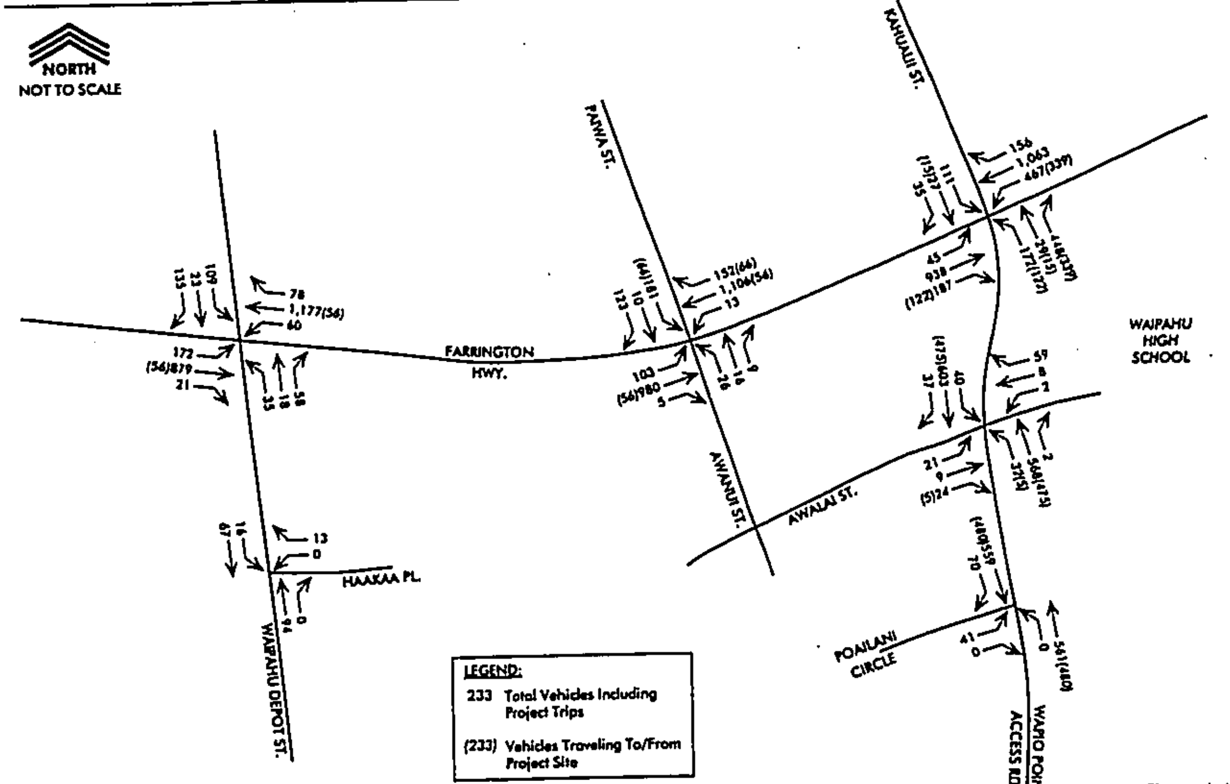


Figure 4-4
2001 WITH PROJECT PHASE 1
SATURDAY MIDDAY PEAK HOUR TRAFFIC

WSA WILBUR SMITH ASSOCIATES

WAIPIO PENINSULA SOCCER PARK TRAFFIC IMPACT STUDY

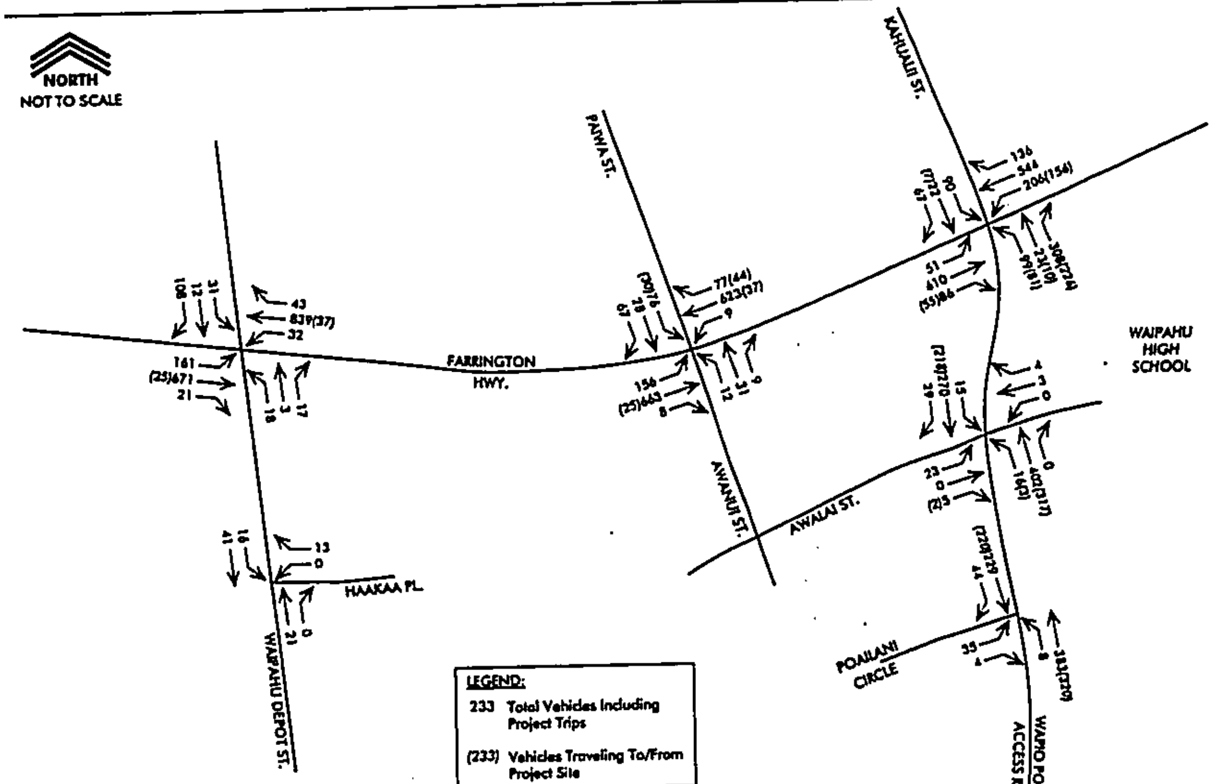


Figure 4-5
2001 WITH PROJECT PHASE 1
SATURDAY TRAFFIC (6:30 - 7:30 PM)

WSA WILBUR SMITH ASSOCIATES

Table 4-2

2001 TRAFFIC CONDITIONS AT KEY INTERSECTIONS WITH PROJECT PHASE 1
Waipio Peninsula Soccer Park Traffic Impact Study

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.817	24.4	C	0.651	18.1	C
Waipio Point Access Rd. at Awalai St./School Dwy.	•	27.0	D	•	12.2	C
Waipio Point Access Rd. at Poailani St.	•	13.8	C	•	8.4	B
Farrington Hwy. at Paiwa St./Awanui St.	0.772	16.8	C	0.709	18.1	C
SATURDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.858	30.5	D	0.573	20.6	C
Waipio Point Access Rd. at Awalai St./School Dwy.	•	39.6	E	•	11.3	C
Waipio Point Access Rd. at Poailani St.	•	25.6	D	•	9.9	B
Farrington Hwy. at Paiwa St./Awanui St.	0.679	14.1	B	0.474	12.0	B
Farrington Hwy. at Waipahu Depot St.	0.549	15.5	C	0.426	13.9	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
• V/C is not calculated for intersections with STOP sign controls.
NA Not Analyzed.

Wilbur Smith Associates; May 15, 1998.

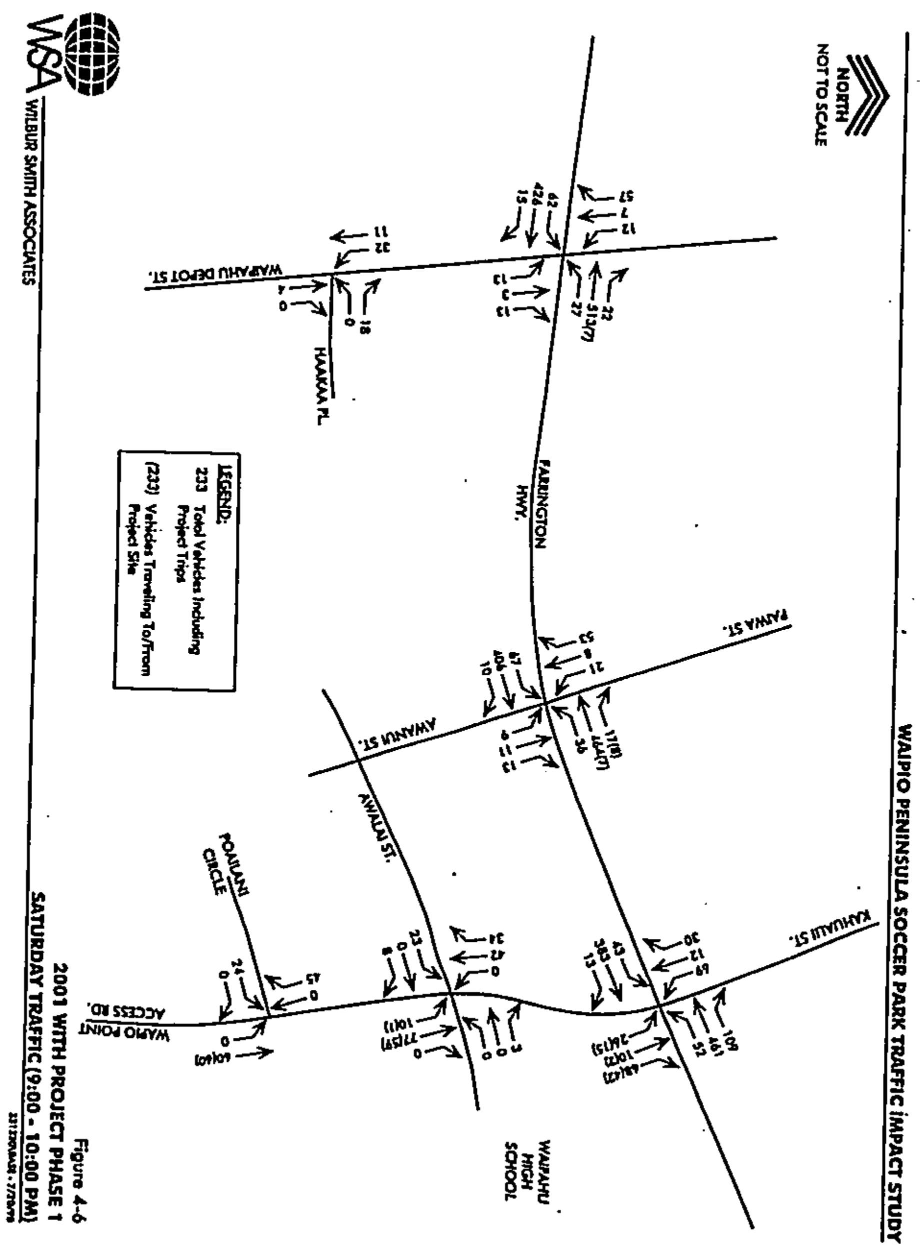


Figure 4-6
2001 WITH PROJECT PHASE 1
SATURDAY TRAFFIC (9:00 - 10:00 PM)

Weekday Conditions

Traffic to/from the Project site for typical weekday games and practice would substantially increase the proportion of capacity used at the intersection of Farrington Highway with Waipio Point Access Road. However, the usage would remain at very acceptable levels (81.7% in afternoon peak hour). The forecast traffic would result in acceptable levels of delay (LOS C). The number of vehicles turning left from westbound Farrington Highway onto Waipio Point Access Road during the afternoon peak hour (399 vehicles) would likely result in a queue of waiting vehicles that exceeds the 180-foot length of the left-turn lane. This could result in the stacking of vehicles waiting to turn left into the adjacent through lane. The length of the left turn lane would have to be extended to nearly 400 feet to accommodate this volume without blockage of the through lane. Alternatively, the start times for use of each field could be staggered to spread the arrival/departure times, which would reduce the length of the turn lane to about 300 feet to avoid blockage of the through lane.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The largest impact would be on traffic turning left from Awalai Street, with the average wait time for these vehicles increasing in the afternoon peak hour from about 7 seconds (LOS B) without the Project to 27 seconds (LOS D) with the Project.

The Project would result in an increase to capacity utilization and average delay at the Farrington Highway intersection with Paiwa Street, primarily due to the increase in vehicles turning left from Paiwa Street enroute to the Project site. Traffic conditions would remain at very acceptable levels.

The traffic conditions in the area should remain at acceptable levels of capacity and delay that should not require mitigative actions. Note that this analysis reflects simultaneous start times for use of all of the fields as worst case. Traffic conditions could be improved by the staggering of the start times for games and practices on each of the fields.

Typical Saturday Conditions

At the intersection of Farrington Highway with Waipio Point Access Road, the changes in traffic conditions with typical Saturday games and practice at the Project would parallel those for the weekday. The Project would result in a substantial increase in the proportion of capacity used by the traffic, but the usage would remain at acceptable levels (85.8% in the peak hour). The forecast traffic should result in acceptable levels of delay, although the conditions would be at LOS D during the midday peak hour. Conditions could be improved to LOS C by either the use of staggered start times for the tournament games or the provision of a second access route to/from the Project via Waipahu Depot Street.

The number of vehicles turning left from westbound Farrington Highway onto Waipio Point Access Road during the midday peak hour (467 vehicles) would likely result in a queue of waiting vehicles that exceeds the 180-foot length of the left-turn lane. The length of the left turn lane

would have to be extended to 400 feet to accommodate this volume with minimal blockage of the adjacent through lane. Use of staggered start times for the fields could reduce the left-turn volume to about 300 vehicles and a turn lane storage length of about 300 feet would be needed to minimize queuing into the through lanes.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The average wait time for traffic turning left from Awalai Street would worsen to LOS E in the midday peak hour, with an average delay of 39.6 seconds. However, the traffic volumes and delay would not warrant mitigative actions.

Traffic conditions at the Farrington Highway intersections with Paiwa Street and Waipahu Depot Street would remain at very acceptable levels of service.

SATURDAY TRAFFIC CONDITIONS WITH A TOURNAMENT

Traffic conditions were analyzed for the intersections along Waipio Point Access Road with a large tournament of local youth teams that would use all of the Phase 1 facility. The assessment was made for the midday peak hour with the combined highest nonproject and Project traffic volumes. The initial analysis was based on the simultaneous start time for games on all of the fields, and the departure of the participants for all the games in the preceding time bracket.

The forecast midday peak hour traffic would exceed the capacity of the Farrington Highway intersection by about 19%, with conditions at LOS F. The traffic turning left from the cross streets and driveways along Waipio Point Access Road would experience very long delays in waiting for an opportunity to enter the roadway, with conditions for the vehicles at LOS F.

Two potential actions were assessed to mitigate the impacts of a large local tournament.

1. Stagger the start times of the games. Games would be started on one-half of the fields in each hour throughout the day.
2. Open Waipahu Depot Street for access to/from the Tournament. An unimproved (gravel) roadway could be provided since this route would be used only several times a year.

The staggering of the game start times would improve midday peak hour conditions to LOS D at the intersection with Farrington Highway, with the forecast traffic at approximating 83% of the intersection capacity. The lower peak hour volumes along Waipio Point Access Road would improve the wait times for vehicles turning left from Awalai Street to LOS E.

The opening of Waipahu Depot Street for access to the site, without the staggered start times, would have attract use by about 35 to 40% of the vehicles traveling to or from the tournament. This amount would be needed to reduce the traffic volume at the Farrington Highway intersection with Waipio Point Access Road to 95% of capacity and improve conditions to LOS E.

Conditions could be improved to LOS C, with traffic equivalent to about 75% of the intersection capacity, by the combined use of staggered start times for the tournament games and the provision of a second access route to/from the Project via Waipahu Depot Street.

SATURDAY EVENING TRAFFIC CONDITIONS WITH A SPECIAL EVENT

Conditions were assessed for a professional sports-type event at the Project site on a Saturday evening. All of the attendees were assumed to arrive in the one hour preceding the start of the event and to depart in the one hour following the event.

The analysis indicates that the forecast traffic volumes during the peak arrival hour would approximate to slightly exceed the capacity of the intersection of Farrington Highway with Waipio Point Access Road. The inbound traffic would also result in long delays (LOS E) for traffic turning left from the cross streets and driveways along Waipio Point Access Road.

The Farrington Highway intersection could accommodate the departing traffic during the late evening peak exit hour. Traffic turning left from the cross streets and driveways should be able to merge with the exiting traffic.

Conditions for the arriving traffic in the early evening could be improved by one of the following actions:

1. Open Waipahu Depot Street for Arriving and Exiting traffic. This secondary route would need to attract 10% or more of the arriving traffic to improve conditions to minimally acceptable levels.
2. Include preliminary events to spread the arriving traffic over a longer period of time. The preliminary event would need to attract 10% of more of the attendees to arrive early.

In addition to the above, traffic control officers may be needed at Awalai Street or other locations during the arrival hour to provide gaps in the arriving traffic to allow vehicles to turn left across the inbound traffic flow to the event.

Chapter 5
2010 WITHOUT PROJECT

The full development of the Project Master Plan (Buildout) is planned for completion and availability for use in year 2010. This chapter provides the traffic forecasts and analyses of conditions in 2010 without the Project to serve as a baseline from which to identify the impacts of the Project Buildout.

ROADWAY IMPROVEMENTS

No roadway improvements were identified for the key intersections and roadway segments by 2010, other than those that may be included as part of the Project.

The State has discussed the construction of a roadway connection between Waipio Point Access Road and the Leeward Community College campus to provide an additional access route for traffic traveling to/from the campus. This roadway, if constructed, would connect to Waipio Point Access Road south of Poailani Circle and would increase the traffic through each of the intersections along Waipio Point Access Road that were analyzed for this study. This potential roadway connection has not been included in the traffic forecasts and analyses for this study since the analyses for this study were completed prior to the proposal.

TRAFFIC GROWTH WITHOUT THE PROJECT

Traffic volumes are expected to increase at the study intersections primarily as a result of general increases in area economic activity and development outside the study area. There are several potential development sites along Waipio Point Access Road. One site has been discussed for potential development with about 150 units of senior citizen housing. No development is reflected in the 2010 forecasts. If developed, a senior citizen project of that size would generate no more than several dozen vehicle trips in the peak hours and should not significantly effect the findings of this study.

General area traffic increases were estimated through the development of a traffic growth factor based on traffic increases recorded in the area in recent years. These increases were developed from historical traffic count data recorded at the State Department of Transportation count station #8-C, located at the intersection of Farrington Highway and Waipahu Depot Street. Traffic volumes at this station have increased an average of about 0.6% per year between 1992 and 1996. This average annual growth rate was assumed to continue through year 2010 and apply to all roadways in the study area.

This annual growth rate would result in a 7.8% increase in traffic volumes by late 2010. The traffic volumes at each intersection and for each time period were increased by this amount to represent traffic volumes without the Project.

INTERSECTION CONDITIONS

Traffic conditions in year 2010 without any development of the Project site are summarized for the key intersections in Table 5-1. Traffic at each intersection would operate at very acceptable conditions during each of the analysis hours, with conditions similar to existing conditions.

Table 5-1

2010 TRAFFIC CONDITIONS AT KEY INTERSECTIONS WITHOUT PROJECT
Waipio Peninsula Soccer Park Traffic Impact Study

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.600	17.4	C	0.529	13.1	B
Waipio Point Access Rd. at Awalai St./School Dwy.	*	7.7	B	*	6.4	B
Waipio Point Access Rd. at Poailani St.	*	4.9	A	*	4.6	A
Farrington Hwy. at Paiwa St./Awanui St.	0.747	16.1	C	0.697	16.6	C
SATURDAY						
Farrington Hwy. at Waipio Point Access Rd.	0.550	10.5	B	0.362	11.1	B
Waipio Point Access Rd. at Awalai St./School Dwy.	*	6.7	B	*	4.8	A
Waipio Point Access Rd. at Poailani St.	*	5.0	A	*	4.2	A
Farrington Hwy. at Paiwa St./Awanui St.	0.598	11.7	B	0.426	12.1	B
Farrington Hwy. at Waipahu Depot St.	0.568	15.8	C	0.441	14.1	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
* V/C is not calculated for intersections with STOP sign controls.
NA Not Analyzed.

Wilbur Smith Associates; May 15, 1998.

Chapter 6
2010 WITH PROJECT BUILDOUT

The traffic forecasts and analyses reflect conditions near yearend 2010 when Buildout of the Project Master Plan of facilities is expected to be completed and fully operational.

PROJECT DESCRIPTION

The Master Plan of facilities for the Project is depicted in Figure 1-2. Buildout of the Project between 2001 and 2010 would include the portion of the Project not identified for development in Phase 1.

Project Facilities

At Buildout, the Project would include the following facilities:

- A stadium and 10 other fields with illumination to permit nighttime use.
- 22 other soccer fields, for a total of 33 available for daytime use.
- A Training Center and facilities for a training camp.
- Restrooms and change facilities.
- A parking area with about 5,000 surfaced stalls.

Roadway Improvements

Phase 1 would include the extension of Waipio Point Access Road to the parking area from its present terminus near the Golf Course as a two-lane roadway. For Project Buildout, the roadway would be extended through the site to connect to Waipahu Depot Street.

PROJECT USE ASSUMPTIONS

The facilities are expected to be regularly used on both weekdays and weekends for soccer practice and games. Tournaments and special events may occur several times a year. Most of the information and assumptions concerning the levels of facility use and the frequency of special events are based on information provided by Stringer Tusher Architects[1] and Belt Collins Hawaii.[2]

Normal Practice and Game Use

The following information and assumptions was used to estimate usage of the Project facilities in year 2010.

- The soccer fields are expected to be used by youth teams primarily on weekday afternoons (3:00 -6:30 PM) and Saturdays during the daytime. Adult teams are

[1] Memorandum to Soccer Committee Task Force from Stringer Tusher Architects, dated March 30, 1998.
[2] Memorandum to Wilbur Smith Associates from Belt Collins Hawaii, dated April 9, 1998.

expected to primarily use the fields during weekday and Saturday evenings, and on Sundays.
- Approximately a two-hour block of time would be used for a soccer game or practice.
- Most youth teams play in only one game or practice session per day.
- The estimated average level of use for the different times of the week is summarized in the following table.

Time of Week	Average Fields In Use	Average Population Per Field	Average Total Population At One Time
Weekday Afternoon	20	30	600
Weekday Evening	9	25	225
Weekend Daytime	30	30	900
Weekend Evening	7	25	275

- The estimated usage of the Training Center facilities is summarized in the following table.

Time of Week	Average Population at Training Center	Persons at Training Camp
Weekday Afternoon	60	0
Weekday Evening	100	0
Weekend Daytime	100	0
Weekend Evening	300	50

Tournaments

Soccer tournaments mostly occur on weekends, except for some that may start on a weekday during the Christmas or Spring Break holidays and end on a weekend day. Most tournaments would be for local teams although the new soccer complex could attract national or international tournaments. For this assessment, the following use characteristics were used:

- A local tournament is used for the analyses since these are likely to generate higher traffic volumes. Participants and a portion of the spectators in a national or international tournament are more likely to travel by groups in vans or buses and result in lower traffic volumes.
- A youth tournament on a Saturday is used for the analyses.
- The tournaments typically start at 9:00 AM and last through 4:00 PM.
- Most youth teams play only one game a day. The participants are assumed to leave after their game.

- A large tournament is likely to use all of the fields during the peak period of play. The estimated population for a large tournament is:
  - 33 fields in use
  - An average of 50 persons per field
  - A peak of 1,650 persons for the ongoing games at any one time.

Special Event

With the Buildout of facilities, special events would likely be professional games or community events on a weekend. These events could have as many as 15,000 attendees. A professional sports event of 15,000 persons on a Saturday evening is used for this assessment.

Additionally, a special event could be held at the Training Center with 300 attendees. For the analyses, special events are assumed to occur at the Training Center during a Tournament, but not during the large special event at the Project site.

VEHICLE TRIP GENERATION

The numbers of vehicle trips generated by the Project facilities were estimated for typical levels of use on weekdays and Saturdays, for a Saturday tournament, and for an evening special event.

Assumptions Used for the Estimated Trip Generation

A set of conservative assumptions was used to provide a high estimate of the numbers of vehicle trips for each of the analysis events and time periods. The same assumptions were used for the year 2010 forecasts as outlined for 2001 (Chapter 4) with the exception of the Special Event.

Special Events

- The trip generation is based on an average of 3 persons per vehicle. With the larger event, it is assumed that more ridesharing would occur.
- As an initial assumption, all attendees are assumed to arrive in a one-hour period prior to the start time and depart within one hour after the conclusion of the event.
- Given the large size of the event and the likelihood of congestion and delays, all vehicles are assumed to remain at the event (no drop-offs).

Estimated Numbers of Vehicle Trips

The estimated number of participants/attendees and the use characteristics were used to estimate the numbers of vehicle trips for each of the analysis periods and scenarios. The estimated numbers of vehicle trips are summarized in Table 6-1. Appendix Table A-2 provides additional information concerning the composition of the estimated numbers of vehicle trips.

For the weekday afternoon peak hour, the use of the facilities is estimated to generate a total of 1,236 vehicle trips ends, with one-half arriving at the site and one-half departing the site. This reflects the simultaneous completion of the preceding games/practice sessions and departure of those users at the same time as the arrival of the participants for the next set of games and

Table 6-1

VEHICLE TRIP GENERATION BY PROJECT BUILDOUT IN 2010
Waipio Peninsula Soccer Park Traffic Impact Study

Event Type & Time Period	Average Site Population	Arriving Vehicles	Departing Vehicles	Total Trip Ends
Typical Weekday Play or Practice				
Afternoon Peak Hour	660	618	618	1,236
Early Evening Hour	660/325	334	400	734
Late Evening Hour	325	0	164	164
Daily	--	1,400	1,400	2,800
Typical Saturday Play or Practice				
Midday Peak Hour	1,000	930	930	1,860
Early Evening Hour	1,000/625	599	615	1,213
Late Evening Hour	625	0	299	299
Daily	--	3,200	3,200	6,400
Saturday Tournament				
Midday Peak Hour	2,000	1,785	1,665	3,450
Daily	--	5,200	5,200	10,400
Special Event				
Arrival Hour	15,000	5,000	0	5,000
Departure Hour	15,000	0	5,000	5,000

Wilbur Smith Associates; May 18, 1998

practices. The Buildout trips would be almost double the number of vehicle trips estimated for the Phase 1 facilities.

Traffic generation during the early evening period amounts to about 60% of that generated in the afternoon peak hour. The lower number of vehicle trips results from fewer vehicles arriving for nighttime use. Nighttime use is constrained by the limited number of illuminated fields. In the late evening hour, 164 vehicles would depart the soccer fields and the Training Center. At full buildout of the Master Plan, the facility is estimated to generate approximately 2,800 vehicle trips to or from the site on a typical weekday, as compared to 1,500 estimated for Phase 1.

Daytime use for typical practice and games on a Saturday would generate about 50% more traffic during the peak traffic hour than the weekday use. The evening use would be almost double the weekday evening use due to use of the Training Center to host an event. The total daily traffic generation on a typical Saturday (6,400 vehicle trips to or from site) would be twice that for the weekday due to the use during the Saturday morning and early afternoon hours, combined with the larger population at any one time during the day. This would be more than double the 3,000 vehicle trips on a Saturday with Phase 1.

A capacity-size youth soccer tournament that extends from morning until late afternoon on a Saturday is estimated to generate approximately 10,400 vehicles trips to or from the site during the day. About 3,450 vehicle trips, or one-third of the total, could be generated during the peak one-hour period with simultaneous start times for the games on all of the fields.

A professional sports event or similar special event with 15,000 attendees could generate approximately 5,000 vehicle trip ends before the event and a similar number after the event.

2010 TRAFFIC VOLUMES DURING THE ANALYSIS HOURS

The same distribution and assignment of Project trips was used for year 2010 as used for 2001.

Weekday Traffic

The resultant estimates of weekday traffic are depicted in Figure 6-1 for the afternoon peak hour, in Figure 6-2 for the early evening analyses hour, and in Figure 6-3 for the late evening analysis hour. The numbers of vehicles traveling to or from the Project and the proportional increase to the forecast 2010 traffic volumes without the Project are summarized in the following table for several key roadways providing access to the site.

The afternoon peak hour would experience both the largest numerical and proportional increase in traffic volumes due to the Project. During this peak hour, the Project would more than triple the number of vehicles using the Waipio Point Access Road during the late afternoon period (approximately 4:00 to 5:00 PM). This peak traffic would occur after the peak traffic associated with students and staff leaving the high school and would represent volumes approximately double those on Waipio Point Access Road during the earlier peak hour for the school traffic.

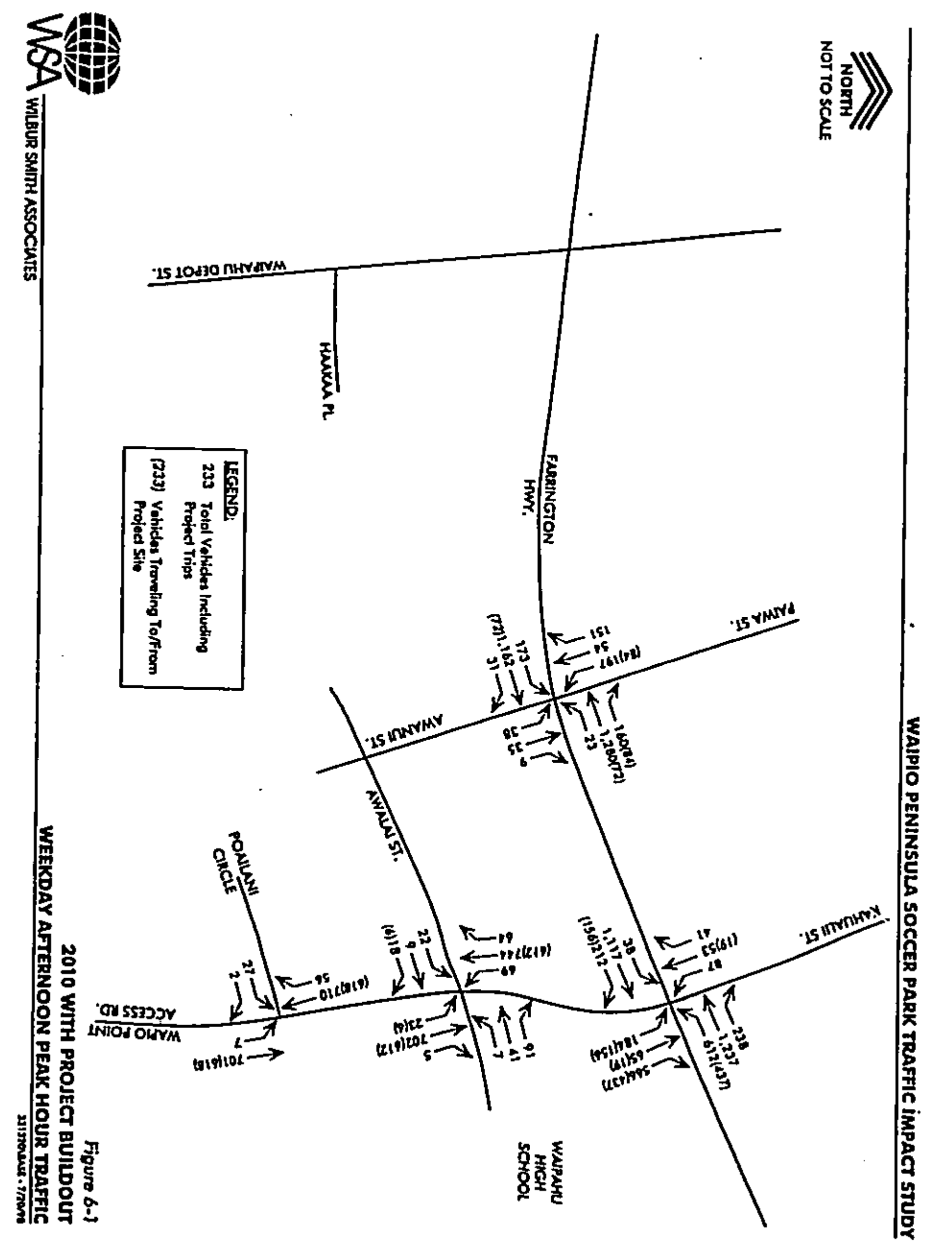
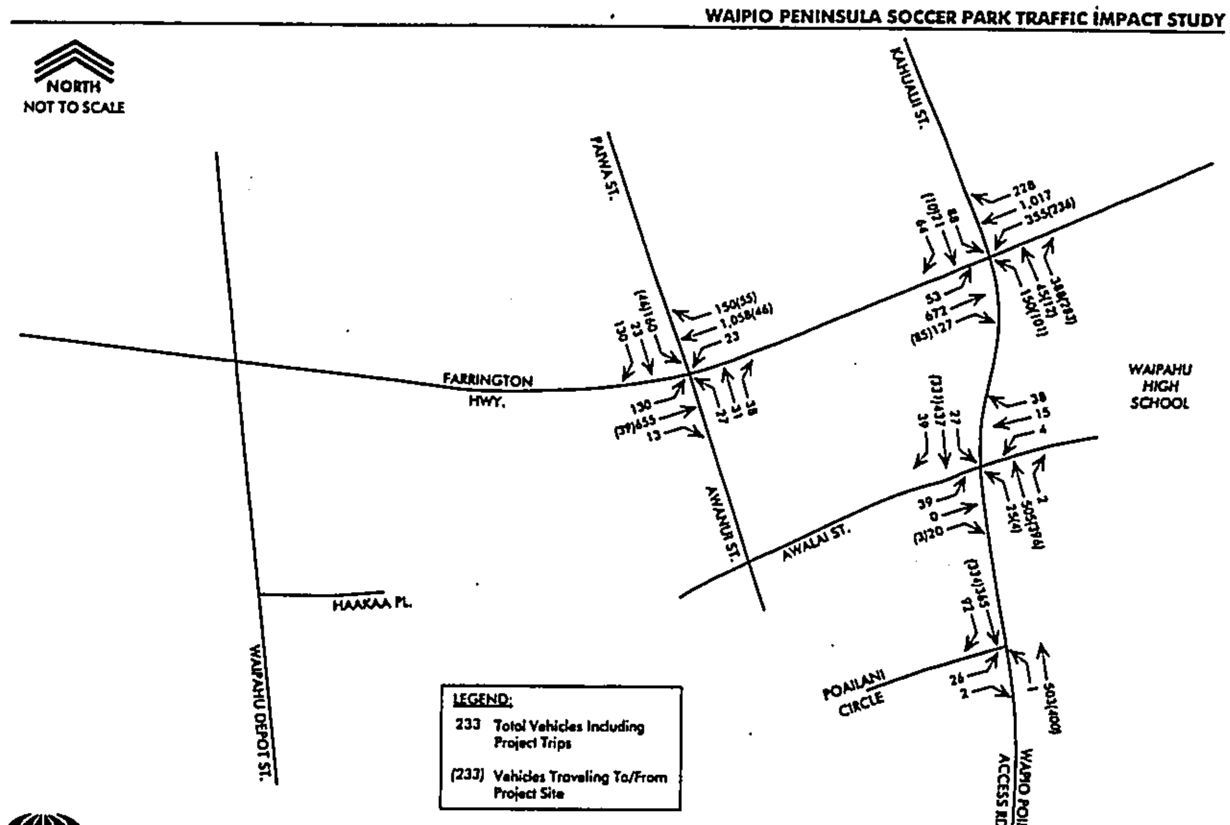
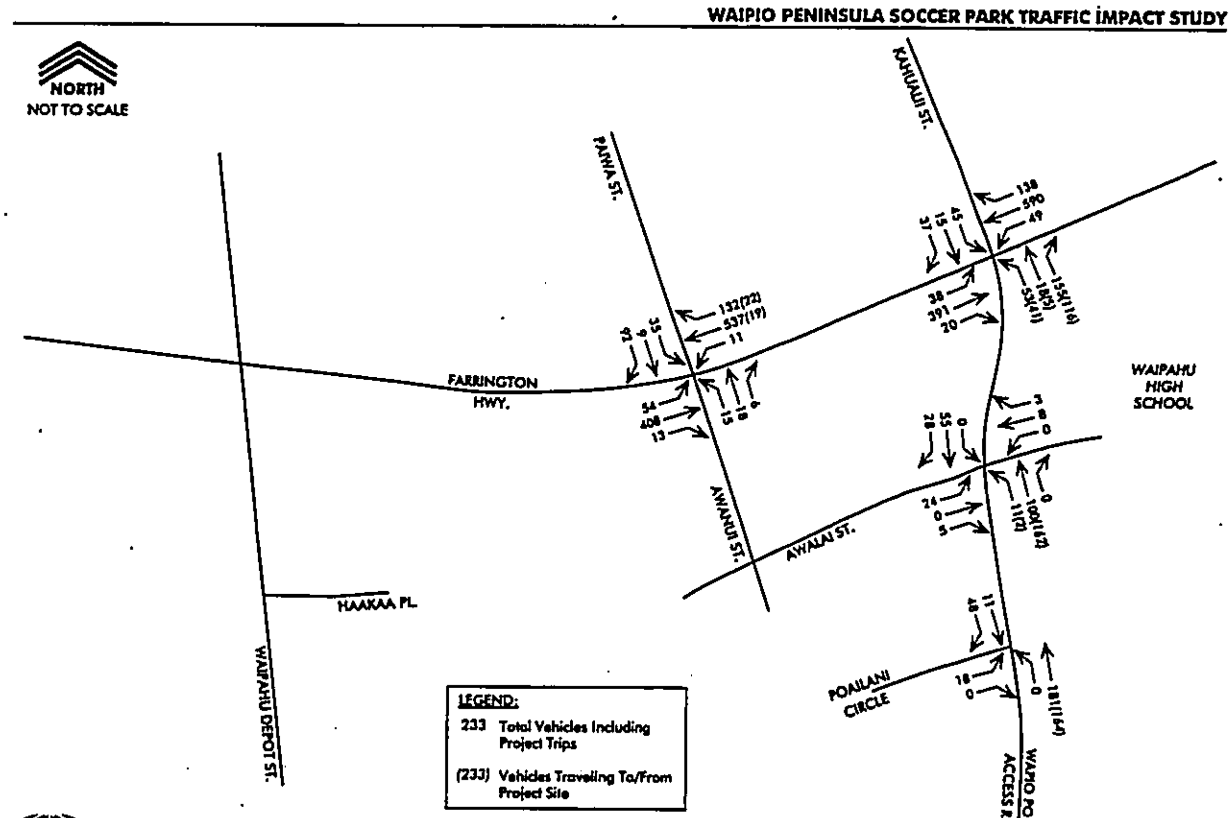


Figure 6-1
2010 WITH PROJECT BUILDOUT
WEEKDAY AFTERNOON PEAK HOUR TRAFFIC



WSA WILBUR SMITH ASSOCIATES

Figure 6-2
2010 WITH PROJECT BUILDOUT
WEEKDAY TRAFFIC (6:00 - 7:00 PM)



WSA WILBUR SMITH ASSOCIATES

Figure 6-3
2010 WITH PROJECT BUILDOUT
WEEKDAY TRAFFIC (8:30 - 9:30 PM)

The Project would also double traffic volumes on Waipio Point Access Road during the early evening hour (6:00-7:00 PM). The Project would result in much lower increases during the other afternoon and evening hours.

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	874	29.3	519	23.3	116	9.3
Waipio Point Access Rd. South of Farrington Hwy.	1,224	261.5	727	202.5	162	109.5
Farrington Hwy. West of Paiwa St.	144	5.4	85	4.4	19	1.7
Paiwa St. North of Farrington Hwy.	168	27.9	101	19.3	22	6.9

Note that the increases in the above table reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the table.

Saturday Traffic

The resultant estimates of traffic volumes for typical Saturday use of the Sports Complex are depicted in Figure 6-4 for the midday peak hour, in Figure 6-5 for the early evening analyses hour, and in Figure 6-6 for the late evening analysis hour. The number of vehicles traveling to or from the Project and the proportional increase to the forecast 2010 traffic volumes without the Project are summarized in the table on the following page for several key roadways providing access to the site.

The proportional increases to midday, early evening, and late evening Saturday traffic would be substantially greater than for the weekday. This results from both the higher volumes of Project traffic and the lower volumes of nonproject traffic on Saturdays

As with the weekday forecasts, these increases reflect the simultaneous start and completion of the games and practice sessions on all of the fields in use. If the start times for the use of the fields were staggered, this could reduce the traffic increases in the afternoon and early evening by as much as one-half of those shown in the following table.

WAIPIO PENINSULA SOCCER PARK TRAFFIC IMPACT STUDY

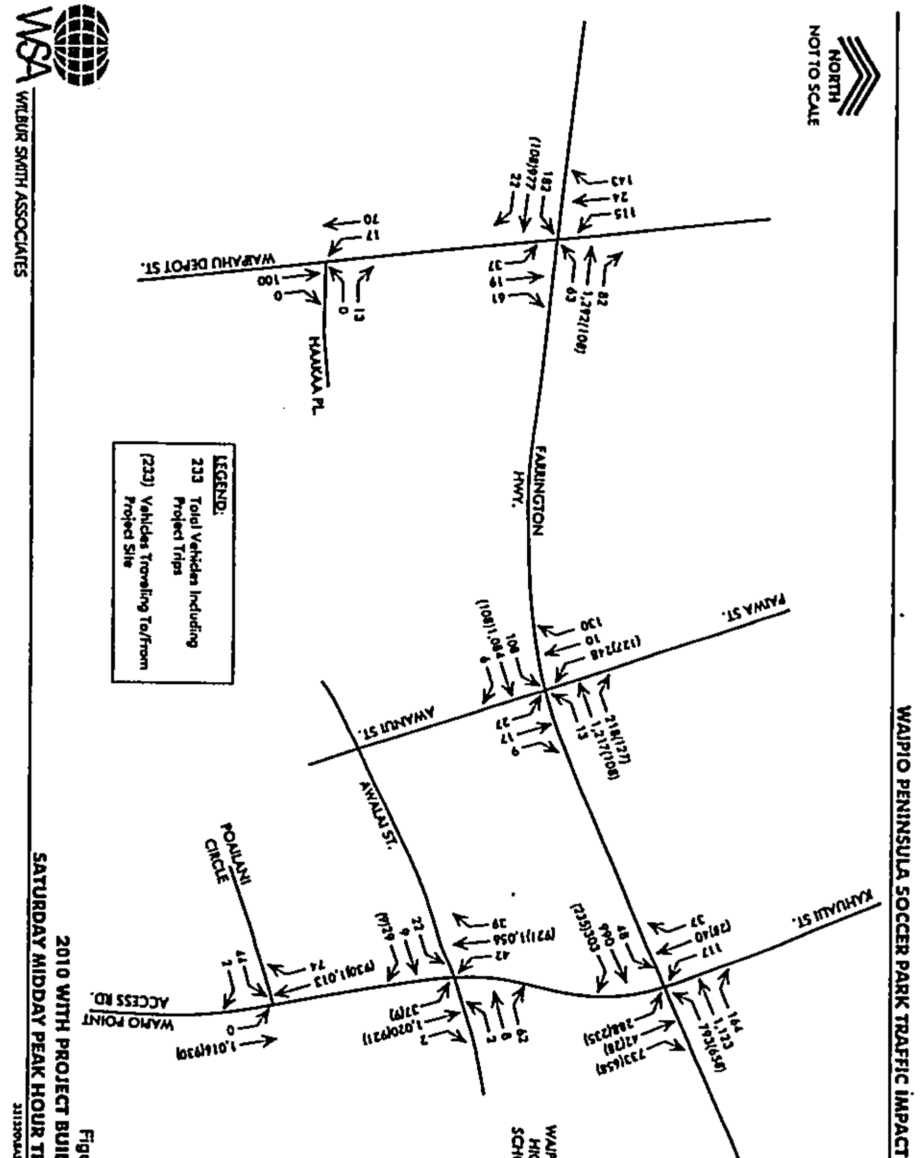


Figure 6-4
2010 WITH PROJECT BUILDOUT
SATURDAY MIDDAY PEAK HOUR TRAFFIC

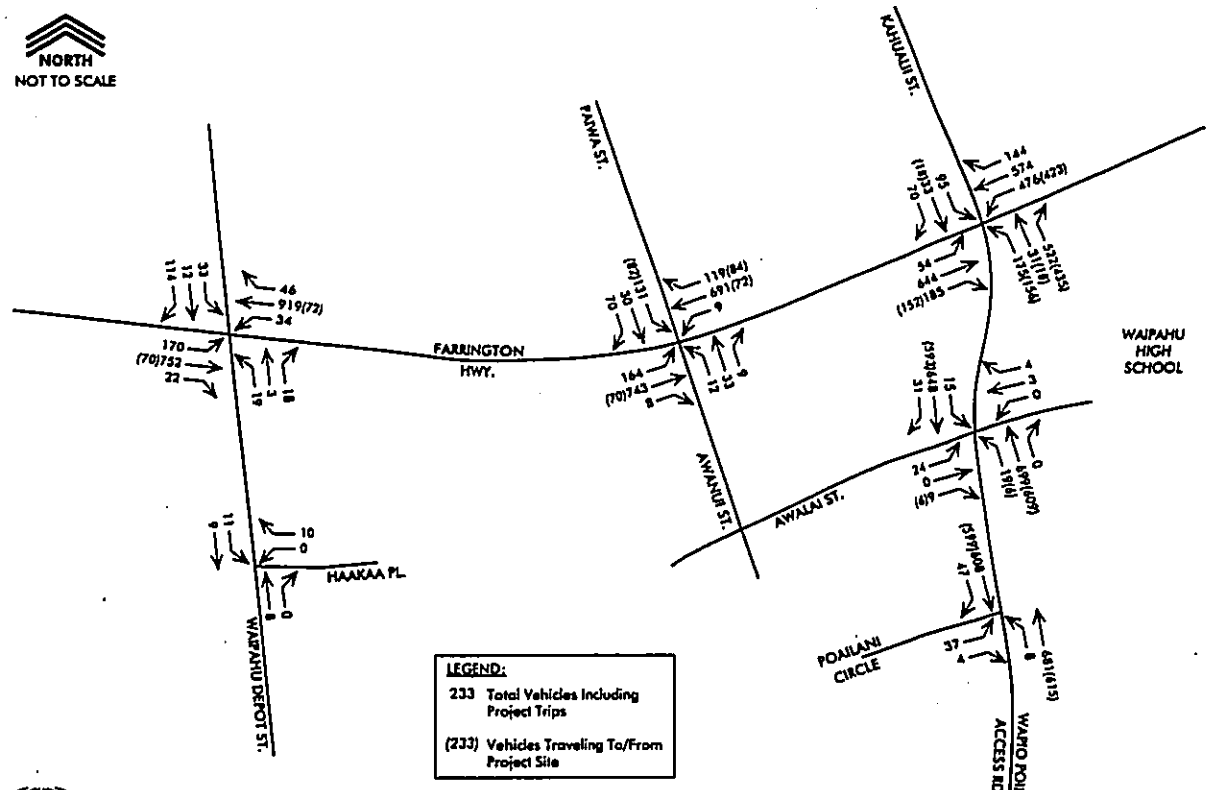


Figure 6-5
2010 WITH PROJECT BUILDOUT
SATURDAY TRAFFIC (6:30 - 7:30 PM)

WSA WILBUR SMITH ASSOCIATES

WAIPIO PENINSULA SOCCER PARK TRAFFIC IMPACT STUDY

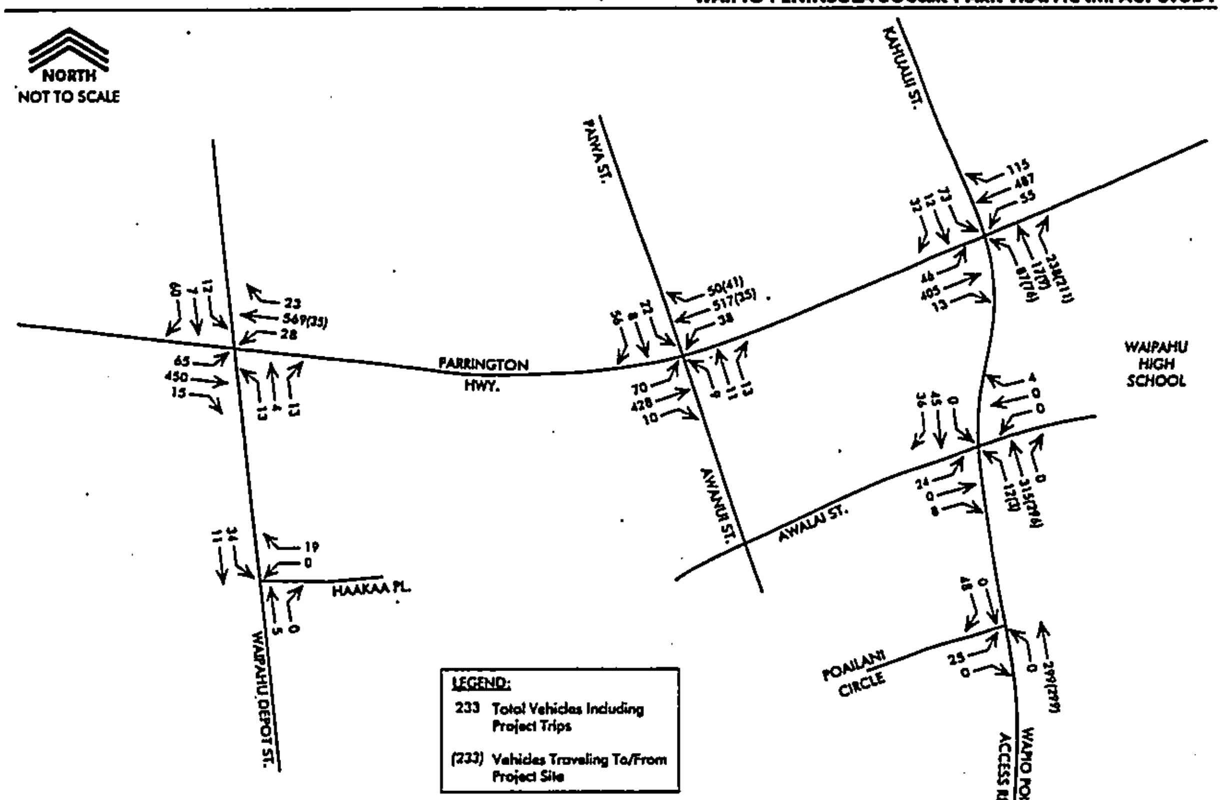


Figure 6-6
2010 WITH PROJECT BUILDOUT
SATURDAY TRAFFIC (9:00 - 10:00 PM)

WSA WILBUR SMITH ASSOCIATES

Location	Afternoon Peak Hour		Early Evening Hour		Late Evening Hour	
	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase	Traffic Increase	Percent Increase
Farrington Highway East of Waipio Point Access Rd.	1,316	49.8	858	53.7	211	18.2
Waipio Point Access Rd. South of Farrington Hwy.	1,842	464.0	1,202	546.4	296	234.9
Farrington Hwy. West of Paiwa St.	216	4.6	142	9.2	35	3.3
Paiwa St. North of Farrington Hwy.	254	53.2	166	43.6	41	23.3

2010 TRAFFIC CONDITIONS AT KEY INTERSECTIONS

Traffic conditions were analyzed at the key intersections with the traffic volumes forecast for the afternoon and early evening hours for typical weekday and Saturday use. The analysis results are summarized in Table 6-2 for the key intersections for both the weekday and Saturday hours with typical practice and games at the Sports Complex.

Weekday Conditions

The estimated traffic volumes in the afternoon peak traffic hour, with simultaneous start of play on all of the fields in use on a typical day, would exceed the capacity of the Farrington Highway with Waipio Point Access Road by about 9%, with conditions at LOS F. The large number of vehicles turning left from westbound Farrington Highway would result in the stacking of waiting vehicles well beyond the 180-foot length of the present left-turn storage lane. The lane would have to be extended to a length of about 640 feet to avoid blockage of the adjacent through lane. The early evening hour traffic would result in acceptable conditions at the intersection.

The increased traffic volumes along Waipio Point Access Road would result in longer waits by vehicles exiting from the cross streets and driveways onto Waipio Point Access Road. The largest impact would be on traffic turning left from Awalai Street during the afternoon peak hour, with the extremely long wait times (LOS F) for these vehicles with the Project.

The Project would result in an increase to capacity utilization and average delay at the Farrington Highway intersection with Paiwa Street, primarily due to the increase in vehicles turning left from Paiwa Street enroute to the Project site. Traffic conditions would remain at very acceptable levels.

Table 6-2

2010 TRAFFIC CONDITIONS AT KEY INTERSECTIONS WITH PROJECT BUILDOUT
Waipio Peninsula Soccer Park Traffic Impact Study

Day and Intersection	Afternoon Peak Hour			Early Evening Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
WEEKDAY						
Farrington Hwy. at Waipio Point Access Rd.	1.090	**	F	0.826	30.4	D
Waipio Point Access Rd. at Awalai St./School Dwy.	*	279.6	F	*	26.1	D
Waipio Point Access Rd. at Poailani St.	*	40.6	E	*	14.9	C
Farrington Hwy. at Paiwa St./Awanui St.	0.890	23.0	C	0.778	18.3	C
SATURDAY						
Farrington Hwy. at Waipio Point Access Rd.	1.263	**	F	0.926	48.2	E
Waipio Point Access Rd. at Awalai St./School Dwy.	*	999.9	F	*	39.7	E
Waipio Point Access Rd. at Poailani St.	*	277.9	F	*	35.3	E
Farrington Hwy. at Paiwa St./Awanui St.	0.803	17.8	C	0.592	13.3	B
Farrington Hwy. at Waipahu Depot St.	0.593	15.9	C	0.458	14.1	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
* V/C is not calculated for intersections with STOP sign controls
** Delay not calculated since unreliable where traffic substantially exceeds capacity.
NA Not Analyzed.

Wilbur Smith Associates; May 15, 1998.

Conditions at the Waipio Point Access Road intersections with Farrington Highway and with Awalai Street would warrant mitigative actions for the afternoon peak hour.

Typical Saturday Conditions

The midday peak hour traffic volumes would exceed the capacity of the Farrington Highway intersection with Waipio Point Access Road by approximately 26%, based on simultaneous for use of the play fields. The large volume of vehicles turning left onto Waipio Point Access Road would result in a stacking problem, with a storage lane length of about 770 feet needed to minimize blockage of the adjacent through lane. Traffic volumes in the early evening hour would use about 92% of capacity with conditions at LOS E.

Both the Awalai Street and Poialani Circle intersections would experience extremely long delays during the midday peak hour for vehicles turning left onto Waipio Point Access Road

Both the Farrington Highway intersections with Paiwa and Waipahu Depot Streets would operate at acceptable levels of service.

Conditions at the Waipio Point Access Road intersections with Farrington Highway, Awalai Street, and Poialani Circle would warrant mitigative actions for the midday peak hour.

Potential Mitigation Actions

The intersection of Farrington Highway with Waipio Point Access Road would operate at unacceptable conditions in both the weekday afternoon peak hour and the Saturday midday peak hour. Several potential actions were assessed for this problem location.

1. Stagger the start times of the games and practice sessions. Games or practice sessions would be scheduled to start on one-half of the fields in use each hour throughout the day, which would reduce the peak hour traffic volumes by about one-half of the volumes in Table 4-1.
2. Open Waipahu Depot Street for use by vehicles traveling to/from the Sports Complex to reduce the traffic use of Waipio Point Access Road.
3. Widen the westbound approach of Farrington Highway to provide a second (double) left-turn lane, which would both increase the capacity and the available storage length for this movement. This would also require the widening of Waipio Point Access Road to provide two southbound lanes to receive the two lanes of vehicles turning left.
4. Reduce the traffic island size in the southeast portion of the intersection to provide separate left-turn and through lanes for traffic exiting Waipio Point Access Road.

The results of the analysis of these actions are summarized in the following table for the intersection of Farrington Highway with Waipio Point Access Road.

Potential Action	Weekday Afternoon Peak Hour			Saturday Midday Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
1. Stagger Start Times of Games	0.833	24.0	C	0.874	30.0	D
2. Open Waipahu Depot Street	0.968	32.0	D	1.033	43.1	E
3. Add 2[nd] Westbound Left Turn Lane	0.890	27.0	D	0.999	41.4	E
4. Add Northbound Left-Turn Lane	0.981	45.6	E		NA	
5. Combine #3 & #4	0.818	23.4	C	0.936	40.6	E

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
NA Not Analyzed.

The analysis indicates that the staggering of field start times (Alternative # 1) would result in acceptable conditions during peak traffic hours for normal use of the Sports Complex on either a weekday or Saturday.

The use of Waipahu Depot Street, without other mitigative actions, would not improve traffic conditions at the Waipio Point Access Road intersection to acceptable levels. This action would have to be combined with other actions to provide acceptable conditions during the peak traffic periods.

The provision of both new left-turn lanes (Alternative #5) would be needed to provide acceptable conditions for the Saturday midday peak hour volumes, if other mitigative actions are not implemented.

SATURDAY TRAFFIC CONDITIONS WITH A TOURNAMENT

Traffic conditions were analyzed for the intersections along Waipio Point Access Road with a large tournament of local youth teams that would use all of the playfields. An event is also assumed at the Training Center facility. The assessment was made for the midday peak hour with the combined highest nonproject and Project traffic volumes. The initial analysis was based on the simultaneous start time for games on all of the fields, and the departure of the participants for all of the games in the preceding time bracket.

With only Waipio Point Access Road open for access to the site, the forecast midday peak hour traffic would be approximately double the capacity of the Farrington Highway intersection (V/C =2.02), with conditions at LOS F. The traffic turning left from the cross streets and driveways along Waipio Point Access Road would experience very long delays in waiting for an opportunity to enter the roadway, with conditions for the vehicles at LOS F.

If the start times for games are staggered with one-half beginning each hour, the lower volume of tournament traffic during the peak hour would result in traffic exceeding the intersection capacity by about 20%.

The widening of the intersection to provide the second left-turn lane on Westbound Farrington Highway and to provide a separate left-turn lane on northbound Waipio Point Access Road, if the start times are not staggered, would result in traffic volumes approximately 28% greater than the intersection capacity. The combination of the two additional left-turn lanes and staggering of start times would improve the conditions to 95% of capacity and LOS D.

If Waipahu Depot Street is open, with staggering of start times, the peak hour traffic volumes would exceed the capacity of the Farrington Highway intersection with Waipio Point Access Road by 5% or more. Therefore, two left-turn lanes would be needed for the turn from westbound Farrington Highway to accommodate traffic to a capacity-size tournament.

With the combination of staggered start times, the double left-turn lanes, and the provision of a second access route via Waipahu Depot Street, the conditions at the intersection of Farrington Highway with Waipio Point Access Road would improve to LOS C with the forecast volumes equivalent to about 85.6% of intersection capacity.

SATURDAY EVENING TRAFFIC CONDITIONS WITH A SPECIAL EVENT

Conditions were assessed for a professional sports-type event at the Project site on a Saturday evening. All of the attendees were assumed to arrive in the one hour preceding the start of the event and to depart in the one hour following the event.

With access only via Waipio Point Access Road, the analysis indicates that the forecast traffic volumes during the peak arrival hour would approximate four times the capacity of the intersection of Farrington Highway with Waipio Point Access Road. The inbound traffic would also result in extremely long delays (LOS F) for traffic turning left from the cross streets and driveways along Waipio Point Access Road.

Conditions for the arriving traffic in the early evening could be improved to acceptable conditions by the combination of the following actions:

1. Open Waipahu Depot Street for arriving and exiting traffic. This secondary route would need to attract close to one-third of the traffic.

2. Include preliminary events to spread the arriving traffic over a longer period of time. The preliminary event would need to attract 50% or more of the attendees to arrive early.
3. Provide two lanes for traffic turning left from Farrington Highway into Waipio Point Access Road.

The combined actions would result in LOS C conditions with traffic approximating 83% of capacity at the intersection of Farrington Highway with Waipio Point Access Road.

In addition to the above, traffic control officers may be needed at Awalai Street or other locations during the arrival hour to provide gaps in the arriving traffic to allow vehicles to turn left across the inbound traffic flow to the event.

During the exit period, a minimum of three outbound lanes would be needed between the site and Farrington Highway, and two right-turn lanes would be needed from Waipio Point Access Road to clear the event traffic within 1 to 1½ hours. Traffic turning left from the cross streets and driveways should be able to merge with the exiting traffic.

Traffic management plans should be developed for events of this size to facilitate the arrival and exiting of event traffic.

APPENDICES

Table A-1

VEHICLE TRIP GENERATION FOR PHASE 1

Time Period & Activity	Average or Peak Population	Average Vehicle Occupancy	Percent Not Staying	Vehicle Trip Generation: Arriving Vehicles	Vehicle Trip Generation: Departing Vehicles	Vehicle Trip Generation: Total Arrivals & Departures
WEEKDAYS						
Afternoon Peak Hour						
Soccer Field Finish Use	330	1.5	0.5	110	220	330
Soccer Field Start Use	330	1.5	0.5	220	110	330
Total				330	330	660
Early Evening						
Soccer Field Finish Use	330	1.5	0.5	110	220	330
Soccer Field Start Use	100	1.68	0	60	0	60
Total				170	220	390
Late Evening						
Soccer Field Finish Use	100	1.68	0	0	60	60
WEEKEND (SATURDAY)						
Midday Peak Hour						
Soccer Field Finish Use	480	1.5	0.5	160	320	480
Soccer Field Start Use	480	1.5	0.5	320	160	480
Total				480	480	960
Early Evening						
Soccer Field Finish Use	480	1.5	0.5	160	320	480
Soccer Field Start Use	100	1.68	0	60	0	60
Total				220	320	540
Late Evening						
Soccer Field Finish Use	100	1.68	0	0	60	60
Tournament, Midday						
Soccer Field Finish Use	900	1.5	0.5	300	600	900
Soccer Field Start Use	900	1.5	0.5	600	300	900
Total				900	900	1800
Special Event						
Arrival Peak Hour	3,000	2.5	0.05	1200	60	1260
Departure Peak Hour	3,000	2.5	0.05	60	1200	1260

5/11/98

Table A-2

VEHICLE TRIP GENERATION FOR TOTAL MASTER PLAN

Time Period & Activity	Average or Peak Population	Average Vehicle Occupancy	Percent Not Staying	Vehicle Trip Generation: Arriving Vehicles	Departing Vehicles	Total Arrivals & Departures
WEEKDAYS						
Afternoon Peak Hour						
Soccer Field Finish Use	600	1.5	0.5	200	400	600
Soccer Field Start Use	600	1.5	0.5	400	200	600
Training Center	60	1.68		18	18	36
Total				618	618	1238
Early Evening						
Soccer Field Finish Use	600	1.5	0.5	200	400	600
Soccer Field Start Use	225	1.68	0	134	0	134
Training Center	100	1.68		30	30	60
Total				334	400	734
Late Evening						
Soccer Field Finish Use	225	1.68	0	0	134	134
Training Center	100	1.68		0	30	30
Total				0	164	164
WEEKEND (SATURDAY)						
Midday Peak Hour						
Soccer Field Finish Use	900	1.5	0.5	300	600	900
Soccer Field Start Use	900	1.5	0.5	600	300	900
Training Center	100	1.68		30	30	60
Total				930	930	1860
Early Evening						
Soccer Field Finish Use	900	1.5	0.5	300	600	900
Soccer Field Start Use	275	1.68	0	164	0	164
Training Center	50	1.68		15	15	30
Training Center Event	300	2.5		120	0	120
Total				599	615	1213
Late Evening						
Soccer Field Finish Use	275	1.68	0	0	164	164
Training Center	50	1.68		0	15	15
Training Center Event	300	2.5		0	120	120
Total				0	299	299

Table A-2 (Continued)

VEHICLE TRIP GENERATION FOR TOTAL MASTER PLAN

Time Period & Activity	Average or Peak Population	Average Vehicle Occupancy	Percent Not Staying	Vehicle Trip Generation: Arriving Vehicles	Departing Vehicles	Total Arrivals & Departures
WEEKENDS						
Tournament, Midday						
Soccer Field Finish Use	1,650	1.5	0.5	550	1100	1650
Soccer Field Start Use	1,650	1.5	0.5	1100	550	1650
Training Center	50	1.68		15	15	30
Training Center Event	300	2.5		120	0	120
Total				1785	1665	3450
Special Event						
Arrival Peak Hour	15,000	3	0	5000	0	5000
Departure Peak Hour	15,000	3	0	0	5000	5000

5/11/98

APPENDIX H

NON-POTABLE WATER WAIKELE STREAM WITHDRAWAL STUDY

Effect of the Proposed Use of the WP-18 Pump Station on Waikele Stream and West Loch

Prepared for:
Belt Collins Hawaii
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Honolulu, Hawaii 96813

June 1998

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Introduction

The reactivation of the pump station on Waikele Stream has been proposed as the source of irrigation supply to Waipio Peninsula for the Makalena Golf Course, a proposed soccer field complex, and agricultural uses on Navy lands (refer to Figure 1 for the location of the station just mauka of Farrington Highway). The required irrigation supply for these uses has been estimated by Belt Collins Hawaii to be 4.6 MGD:

	Irrigation Requirement (MGD)
Soccer Complex	1.2
Makalena Golf Course	0.9
Navy Agricultural Use	2.5
Total Supply Requirement	4.6

This report presents an analysis of the effects of withdrawing 4.6 MGD from Waikele Stream. It is particularly focused on the stream itself and the very shallow upper end of Pearl Harbor's West Loch, the receiving body of water. Related studies by Ron Englund and Steve Dollar address the biological impacts of this withdrawal on the stream and in West Loch, respectively. The analysis herein is based on the assumption that the withdrawal would be at a constant year-round rate of 4.6 MGD. Supplemental groundwater sources may be developed to supply dry-period irrigation requirements which exceed 4.6 MGD, but this has not been considered herein.

Historic Development and Use of WP-18

WP-18 was constructed in 1961-62 to provide supplemental irrigation supply for Oahu Sugar Company (OSCO). The pump station is located on the east bank of the stream and on the mauka side of a 5-foot high concrete weir which constructed across the stream just mauka of Farrington Highway. The station's intake is a pipeline to the pool of water impounded behind the weir. The intake pipeline is connected to a concrete wet well into which two large capacity line shaft turbine pumps were installed. The station was used by OSCO in varying amounts from May 1962 to July 1989. Although operated and maintained by OSCO, the facility was designed and constructed by the Honolulu Board of Water Supply (BWS). With the closing of OSCO in 1995, the facility reverted to BWS.

Data of OSCO's use of WP-18 are only available as monthly amounts. Figure 2 is a plot of this use expressed in monthly averages, moving 12-month average, and long-term (1970 to 1989) average. After very little use during the 1960s, WP-18 was used almost continuously from 1970 through mid-1989. Monthly average withdrawals sometimes exceeded 10 MGD. The 12-month moving average reached a peak of 7 MGD in 1977 and 1978 and the long-term average over this 19-year period was 3.7 MGD. This is about 0.9 MGD less than the proposed irrigation use.

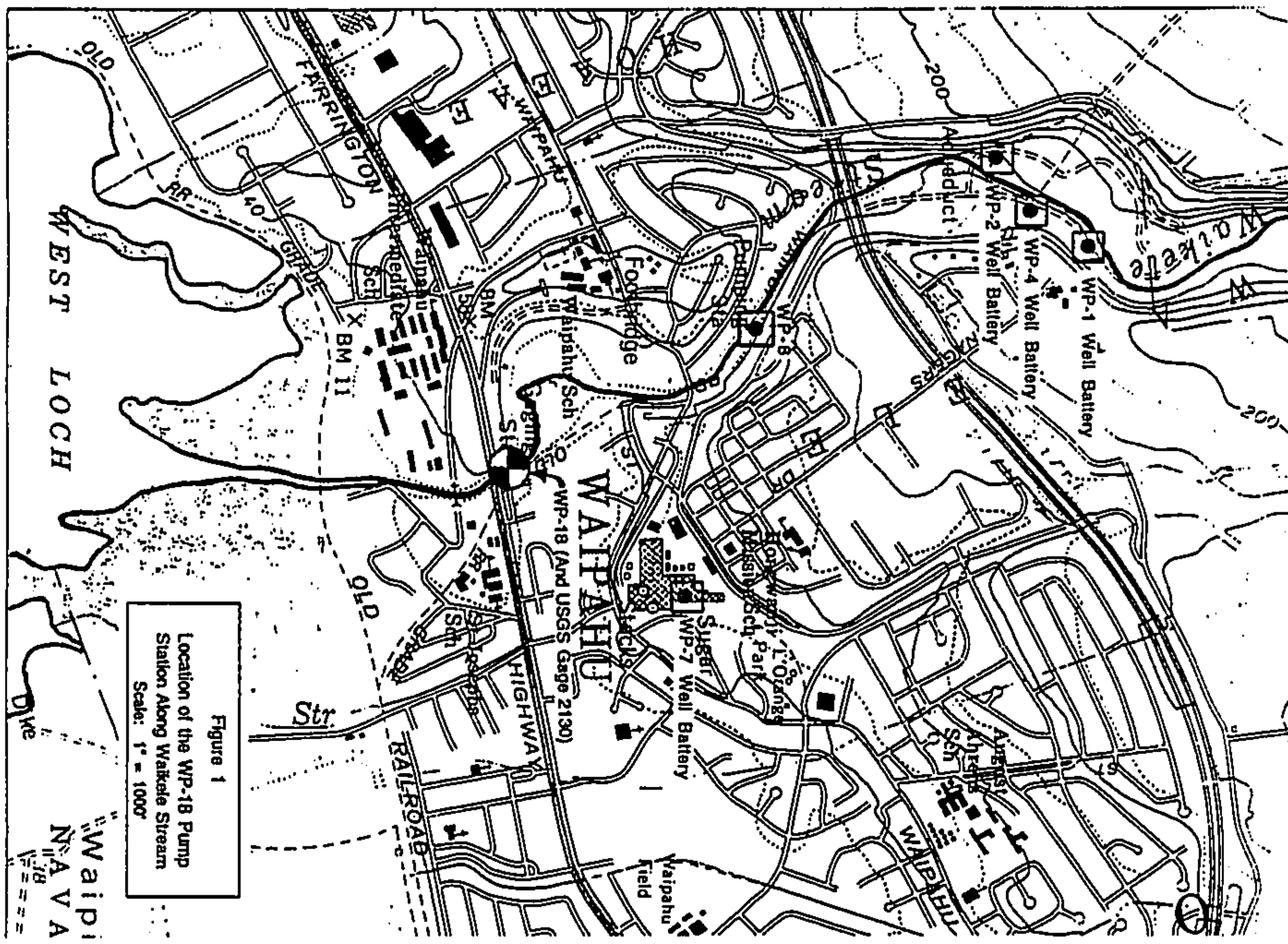
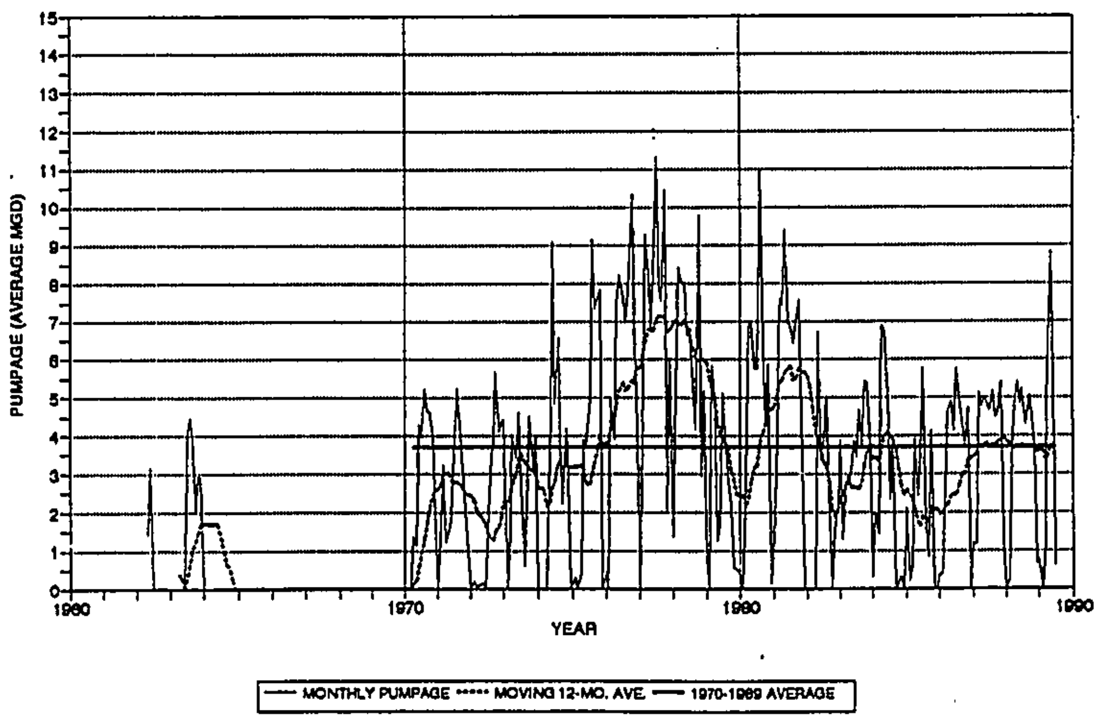


Figure 1
Location of the WP-18 Pump Station Along Waikele Stream
Scale: 1" = 1000'

FIGURE 2
PUMPAGE FROM OSCO'S WP 18
MAY 1962 TO JULY 1989



Other OSCO Water Use Which Affected Waikele Streamflow

Although WP-18 was OSCO's only direct withdrawal from Waikele Stream, some of its other water uses did influence the flowrate in the stream's lower reach. A pump station known as WP-8 had the greatest of these indirect impacts. This facility, which is located along the eastern stream bank between Waipahu Street and H-1 freeway, pumped water from a spring and a development tunnel which was drilled into the east bank. Virtually all of the water pumped by WP-8 in this manner would otherwise have discharged directly or indirectly into the stream.

Data of OSCO's use of WP-8 are also only available as monthly amounts. Figure 3 is plot of this use from the 1950s to the end of 1973. After 1973, WP-8 was used exclusively as a booster station with no impact on streamflow. Monthly average use of WP-8 approached 10 MGD on occasion and the 12-month moving average reached peaks of 7 MGD in the early 1990s. The long-term average (1951 to 1973), including the period of almost no use from March 1964 through April 1967, was 4.1 MGD.

Since pumpage by WP-8 was essentially a direct reduction of streamflow in the reach of the stream below this station, it is appropriate to consider the combined pumpage of WP-8 and WP-18. This is depicted on Figure 4. Monthly withdrawals of up to 14 MGD occurred in the early 1970s and the 12-month moving average during this time was about 10 MGD. Over the 38-year period from 1951 to 1989, average pumpage was 4.3 MGD. This is almost equivalent to the proposed withdrawal of 4.6 MGD.

OSCO also operated batteries of wells further mauka in Waikele Gulch (identified as WP-1, WP-2, and WP-4 located on Figure 1) and at its mill (WP-7). The combined pumpage of these well batteries during the furrow irrigation era (pre-1980s) was in the order of 45 MGD during summertime peaks. After conversion to drip and the loss of fields to urban development, pumpage was reduced to about 30 MGD. The impact of this pumpage on the flowrate of Waikele stream was indirect. The lower reach of the stream is fed by groundwater springs at rates which are dependent on the groundwater head. Reduction of the head by pumpage of the OSCO well batteries reduced spring discharge by some, albeit unknown, amount. Pumpage from these well batteries ended in the 1994-1995 period.

Characterization of Waikele Streamflow

Contributing Watershed. Waikele Stream drains 45.7 square miles of Central Oahu. Its watershed extends to the Koolau and Waianae crests and north to Schofield. Streamflow at elevations above about 18 feet (ie. inland of H-1 freeway) is primarily surface water runoff. Below this point, extending from the cane haul crossing just makai of H-1 freeway to the concrete weir just above Farrington Highway, substantial groundwater discharge into the stream occurs at discreet springs and as more diffuse upward leakage. In a dry period, for example, it is not unusual to have 2 MGD or less at the cane haul crossing and more than 10 MGD flowing over the concrete weir at Farrington Highway just 0.8 miles downstream. The difference in flowrates is the groundwater contribution over this short reach.

FIGURE 3
PUMPAGE FROM OSCO'S WP 8
JANUARY 1951 TO DECEMBER 1973

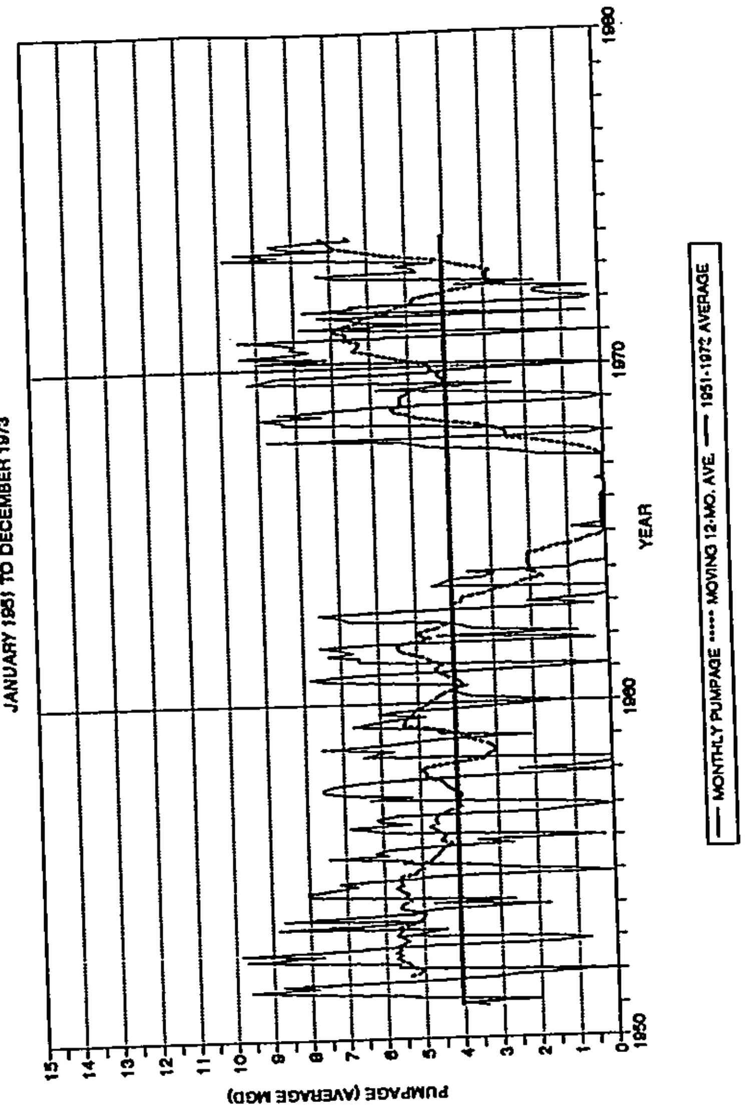
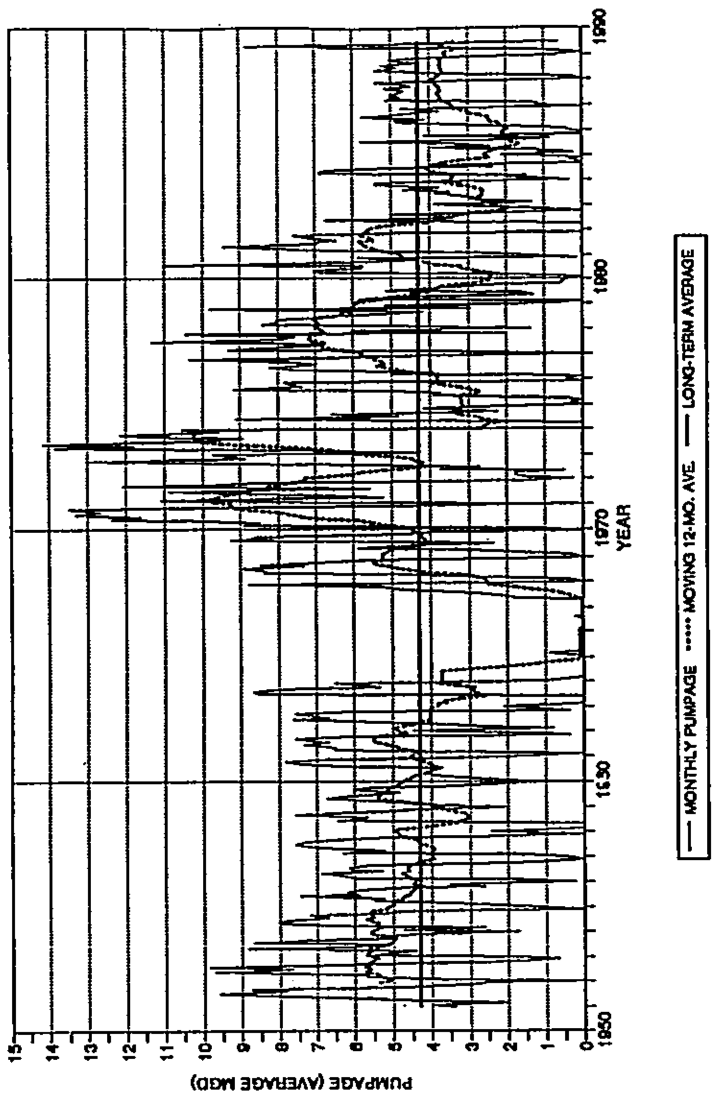


FIGURE 4
PUMPAGE FROM OSCO'S WP 8 AND WP 18
JANUARY 1951 TO JULY 1989



Streamflow Gaging. The U.S. Geological Survey (USGS) has maintained Gaging Station 2130 on the lower reach of Waikele Stream since 1951. In July 1960, the station was relocated to the concrete weir which had just been constructed. Prior to that, the gaging station was located 300 feet downstream. The only breaks in the gaging record are from September 1951 through March 1952 and October 1959 through June 1960. The latter period coincided with construction of the weir and installation of concrete banks along the stream channel for flood protection.

Figure 5 is a plot of monthly average streamflow at USGS Gage 2130. Long-term averages are shown for the periods prior to and following July 1989 to differentiate the effect of OSCO's use of WP-8 and WP-18 from the present situation. For the period up to July 1989, streamflow averaged 26.2 MGD. Since August 1989, its average has been just 0.8 MGD higher at 27.0 MGD. This is a somewhat surprising considering the amount of OSCO pumpage up to 1989. However, the daily statistics of USGS Gage 2130 do illustrate the impact of OSCO's withdrawals. Figure 6 presents the duration-discharge curve of the daily flowrates before and after July 1989. Low-flow days have obviously been higher since 1989 than in the earlier period. Figure 7 is a comparison of low flow rates for 30 consecutive day periods. The differences before and after July 1989 are of the same 4 to 5 MGD magnitude as the combined long-term average pumpage by WP-8 and WP-18.

Stream Water Quality Mauka of the Concrete Weir. The concrete weir that was installed in 1960 creates a discontinuity in the stream. It separates the entirely fresh water on the upstream side from the tidal reach on the downstream side. Depending on the phase of the tide, the difference in stream levels may be three to five feet. The quality of water on the upstream of the weir is described in this section. Quality in the tidal reach downstream is discussed in the next section.

As noted previously, water upstream the weir is comprised of surface runoff from the inland watershed and groundwater inflow over the 0.8-mile reach above the weir. Water samples were collected during a relatively dry period to illustrate the contributions of surface and groundwater sources. Sample locations are shown on Figure 8 and the water quality results are compiled on Table 1. Samples 1 and 2 were taken upstream of the spring discharges and are representative of dry-period surface runoff: very low salinity (0.13 PPT); low levels of silica (165 µM); and very low concentrations of dissolved nutrients (0.05 µM NO_3 and 0.20 µM PO_4). Samples 7 and 8 were taken from springs at WP-8 and at the abutment of the Waipahu Street bridge. Their quality is representative of influent groundwater over the 0.8 miles above the weir: higher salinity than surface water (0.28 PPT); silica levels above 1000 µM; and higher dissolved nutrients (160 µM NO_3 and 8.0 µM PO_4). Samples 3 through 6 were taken from the 0.8-mile reach of the stream and are comprised of a mixture of surface and groundwater. The predominance of groundwater in the samples is obvious in their values of salinity, silica, and dissolved nutrients. Based on simple mixing, these constituent levels suggest that flow over the weir on the May 17th sampling date was 60 percent groundwater. This is generally in accord with observed flows on that day of about 3 MGD at Site 2 and 15 MGD flowing over the weir.

FIGURE 4
PUMPAGE FROM OSCO'S WP 8 AND WP 18
JANUARY 1951 TO JULY 1989

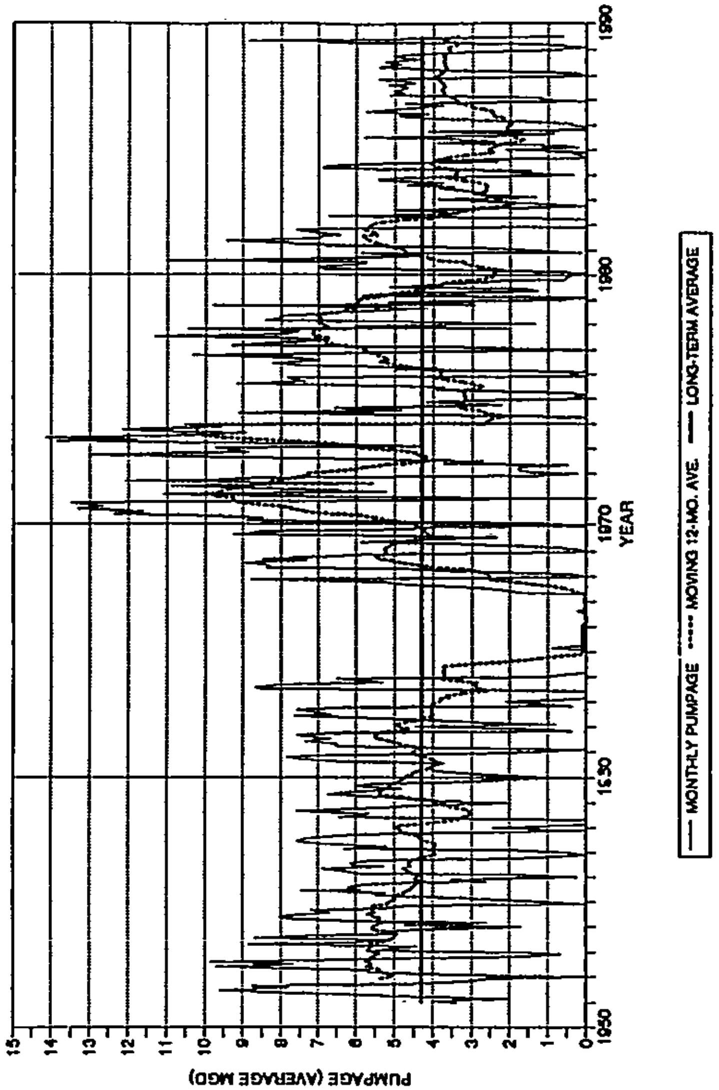


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FIGURE 5
MONTHLY AVERAGE FLOW AT USGS GAGE 2130
ON WAIKELE STREAM, 1951 TO 1997

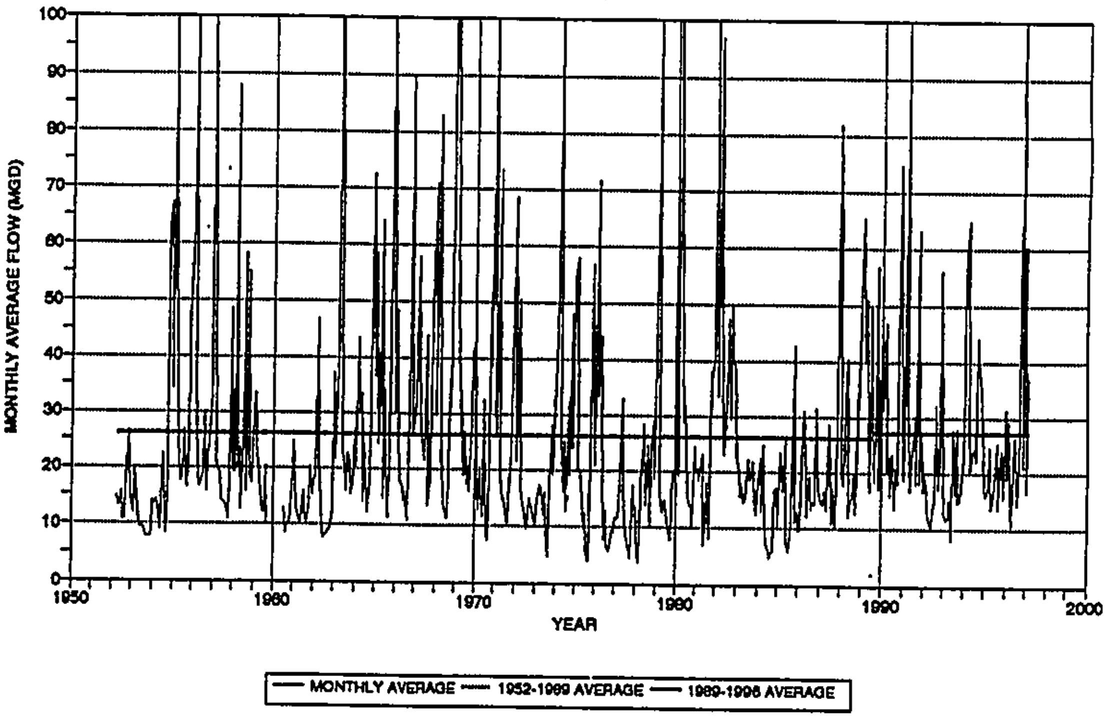
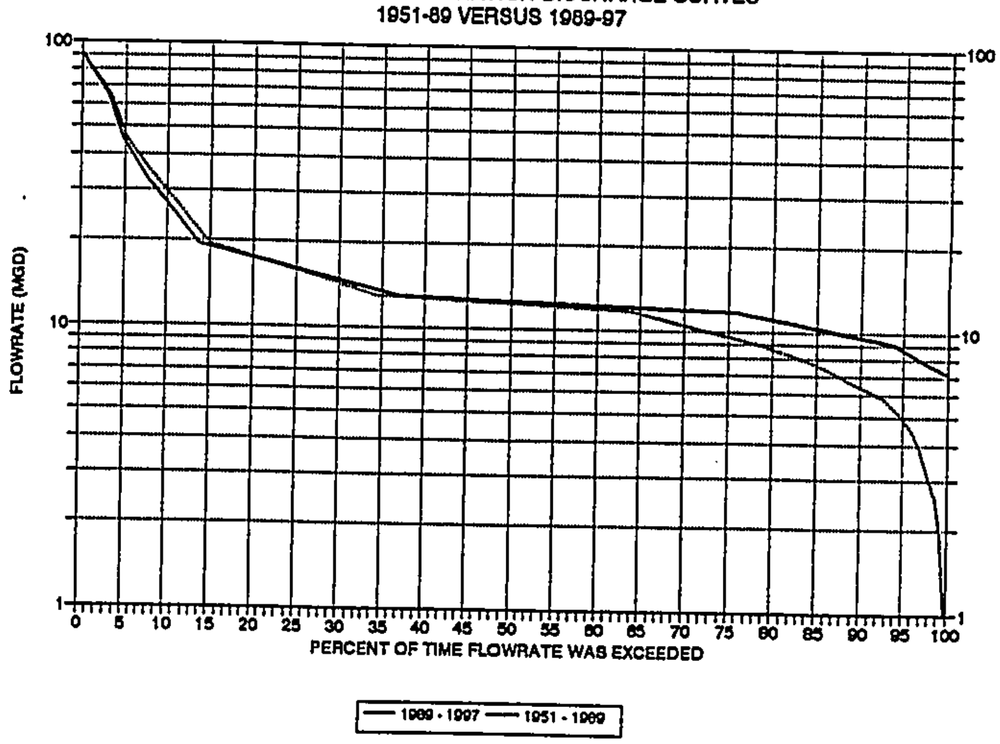


FIGURE 6
COMPARISON OF DURATION DISCHARGE CURVES
1951-89 VERSUS 1989-97



CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

FIGURE 5
MONTHLY AVERAGE FLOW AT USGS GAGE 2130
ON WAIKELE STREAM, 1951 TO 1997

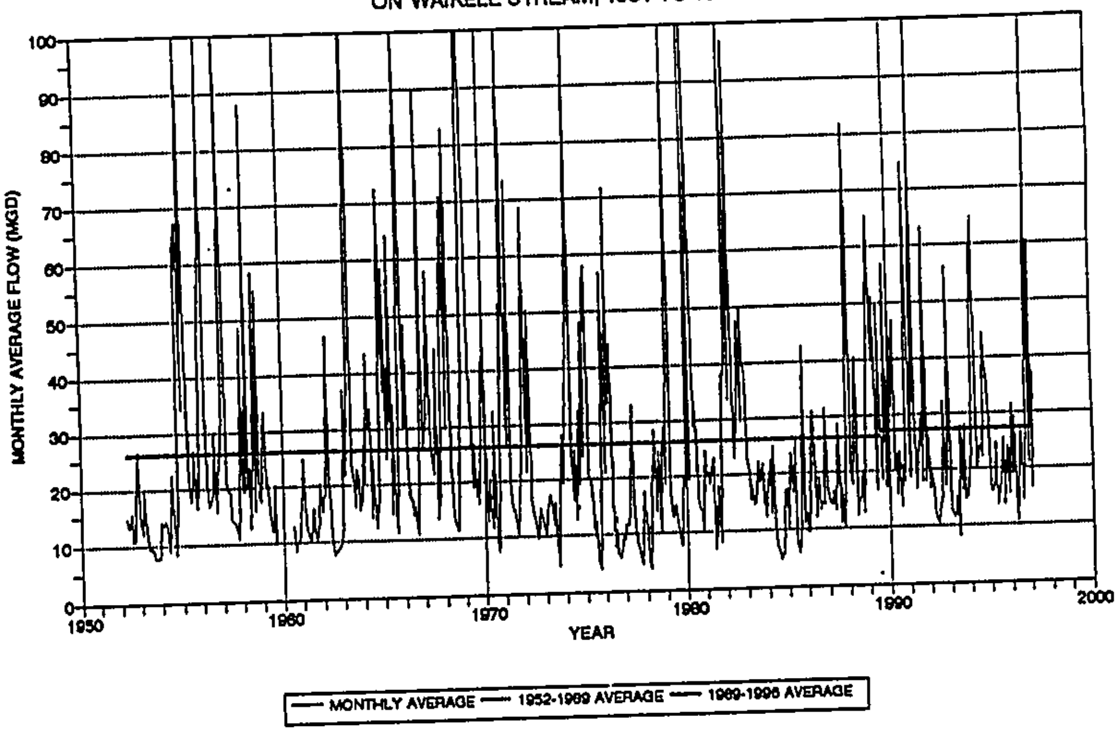


FIGURE 6
COMPARISON OF DURATION DISCHARGE CURVES
1951-89 VERSUS 1989-97

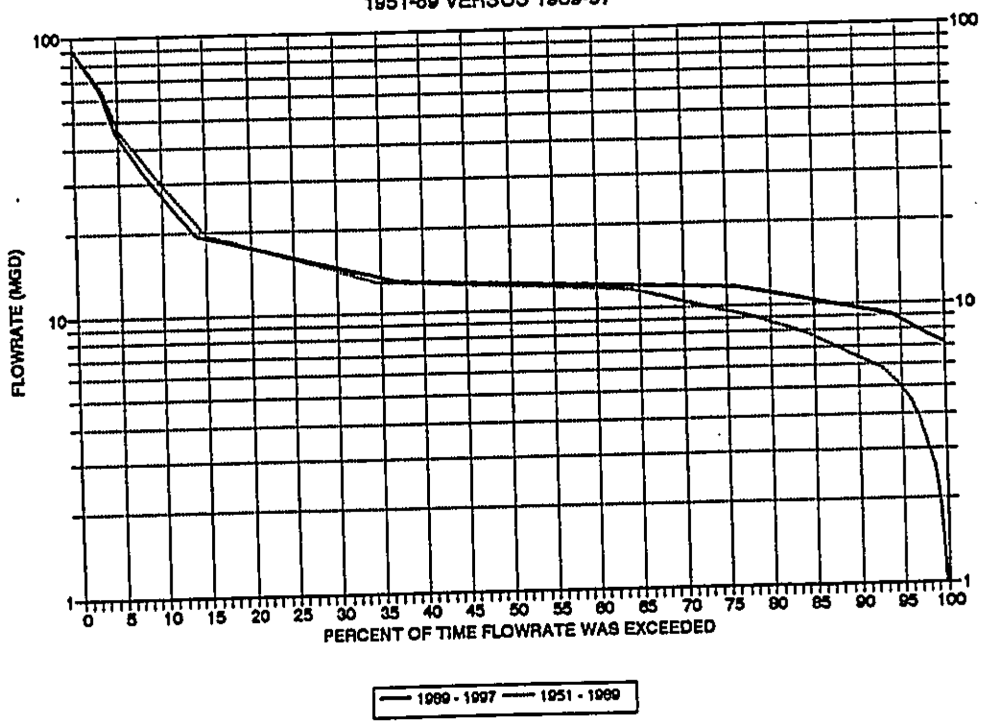
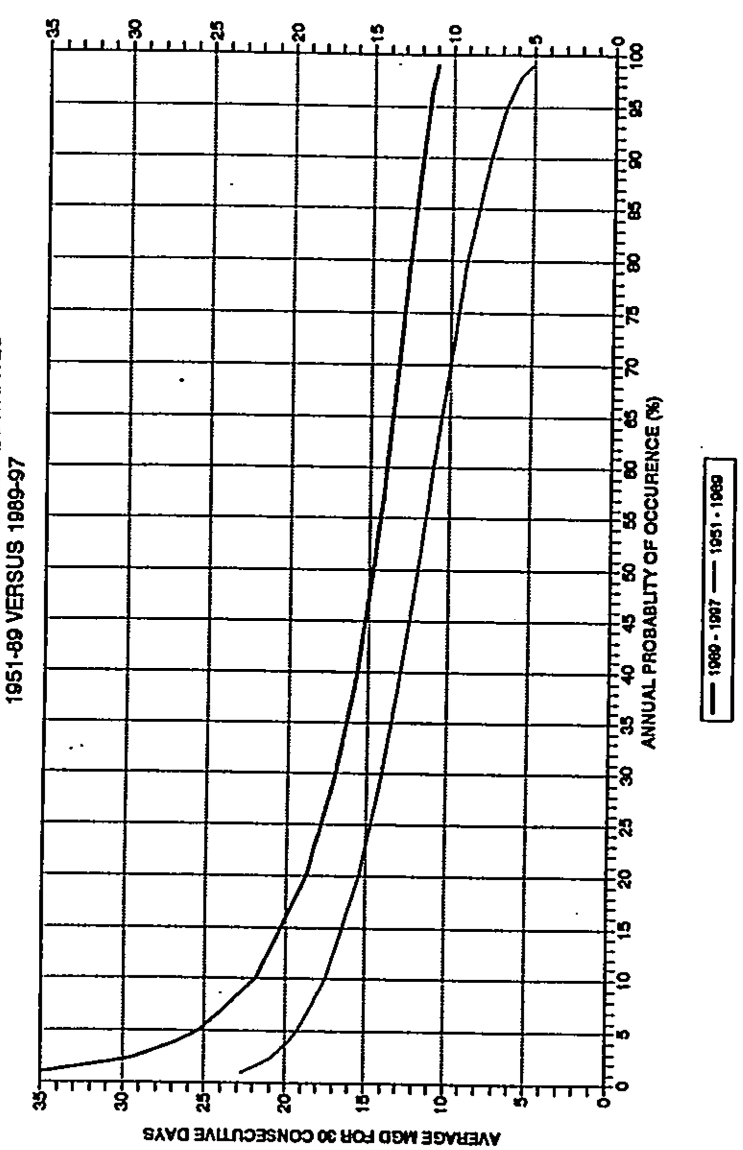


FIGURE 7
COMPARISON OF 30-DAY MINIMUM FLOWRATES
1951-89 VERSUS 1989-97



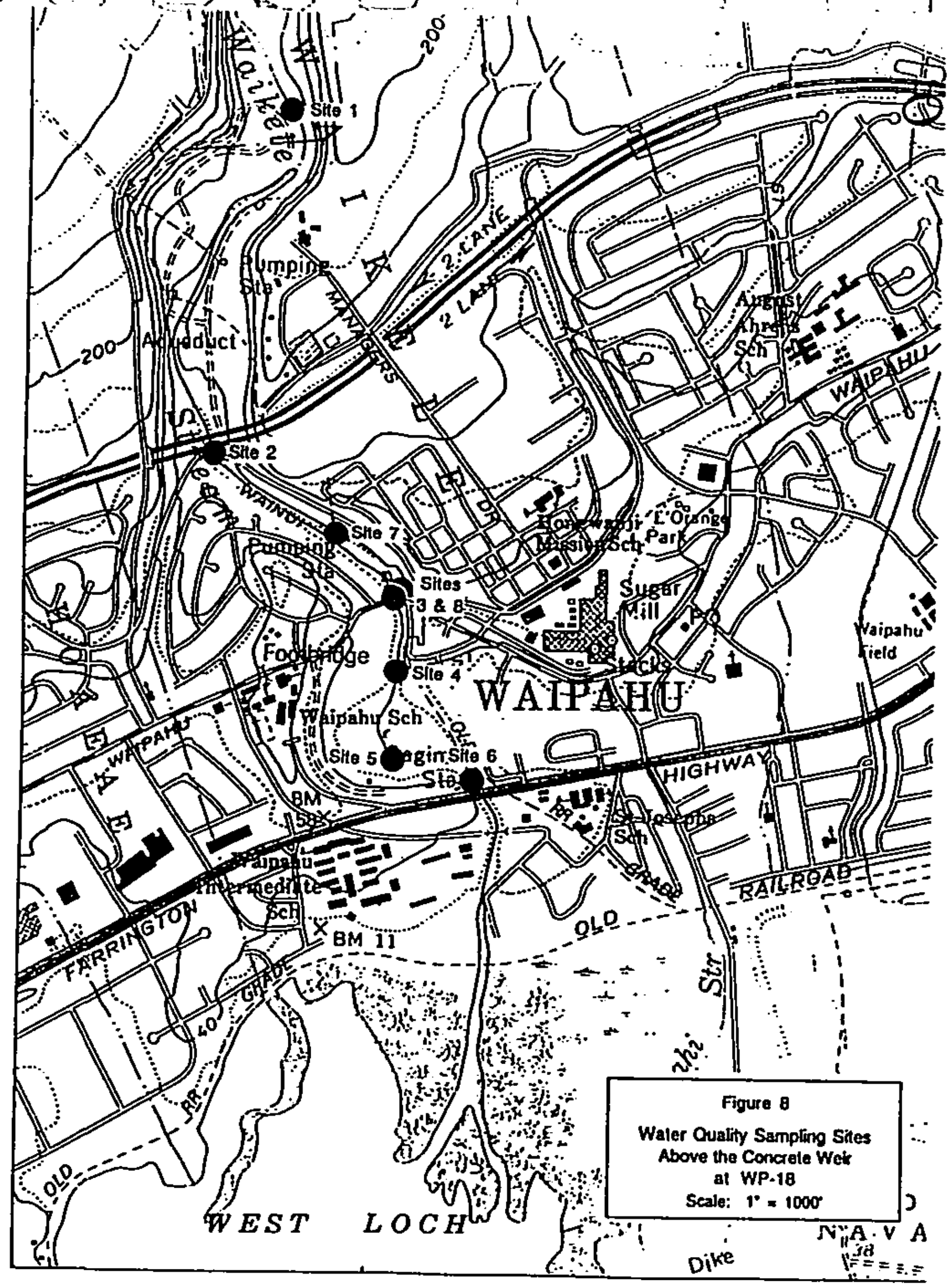
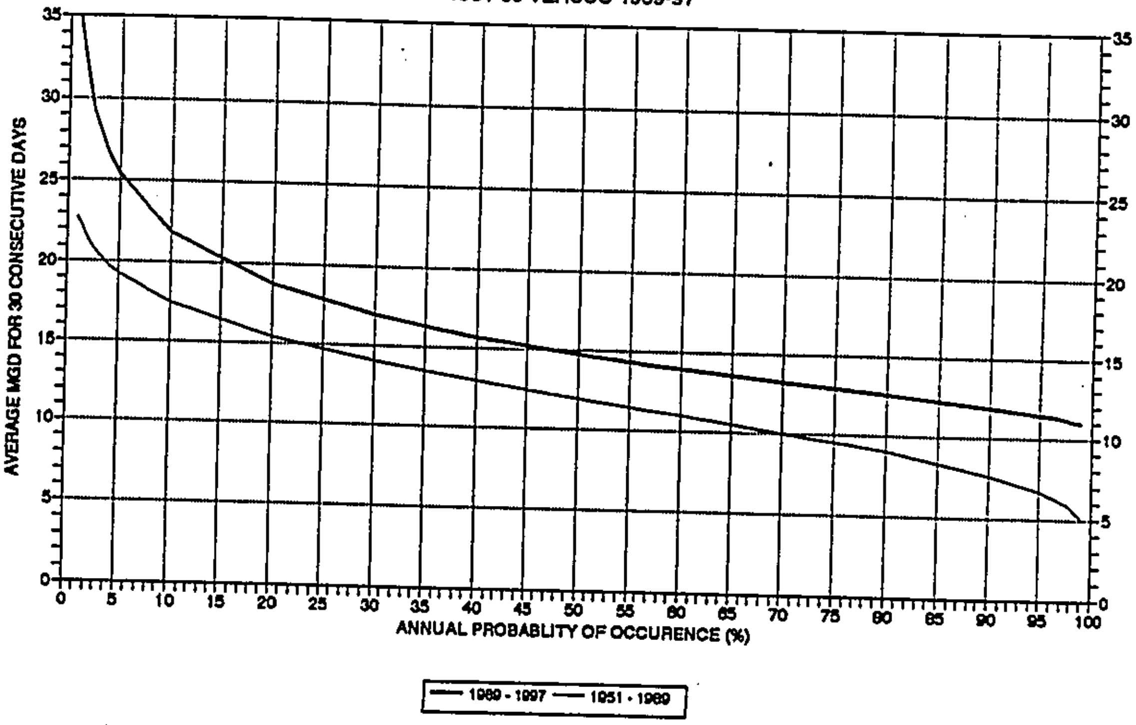


Figure 8
Water Quality Sampling Sites
Above the Concrete Weir
at WP-18
Scale: 1" = 1000'

FIGURE 7
COMPARISON OF 30-DAY MINIMUM FLOWRATES
1951-89 VERSUS 1989-97



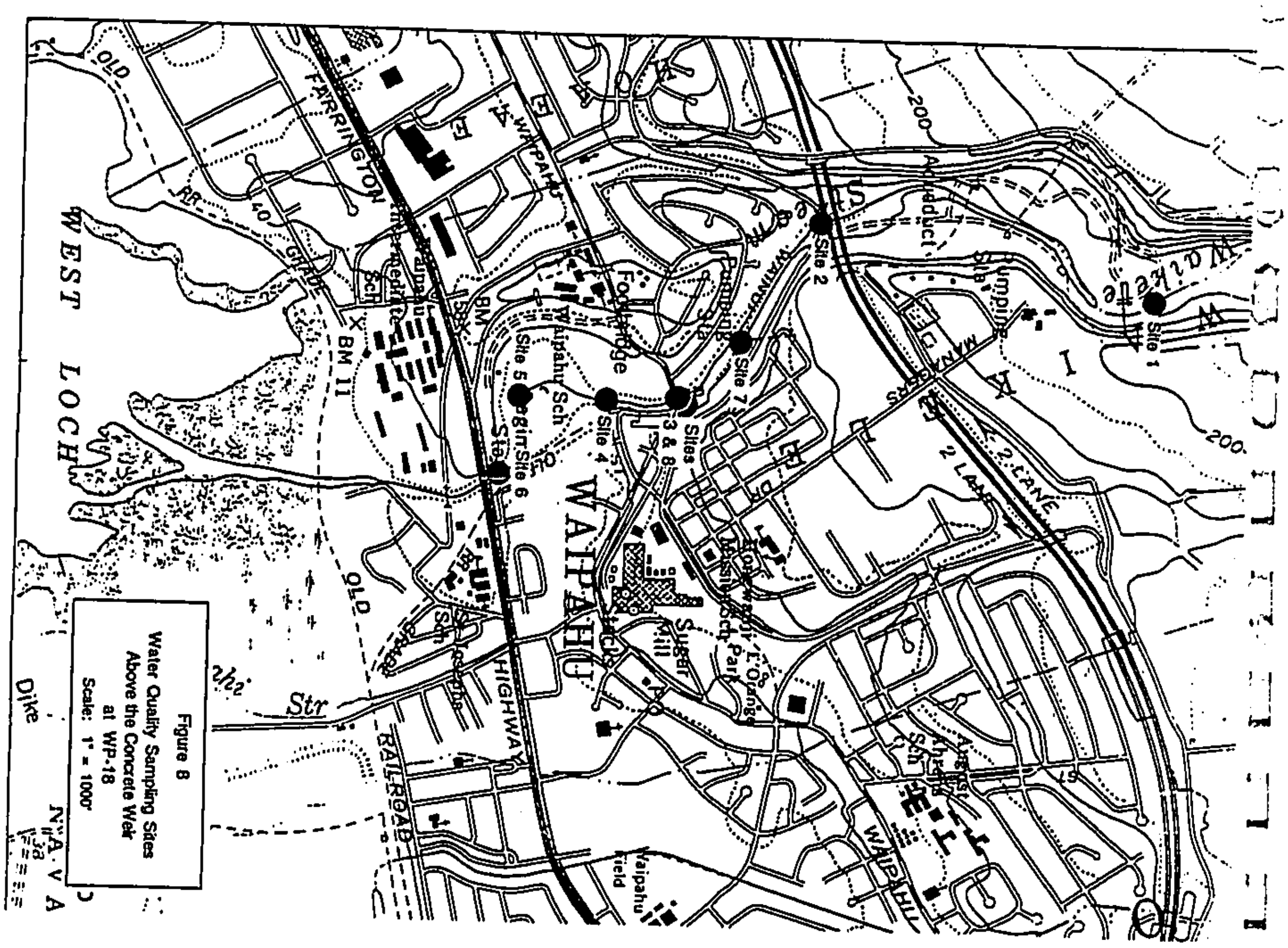


Figure 8
Water Quality Sampling Sites
Above the Concrete Weir
at WP-18
Scale: 1" = 1000'

Table 1

Stream Water Quality Upgradient of the WP-18 Pump Facility
(Refer to Figure 8 for Sampling Locations)

Site Number	Salinity (PPT)	Turbidity (NTU)	pH	Silica (µM)	Nitrogen: NO_3 (µM)	Nitrogen: NH_4 (µM)	Nitrogen: DON (µM)	Nitrogen: Total N (µM)	Phosphorus: PO_4 (µM)	Phosphorus: DOP (µM)	Phosphorus: Total P (µM)
1	0.13	6.70	7.86	173	0.05	3.20	50.9	54.2	0.20	0.90	1.10
2	0.12	7.80	7.78	160	0.05	1.05	59.7	60.8	0.20	0.80	1.00
3	0.22	3.40	7.41	692	91.2	1.40	50.3	142.9	4.35	0.85	5.20
4	0.34	1.78	7.34	830	91.9	1.40	42.9	136.2	4.90	0.55	5.45
5	0.33	1.85	7.76	842	93.6	0.90	47.1	141.6	5.00	0.75	5.75
6	0.32	2.30	7.46	810	87.6	0.95	52.7	141.2	4.70	1.05	5.75
7	0.29	0.98	7.49	1065	162	1.10	47.0	209.7	7.70	0.50	8.20
8	0.27	0.13	7.14	1036	156	1.10	46.9	203.7	8.40	0.40	8.80

Notes:
1. Samples collected by TNWRE on May 17, 1998. Analyses by Marine Analytical Specialists on May 26, 1998.
2. Samples 1 through 6 taken directly from the stream. Samples 7 and 8 are spring discharges into the stream.

Water Quality in Tidal Reach Downstream of the Concrete Weir. The 0.6-mile long reach of the stream from the makai side of the concrete weir to its discharge into the upper end of West Loch is tidal. Like a typical estuary, fresh water flows out over a saltwater along the bottom of the stream. On higher phases of the tide, the saltwater wedge extends all the way back to the base of the concrete weir. As fresh water plunges over the weir, some mixing and an increase in salinity occurs. At lower tide levels, the reach of saltwater ends about 200 feet downstream. Since mixing does not occur at the plunge over the weir, the freshwater layer moving downstream has a lower salinity.

Salinity and temperature profiles through the water column were made at the seven sites along the tidal reach shown on Figure 9. This was done on three different days to provide information on the thickness and salinity in the surface layer as a function of discharge rate and other factors. All profiles were made using an Ocean Sensors Model OS-200 CTD. Rates of freshwater discharge and prevailing tide level, are keys to interpreting the properties of the freshwater layer. Dates, discharge rates, and tide levels were as follows:

Day	Hours	Rate of Discharge Over the Weir (MGD)	Prevailing Tide
May 20	1330 to 1430	13.2	Falling Tide at 1.1 Feet (MLLW)
May 31	1330 to 1400	11.0	Slack Tide at 0.4 Feet (MLLW)
June 6	1345 to 1445	12.6	Rising Tide at 1.7 Feet (MLLW)

Note: Rates of discharge over the weir were provided by the USGS for Gaging Station 2130.

Individual plots of each of the salinity and temperature profiles can be found in Appendix A. Figures 10 through 16 compare the salinity profiles at each of the seven sampling sites. From an examination of these profiles allows the following conclusions to be drawn:

- The thickness of the surface layer is primarily, but not exclusively, a function of freshwater flowrate.
- At high tide, mixing with saltwater occurs at the plunge over the weir (the June 6th profiles). At low tide, even when the discharge rate is lower, the lack of mixing at the plunge over the weir produces a fresher top layer (the May 31st profiles).
- Rising and falling tides in the estuary create gradients at the freshwater-saltwater interface which appear to have some influence on the thickness of the freshwater layer. During the falling tide on May 20th, for example, the freshwater layer was as thin or thinner than on a rising tide on June 6th, although the freshwater flowrate was higher.

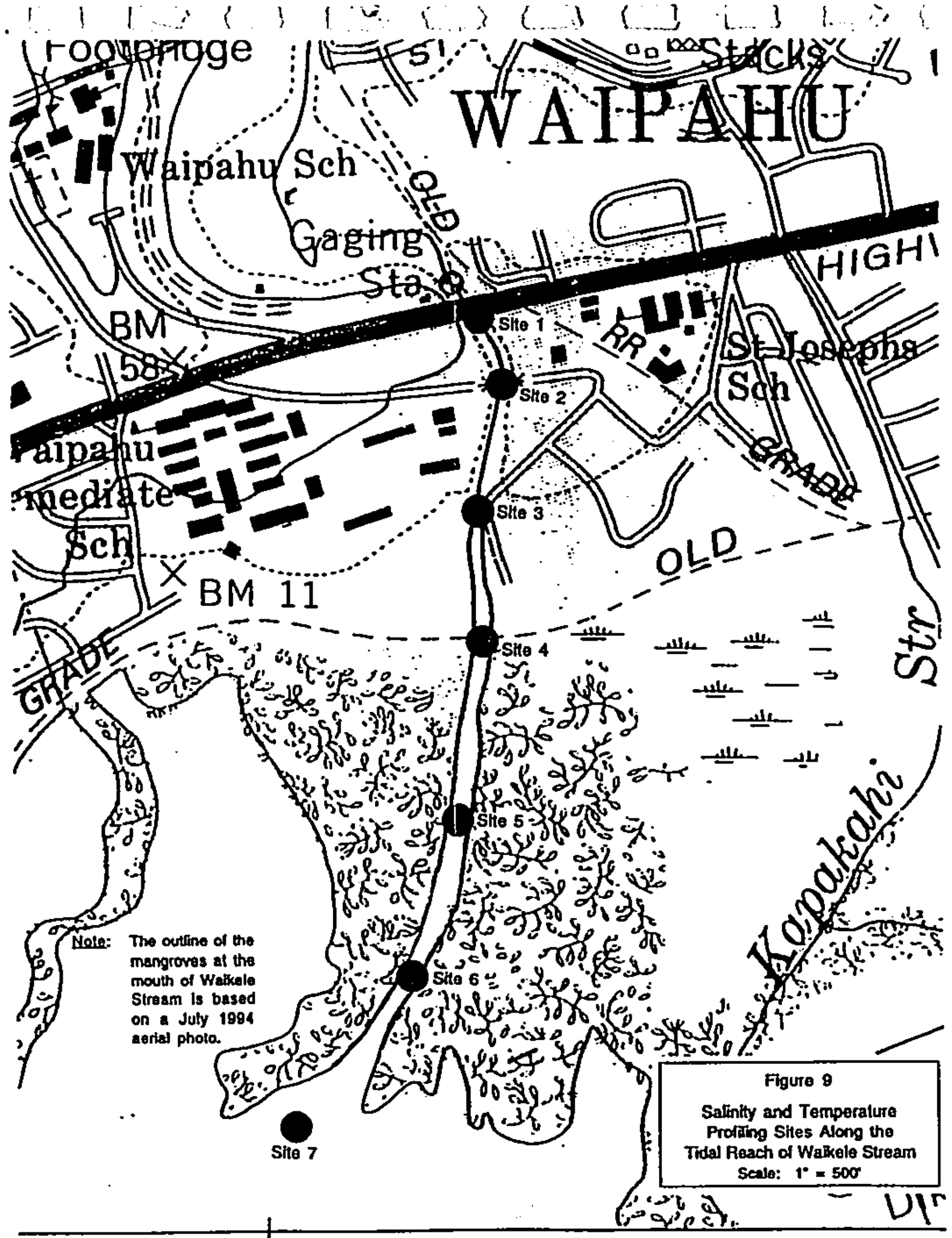
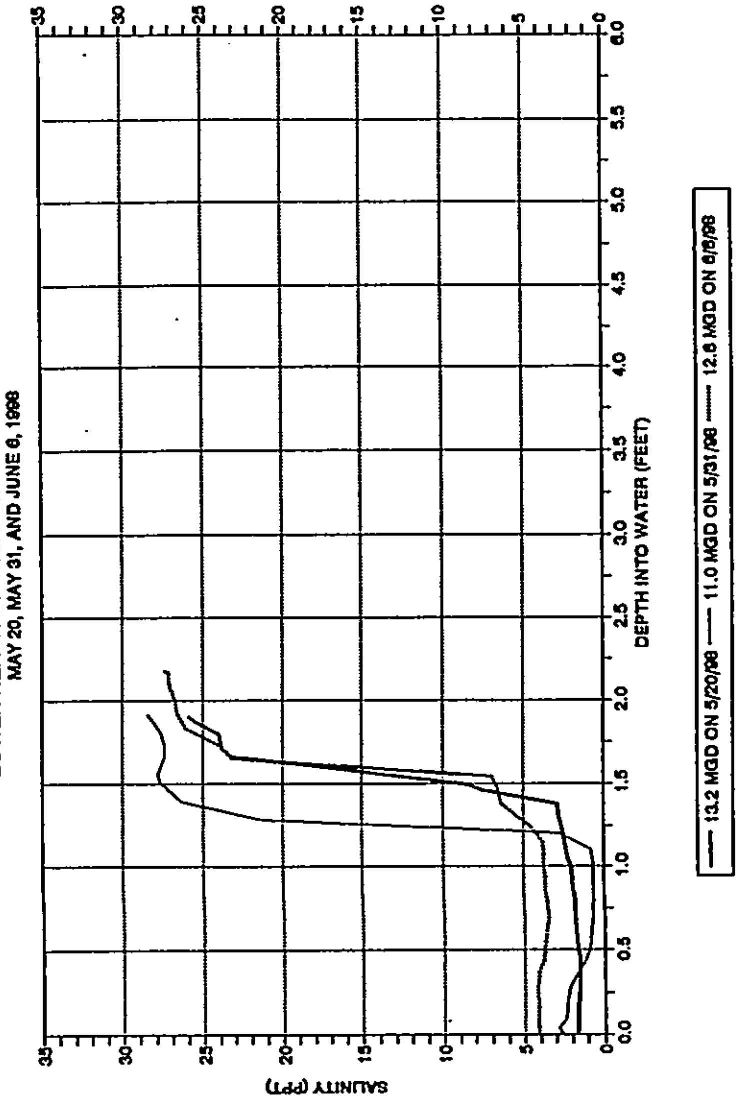
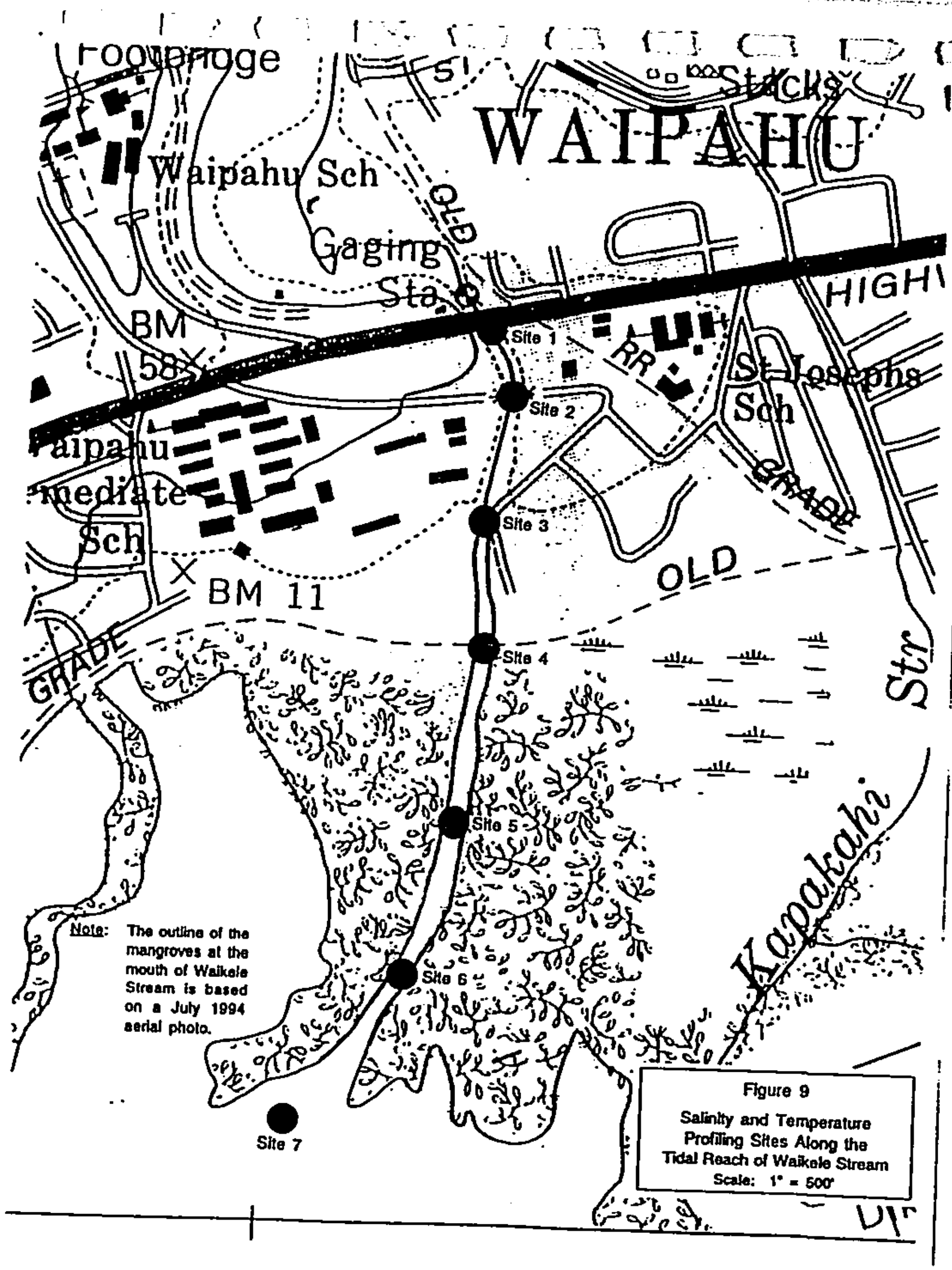


Figure 9
Salinity and Temperature Profiling Sites Along the Tidal Reach of Waikele Stream
Scale: 1" = 500'

FIGURE 10
LOWER REACH OF WAIKELE STREAM AT SITE 1
MAY 20, MAY 31, AND JUNE 6, 1998





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Scale: 1" = 500'

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MAY 20, MAY 31, AND JUNE 6, 1998

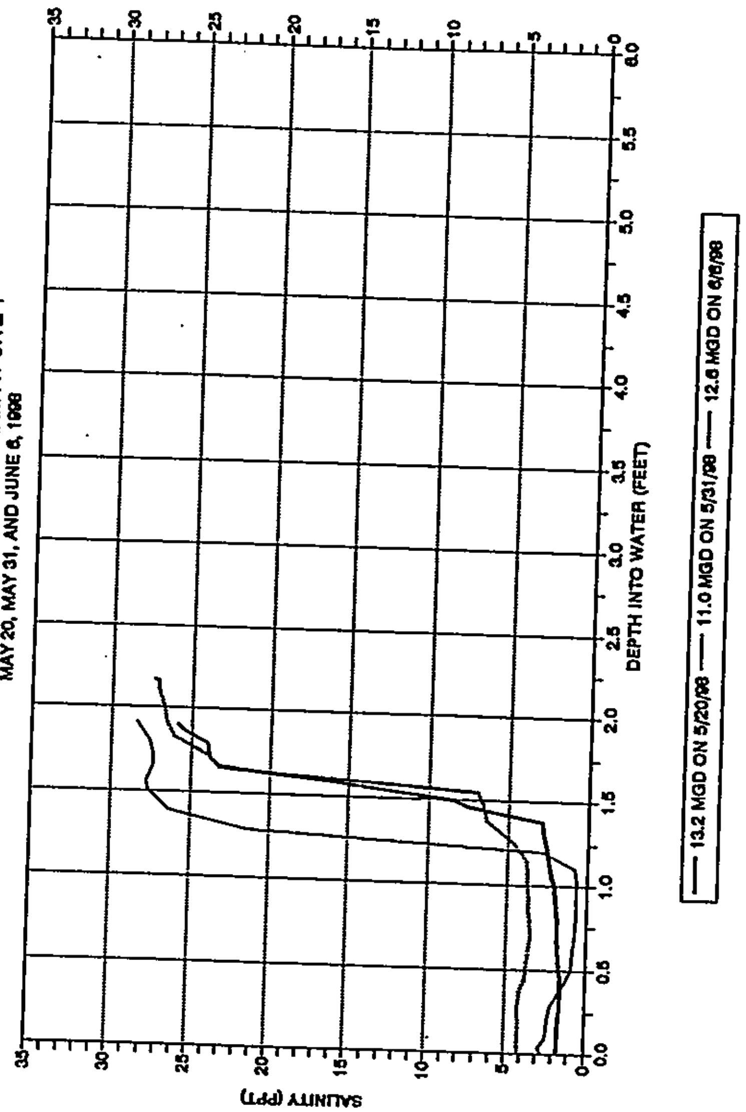


FIGURE 11
LOWER REACH OF WAIKELE STREAM AT SITE 2
MAY 20, MAY 31, AND JUNE 6, 1998

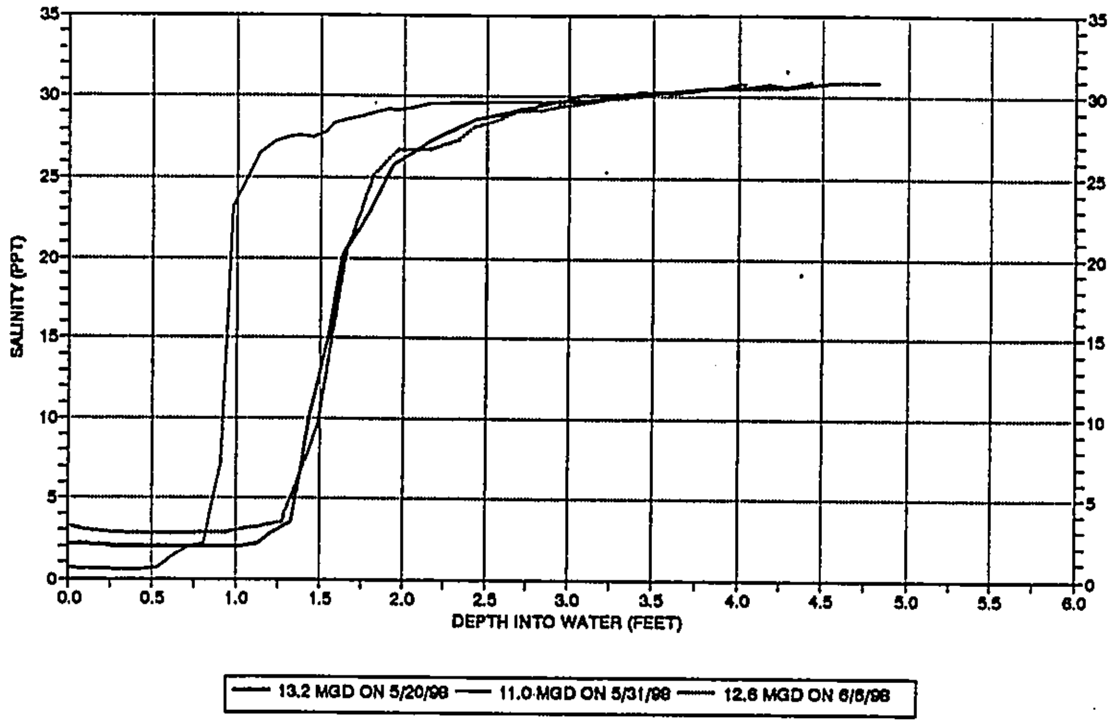


FIGURE 12
LOWER REACH OF WAIKELE STREAM AT SITE 3
MAY 20, MAY 31, AND JUNE 6, 1998

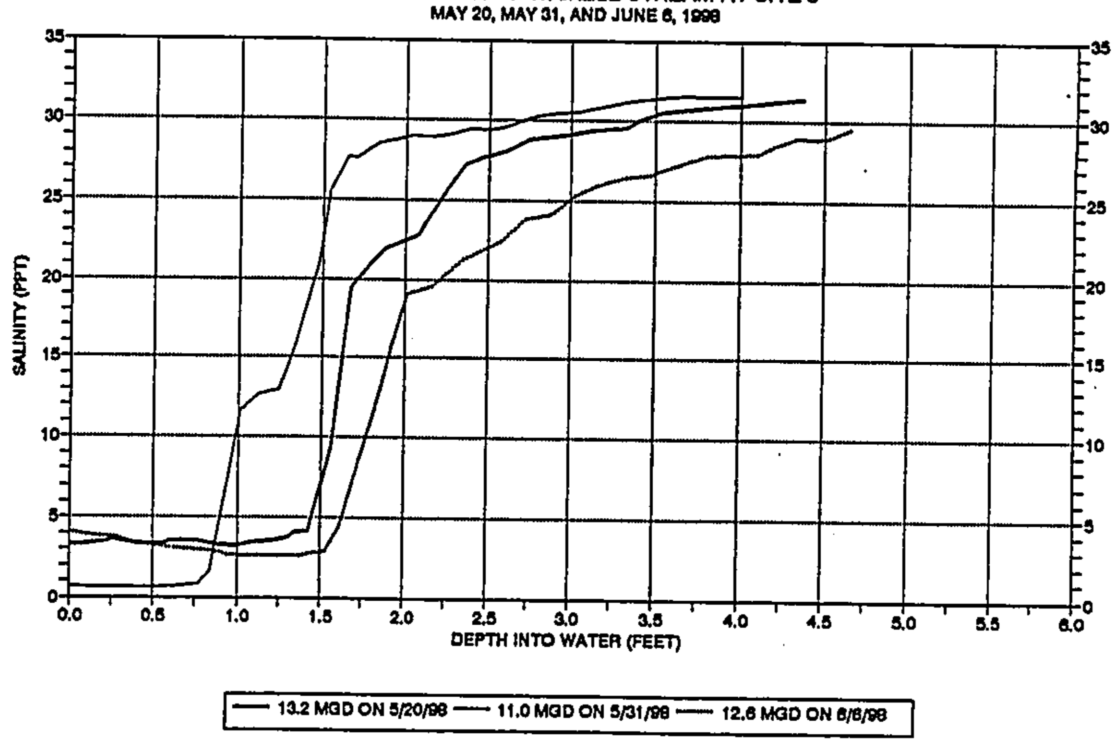
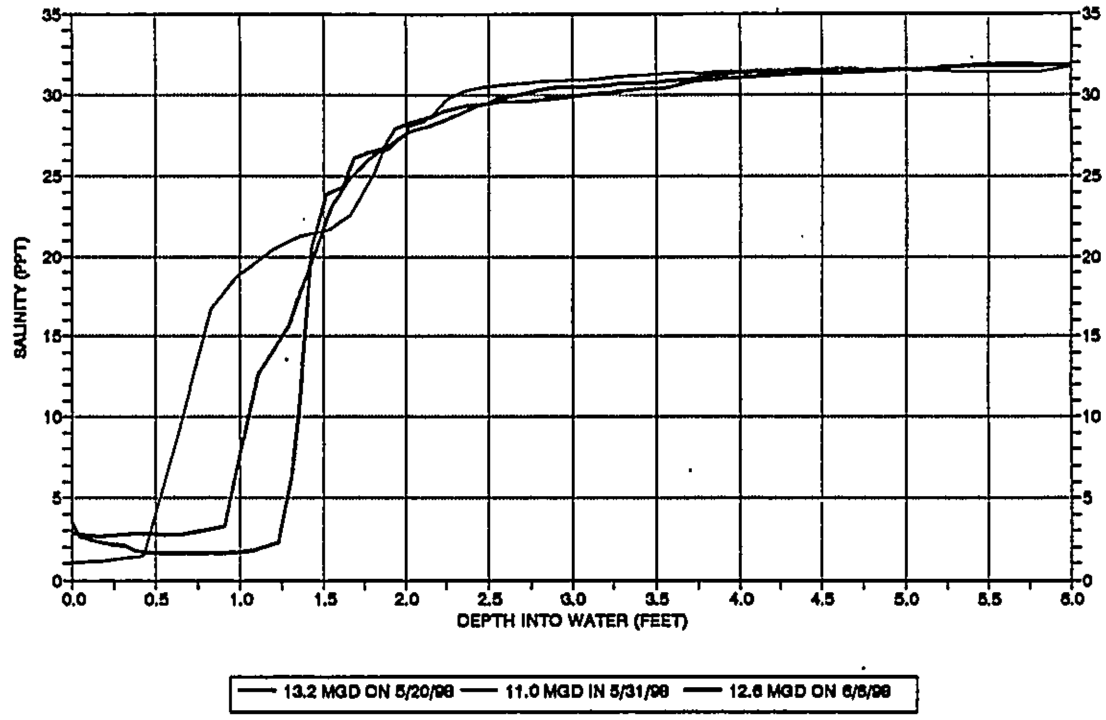


FIGURE 13
LOWER REACH OF WAIKELE STREAM AT SITE 4
MAY 20, MAY 31, AND JUNE 6, 1998



- 18 -

FIGURE 14
LOWER REACH OF WAIKELE STREAM AT SITE 5
MAY 20 AND JUNE 6, 1998

- 19 -

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

FIGURE 13
LOWER REACH OF WAIKELE STREAM AT SITE 4
MAY 20, MAY 31, AND JUNE 6, 1998

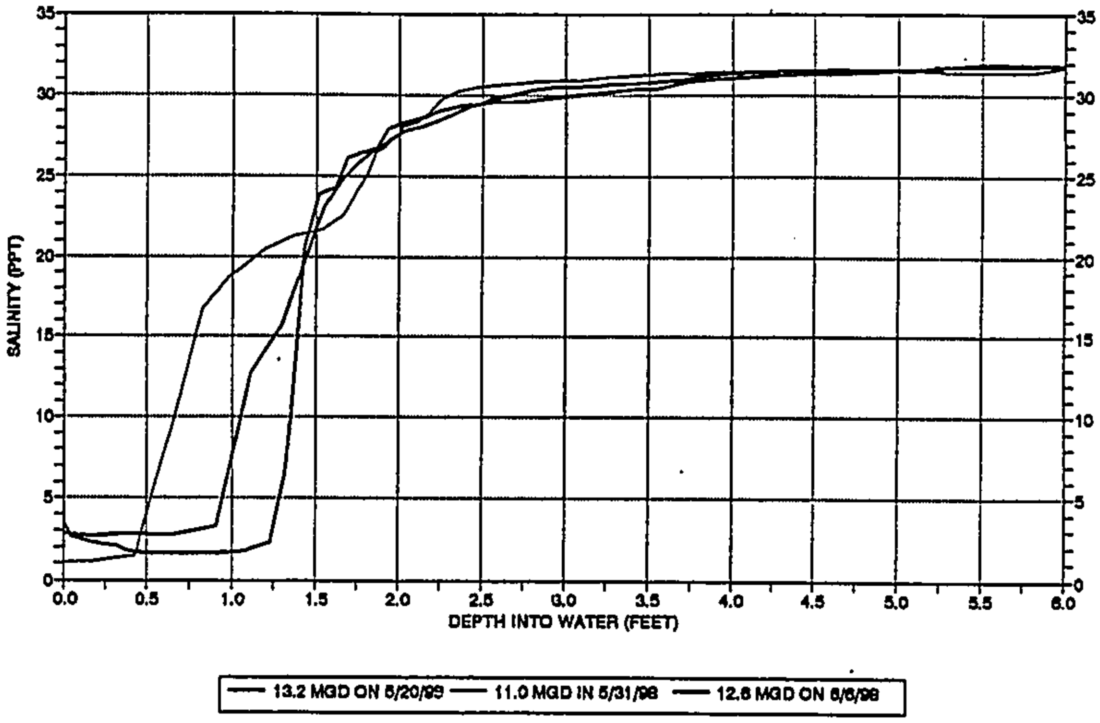


FIGURE 14
LOWER REACH OF WAIKELE STREAM AT SITE 5
MAY 20 AND JUNE 6, 1998

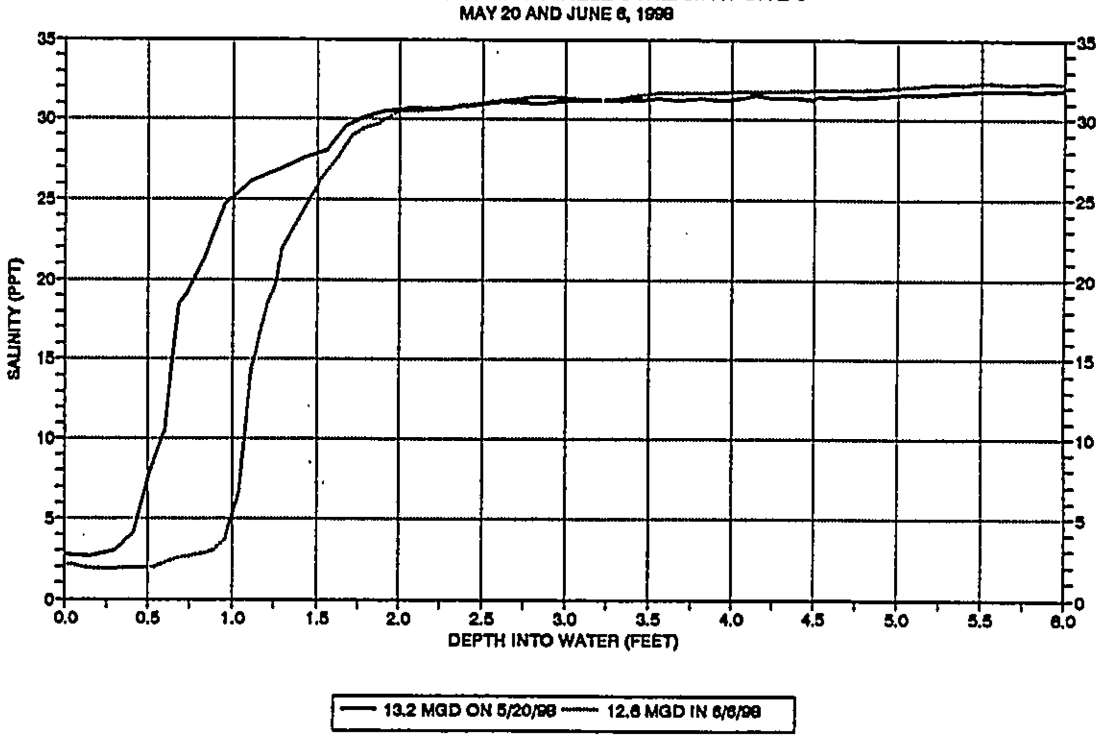


FIGURE 15
LOWER REACH OF WAIKELE STREAM AT SITE 6
MAY 20 AND JUNE 6, 1998

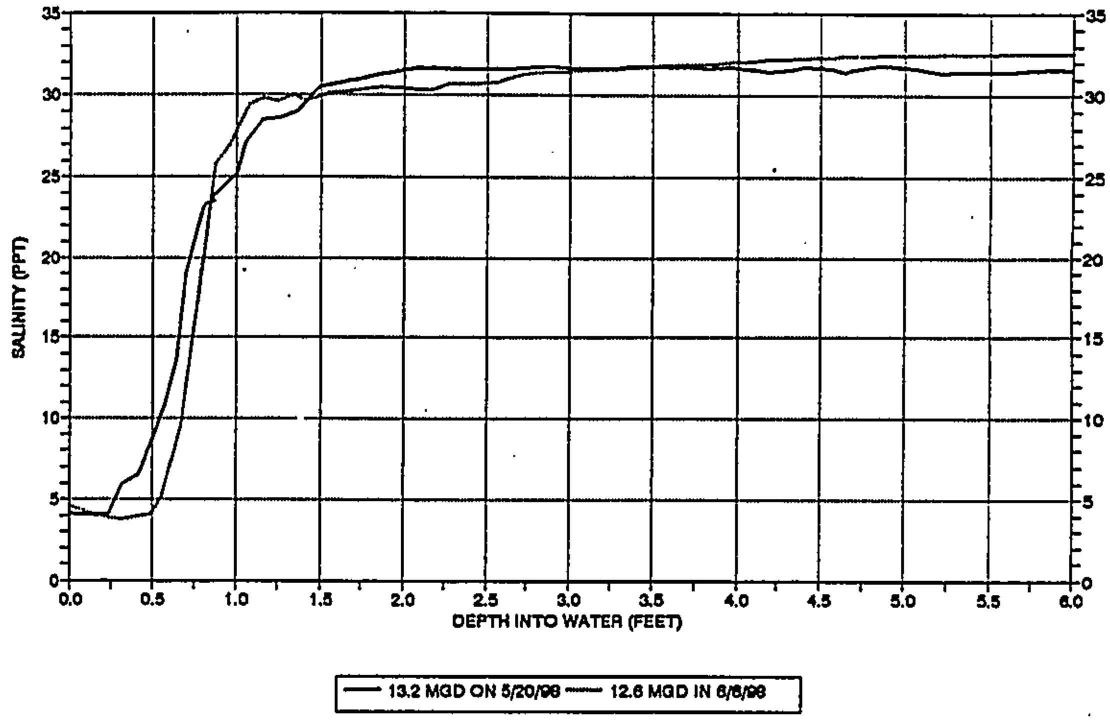
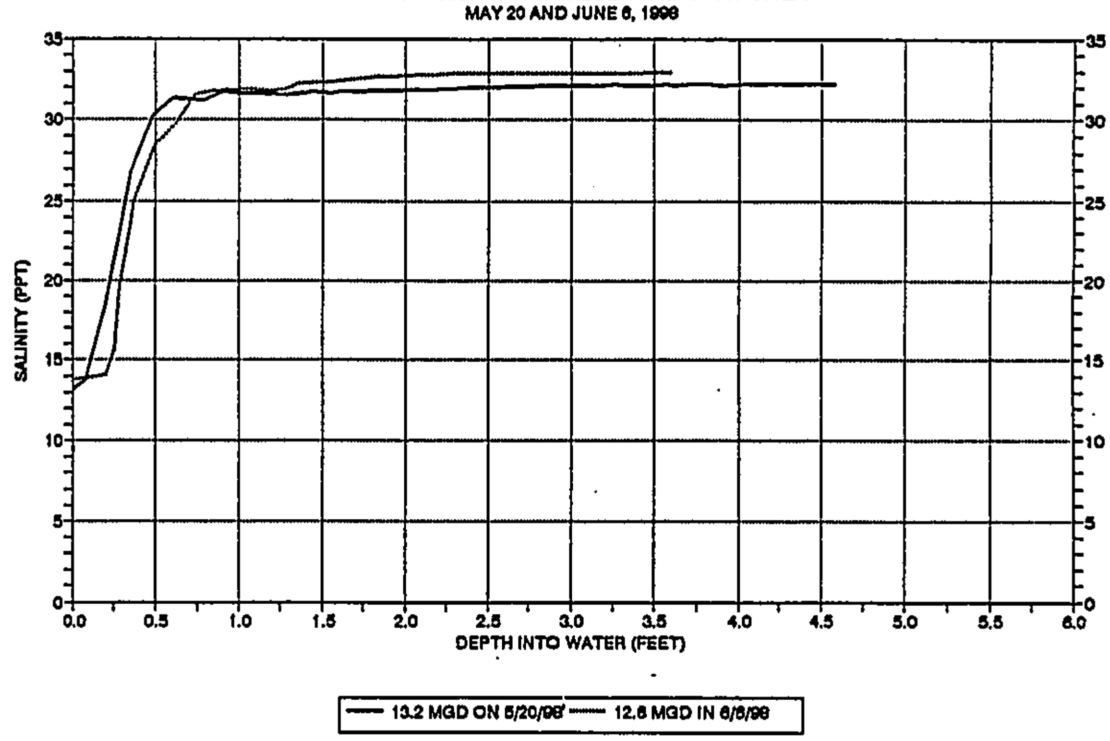


FIGURE 16
LOWER REACH OF WAIKELE STREAM AT SITE 7
MAY 20 AND JUNE 6, 1998



Samples of the water from the top and bottom of the water column at each of the seven sites shown on Figure 9 were also analyzed for salinity, silica, nitrogen, and phosphorus. These results are compiled in Table 2. The low salinity, high silica, and high nitrate levels of the surface samples clearly reflect the groundwater component of Waikele streamflow. As with the salinity profiles depicted on Figures 10 to 16, mixing of saltwater into the surface layer is very gradual until the point of discharge into West Loch (Site 7).

Other Freshwater Input to the Upper End of West Loch

Two other streams which discharge into the Loch's upper end, Honouliuli to the west of Waikele and Kapakahi to the east. Honouliuli drains an 11.5-square mile area. Its watershed extends to the crest of the Waianae range and is about one-quarter the size of the Waikele basin. The gulch is normally dry except in the lower reach from just above the Fort Weaver Road bridge to the West Loch shoreline. In this lower reach, a modest flow of about 0.5 MGD is maintained by groundwater seepage. This is only about five percent of the base flow of Waikele Stream.

Kapakahi Stream originates as a spring on the mauka side of Farrington Highway in Waipahu. The spring's flow is also on the order of 0.5 MGD or about five percent of the base flow of Waikele Stream. The quality of samples taken from locations along Honouliuli and Kapakahi Streams are presented in Table 3. The low salinity, high silica, and high nitrate levels of Honouliuli Stream at the Fort Weaver Road bridge and along Kapakahi Stream clearly identify these as groundwater sources. Their combined input to West Loch, however, is 10 percent or less of the input of Waikele Stream.

Movement of Waikele Stream's Discharge into the Upper End of West Loch

To delineate the movement of Waikele streamflow into West Loch, a series of salinity and temperature profiles were made and water quality samples were taken. The sampling sites were along the four transects shown on Figure 17. Plots of all of these profiles can be found in Appendix B. This work was done on May 25, 1998 from 9:00 to 11:00 a.m. The tide levels was extremely low, from (-)0.4 feet (MLLW) at the start to 0.0 feet (MLLW) at the end. Waikele streamflow was a relatively low 11.9 MGD during this period. At water depths of less than three feet, profiles were made with a hand-held Orion Model 130 conductivity meter. At deeper sites, an Ocean Sensors Model OS-200 CTD was used. Based on the profiles in Appendix B compared to those of Waikele Stream, the following picture of the movement of Waikele streamflow into the upper end of West Loch emerges:

- The relatively narrow (40± foot wide) Waikele Stream channel has high concrete banks from the weir down to sampling Site 3 and is lined on both sides by dense mangroves from there to West Loch. These banks shield the freshwater layer from mixing by wind stress, allowing it to remain essentially intact all the way to the point of discharge into West Loch.

- At the mouth of the stream (Sampling Site 7), its cross section immediately widens and its depth decreases from 6 to 8 feet in the channel to less than half of this in the stream's delta. The water is also subject to wind stresses, most typically moving from east to west. All these factors cause substantial mixing to occur.

Table 2

Stream Water Quality in the Tidal Reach of Waikele Stream Downstream of the Concrete Weir
(Refer to Figure 9 for Sampling Locations)

Site Number	Depth in the Water Column	Salinity (PPT)	Silica (µM)	Nitrogen: NO_3 (µM)	Nitrogen: NH_4 (µM)	Nitrogen: DON (µM)	Nitrogen: Total N (µM)	Phosphorus: PO_4 (µM)	Phosphorus: DOP (µM)	Phosphorus: Total P (µM)
1	Top	1.73	806	82.4	1.22	10.1	93.8	4.17	0.49	4.66
	Bottom	21.73	357	35.4	12.7	63.4	111.5	2.68	0.55	3.23
2	Top	2.10	800	81.6	1.74	8.82	92.2	4.03	0.46	4.51
	Bottom	30.81	163	7.35	12.8	48.3	68.8	3.59	1.22	4.81
3	Top	2.01	808	81.8	3.36	10.5	95.6	4.12	0.54	4.66
	Bottom	29.10	166	1.04	0.06	38.3	39.4	1.23	2.36	3.61
4	Top	2.06	807	82.1	2.31	9.04	93.4	4.10	0.45	4.55
	Bottom	30.62	130	6.42	8.91	27.2	42.5	0.84	1.10	1.94
5	Top	2.18	808	81.9	1.45	8.51	91.9	3.90	0.68	4.58
	Bottom	29.77	151	10.6	12.2	21.8	44.6	1.08	0.94	2.02
6	Top	3.05	788	79.5	1.89	8.07	89.5	3.97	0.53	4.50
	Bottom	30.85	133	6.66	9.12	20.1	35.8	0.85	0.83	1.68
7	Top	21.48	340	32.2	3.99	14.9	51.2	1.83	0.46	2.29
	Bottom	32.24	89	2.54	2.56	23.9	29.0	0.52	0.99	1.51

Notes: Samples collected by Tom Nance and Steve Dollar on May 20, 1998 and analyzed by Marine Analytical Specialists.

Samples of the water from the top and bottom of the water column at each of the seven sites shown on Figure 9 were also analyzed for salinity, silica, nitrogen, and phosphorus. These results are compiled in Table 2. The low salinity, high silica, and high nitrate levels of the surface samples clearly reflect the groundwater component of Waikele streamflow. As with the salinity profiles depicted on Figures 10 to 16, mixing of saltwater into the surface layer is very gradual until the point of discharge into West Loch (Site 7).

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1	Top	1.73	806	82.4	1.22	10.1	93.6	4.17	0.49	4.66
	Bottom	21.73	357	35.4	12.7	63.4	111.5	2.68	0.55	3.23
2	Top	2.10	800	81.6	1.74	8.82	92.2	4.03	0.48	4.51
	Bottom	30.81	163	7.35	12.8	48.3	68.5	3.59	1.22	4.81
3	Top	2.01	808	81.8	3.36	10.5	95.6	4.12	0.54	4.66
	Bottom	29.10	165	1.04	0.06	38.3	39.4	1.23	2.38	3.61
4	Top	2.08	807	82.1	2.31	9.04	93.4	4.10	0.45	4.55
	Bottom	30.62	130	6.42	8.91	27.2	42.5	0.84	1.10	1.94
5	Top	2.16	808	81.9	1.45	8.51	91.9	3.90	0.68	4.58
	Bottom	29.77	151	10.6	12.2	21.8	44.6	1.08	0.94	2.02
6	Top	3.05	788	79.5	1.89	8.07	89.5	3.97	0.53	4.50
	Bottom	30.85	133	6.66	9.12	20.1	35.8	0.85	0.83	1.68
7	Top	21.48	340	32.2	3.99	14.9	51.2	1.83	0.46	2.29
	Bottom	32.24	89	2.54	2.56	23.9	29.0	0.52	0.99	1.51

Notes: Samples collected by Tom Nance and Steve Dollar on May 20, 1998 and analyzed by Marine Analytical Specialists.

Table 3

Water Quality of Other Freshwater Inflow Into the Upper End of West Loch

Stream Source	Sample Location	Salinity (PPT)	Silica (µM)	Nitrogen NO_3 (µM)	Nitrogen NH_4 (µM)	Nitrogen DON (µM)	Nitrogen Total N (µM)	Phosphorus PO_4 (µM)	Phosphorus DOP (µM)	Phosphorus Total P (µM)
Honouliuli	Fort Weaver Road Bridge	0.82	1121	129	5.55	44.2	179	4.15	0.35	4.50
	Golf Cart Bridge - Top	4.98	990	216	14.0	78.4	309	11.3	1.05	12.4
	Golf Cart Bridge - Bottom	24.78	333	57.0	11.2	48.0	116	4.50	1.10	5.60
	Makai End of Golf Course	24.32	329	50.2	9.20	49.0	108	3.65	1.10	4.75
	Outlet Into West Loch	29.86	149	12.2	9.95	54.0	76.1	2.25	0.35	2.60
Kapakahi	At Farrington Highway Spring	0.42	940	117	13.0	14.1	144	5.91	0.42	6.33
	1000-Ft. Downstream of Spring	0.45	979	113	16.6	60.2	190	6.35	1.70	8.05

<u>Notes</u>: Samples collected by TNWRE on May 23, 1998 and analyzed by Marine Analytical Specialists.

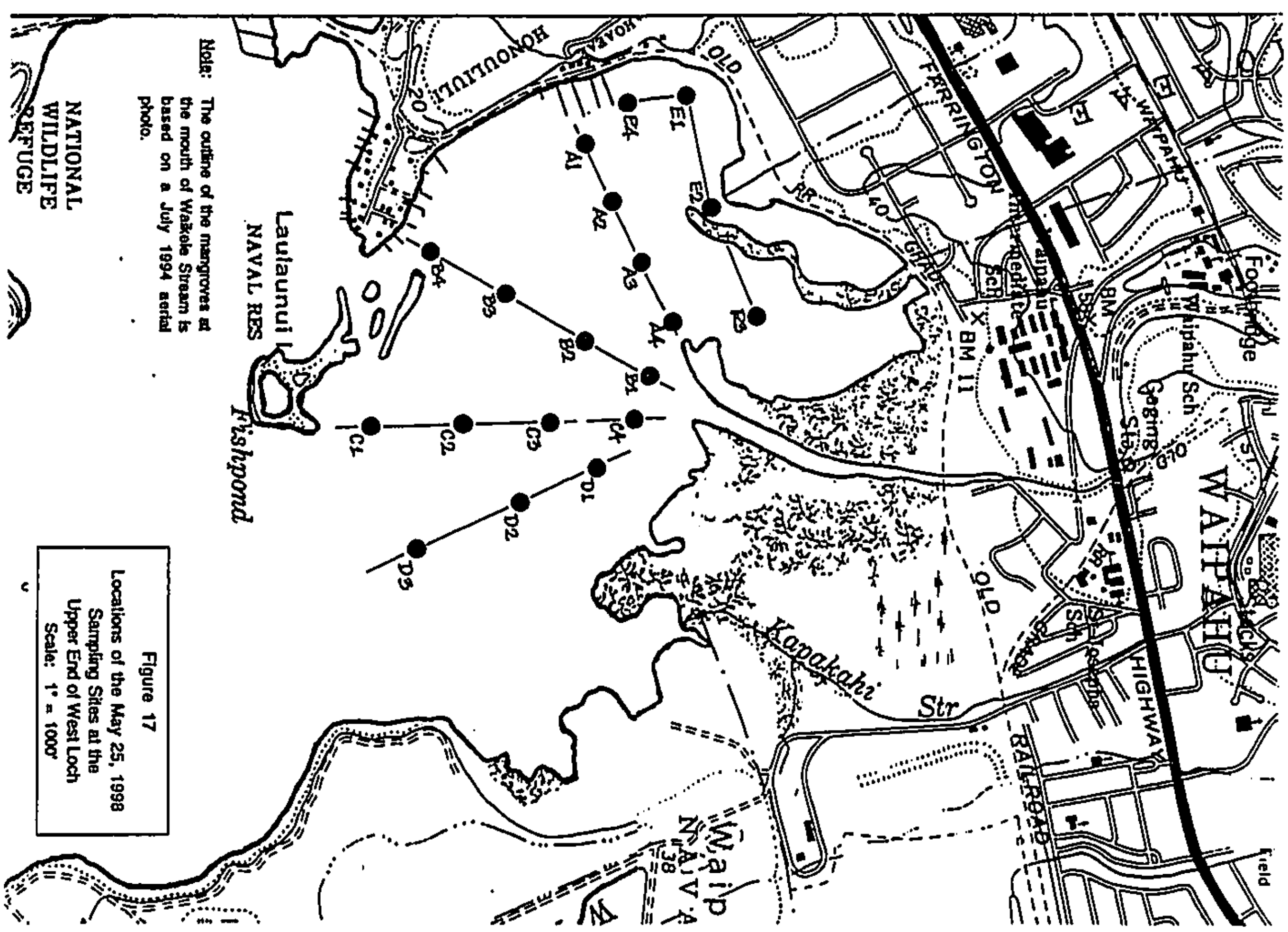


Figure 17
Locations of the May 25, 1998 Sampling Sites at the Upper End of West Loch
Scale: 1" = 1000'

- Wind blowing across this very shallow and completely exposed upper end of West Loch results in substantial mixing. The still discernable but highly salinized stream water is blown toward and along West Loch's western shoreline. At sites upwind of the stream's mouth, the freshwater input is still generally discernable at the surface but is obviously less significant.

Analyses were also done of samples taken at the sites at the upper end of West Loch shown on Figure 17. Generally, near-surface and near-bottom samples were obtained at each site. However, in extremely shallow water and/or where hand-held instruments indicated that the water column was fully mixed, a single sample was taken from mid-depth. These results, which are compiled in Table 4, are fully in accord with the salinity profiles in Appendix B. Fresh water is clearly identifiable in the surface samples as compared to those at depth, but they are also extensively mixed with seawater.

Fresh Water Movement Out the Lower End of West Loch

Salinity and temperature profiling and water quality sampling was also done in the navigable portion of West Loch at the sites shown on Figure 18. This work was done from 11:00 a.m. to 1:00 p.m. on May 30, 1998 when the tide was at 0.4 feet (MLLW) and the stream's discharge rate was 11.0 MGD. Plots of the profiles can be found in Appendix C. There is a clearly discernable salinity and temperature stratification all the way to the entrance channel of Pearl Harbor. Within West Loch, a five- to eight-foot surface layer of 31 to 32 PPT contrasts with the 34 to 34.5 PPT bottom layer. At Site 5 in the harbor channel, a 20-foot thick surface layer of 33.5 to 34.0 PPT contrasts with water of 34.5 PPT at depth.

Water quality data of top and bottom samples from the five deepwater sites in West Loch and one site in Middle Loch (Site 6 on Figure 18) are compiled in Table 5. As also demonstrated by the salinity profiles, the still stratified surface layer is progressively mixed to near seawater salinity as it moves out of West Loch and into Pearl Harbor's entrance channel.

Impact of the Proposed 4.6 MGD Withdrawal at WP-18

The effect of a continuous withdrawal of 4.6 MGD at the WP-18 pump station is discussed in the following four sections: change in the discharge rate over the concrete weir; effects upstream of the concrete weir; changes to the tidal reach downstream; and changes in the upper end of West Loch.

Changes to the Discharge Rate Over the Concrete Weir. Since use of WP-18 ended in July 1989, discharge over the weir has averaged 27.0 MGD. The lowest flowrate in this time was 7.1 MGD on June 24 to 26, 1993. Over a 30-consecutive day period, the lowest flow averaged 11.6 MGD (in August 1995). With a continuous 4.6 MGD withdrawal at the pump station, all of these statistics of discharge would be reduced by that amount: the average would be 22.4 MGD; the minimum day would be 2.5 MGD; and the 30-day low flow would be 7.0 MGD. Across the entire range of flowrate, the change in flow over the weir would be as shown on Figure 19. It illustrates that during very dry periods, the flow over the weir would be greater than in a similar period during the pre-1989 period of OSCO withdrawals. However, over the more typical 10 to 14 MGD flowrate which occurs on about half the days, the proposed 4.6 MGD withdrawal would have an apparently greater impact than OSCO's prior usage of the pump station.

Table 4

Water Quality in the Upper Shallow End of West Loch
(Refer to Figure 17 for Sampling Locations)

Transect	Site Number	Depth in Water Column	Salinity (PPT)	Silica (µM)	Nitrogen NO_3 (µM)	Nitrogen NH_4 (µM)	Nitrogen DON (µM)	Nitrogen Total N (µM)	Phosphorus PO_4 (µM)	Phosphorus DOP (µM)	Phosphorus Total P (µM)
A	1	Top	29.63	114	0.01	0.43	25.8	26.2	0.37	0.95	1.32
		Bottom	30.40	97	0.01	0.20	29.0	29.2	0.37	1.14	1.51
	2	Top	30.'2	102	0.02	0.56	23.7	24.2	0.33	0.94	1.27
		Bottom	31.11	95	0.03	0.42	27.0	27.4	0.33	1.02	1.35
	3	Middle	32.20	82	0.79	1.13	28.2	30.1	0.44	0.91	1.35
	4	Middle	32.10	106	2.08	1.87	23.2	27.2	0.62	0.78	1.40
B	1	Middle	32.62	70.5	0.72	4.07	19.5	24.3	0.46	0.65	1.11
	2	Top	32.36	70.5	0.08	0.67	21.5	22.2	0.36	0.86	1.22
		Bottom	32.54	66.3	0.04	0.64	26.0	26.7	0.35	1.14	1.49
	3	Top	31.15	86.2	0.00	0.32	26.9	27.2	0.32	0.92	1.24
		Bottom	31.71	77.3	0.01	0.57	25.0	25.5	0.34	1.07	1.41
	4	Top	29.77	115	0.01	0.69	27.0	27.7	0.34	1.14	1.48
		Bottom	30.20	112	0.09	0.63	27.7	28.5	0.43	1.03	1.46
C	1	Top	31.56	76.2	0.01	0.33	21.8	22.1	0.38	0.76	1.14
		Bottom	32.42	63.5	0.01	0.23	26.7	27.0	0.31	0.92	1.23
	2	Middle	32.76	61.2	0.02	0.58	22.6	23.2	0.32	0.76	1.08
	3	Middle	32.78	60.9	0.07	0.84	21.4	22.3	0.43	0.82	1.25
	4	Middle	32.50	68.0	0.05	0.89	22.0	22.9	0.44	0.83	1.27
D	1	Middle	28.71	142	15.2	7.96	20.9	44.0	0.65	0.44	1.09
	2	Middle	32.63	61.2	0.06	0.47	22.7	23.3	0.33	0.84	1.17
	3	Middle	32.60	56.2	0.04	0.36	21.2	21.6	0.28	0.84	1.12
E	1	Middle	31.90	79.7	0.22	0.52	45.3	46.0	0.36	2.22	2.73
	2	Middle	26.54	127	3.27	5.33	25.6	34.2	0.65	0.80	1.38
	3	Middle	30.15	86.0	0.10	0.51	28.4	29.0	0.33	0.80	1.16
	4	Middle	31.75	86.9	0.78	1.01	25.9	27.7	0.44	1.01	1.45

Notes:
1. Samples collected by Tom Nance and Steve Dollar on May 25, 1998. Analyses by Marine Analytical Specialists.
2. At extremely shallow sites without obvious stratification, a single mid-depth sample was taken. At all other sites, samples were taken from near surface and near to the bottom.

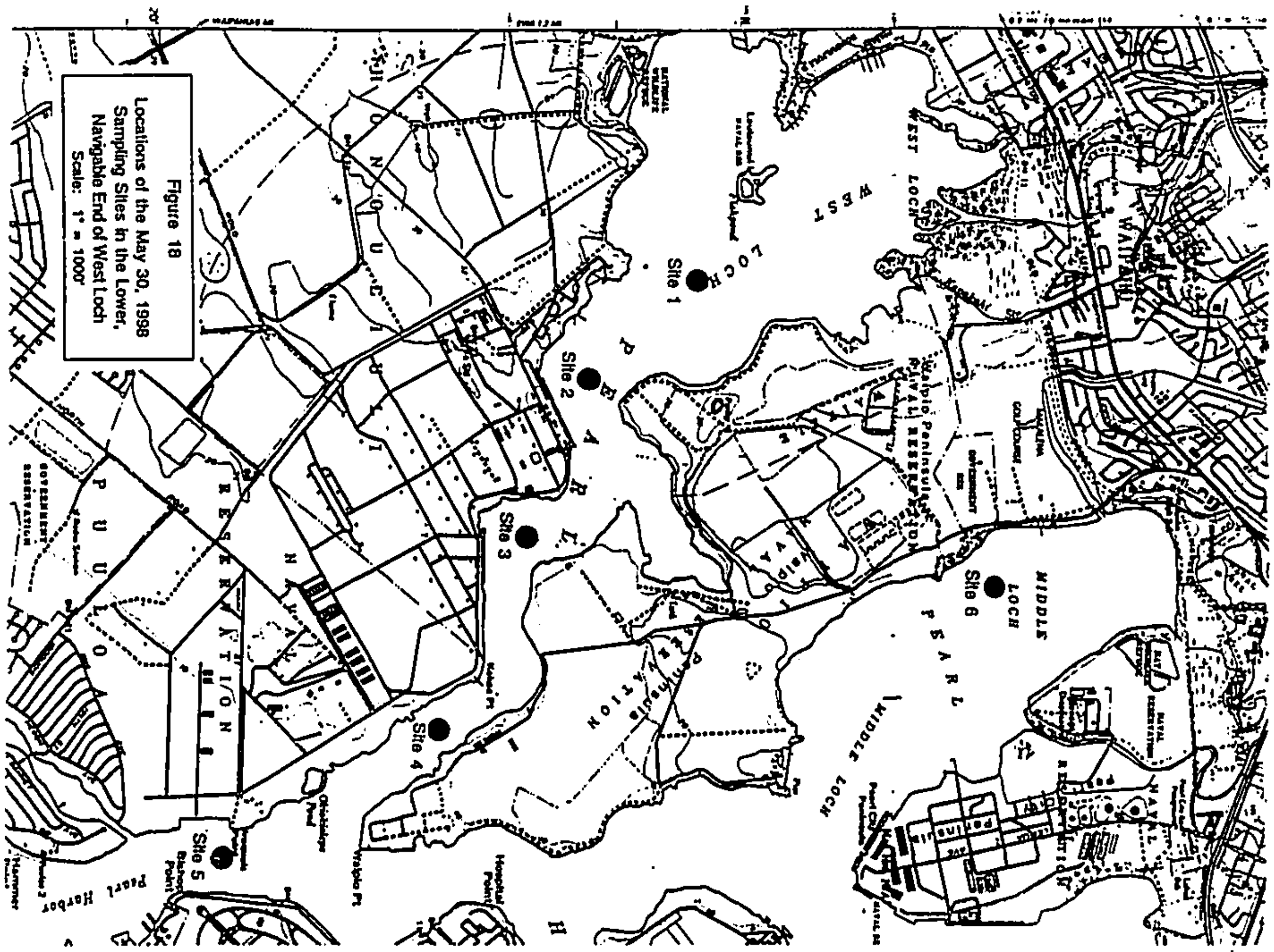


Figure 18
Locations of the May 30, 1998 Sampling Sites in the Lower, Navigable End of West Loch
Scale: 1" = 1000'

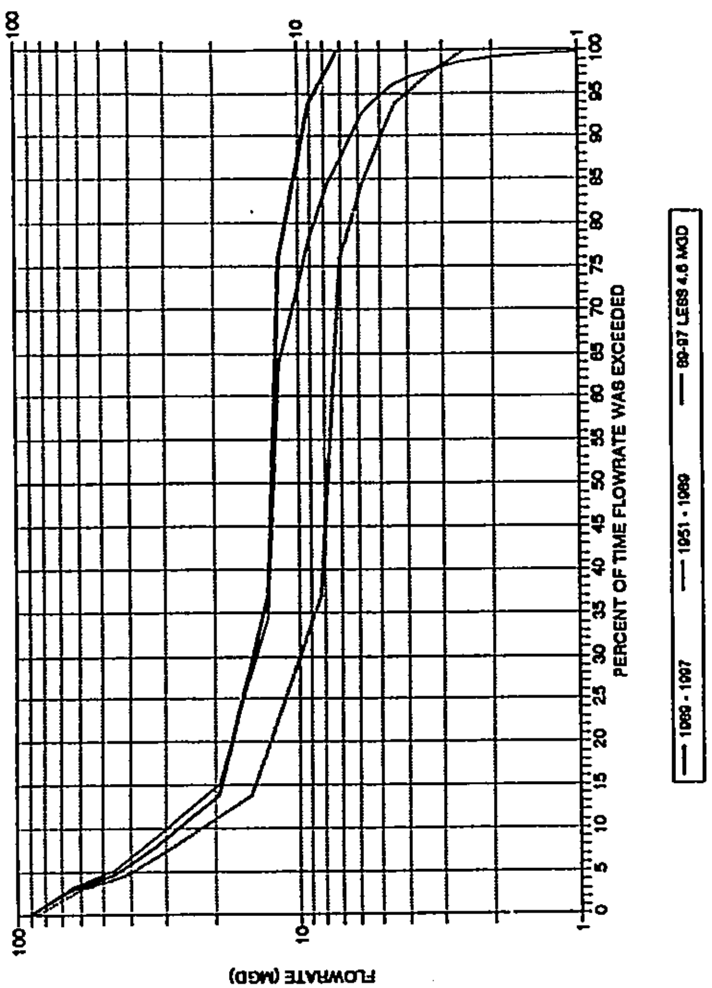
Table 5

Water Quality in the Deeper Navigable Portion of West Loch
(Refer to Figure 18 for Sampling Locations)

Sampling Site	Depth in the Water Column	Salinity (PPT)	Silica (µM)	Nitrogen				Phosphorus		
				No_3 (µM)	NH_4 (µM)	DON (µM)	Total N (µM)	PO_4 (µM)	DOP (µM)	Total P (µM)
1	Top	32.77	45.7	0.44	2.12	48.3	50.9	0.48	1.40	1.88
	Bottom	34.39	30.9	0.24	0.76	34.9	35.9	0.32	1.04	1.36
2	Top	32.14	42.2	0.16	1.20	44.3	45.7	0.44	1.16	1.60
	Bottom	34.95	35.2	2.36	0.84	28.5	31.7	0.56	0.80	1.36
3	Top	32.44	35.2	0.20	1.00	38.3	39.5	0.44	1.16	1.60
	Bottom	34.97	30.7	0.72	0.60	21.6	22.9	0.56	0.44	1.00
4	Top	32.92	29.8	0.10	1.25	40.4	41.7	0.24	1.44	1.68
	Bottom	35.01	17.7	0.16	0.28	26.4	26.8	0.24	0.88	1.12
5	Top	34.67	22.1	0.00	0.80	25.6	26.4	0.20	0.92	1.12
	Bottom	35.10	8.40	0.00	0.52	24.9	25.4	0.12	0.92	1.04
6	Top	34.08	40.4	0.04	0.40	25.4	25.9	0.12	1.12	1.24
	Bottom	34.82	27.8	0.08	1.48	28.9	30.4	0.40	1.04	1.44

__Notes:__
1. Samples collected by Tom Nance and Steve Dollar on May 30, 1998. Analyses by Marine Analytical Specialists.
2. Sites 1 through 5 move progressively out of West Loch. Site 6 is in Middle Loch.

FIGURE 19
FLOWRATE AT USGS GAGE 2130 WITH
PROPOSED 4.6 MGD WITHDRAWAL AT WP-18



The depiction of the impact of withdrawing 4.6 MGD as shown on Figure 19 is somewhat misleading, however. The average streamflow of 27.0 MGD since 1989 is only slightly higher than the 26.2 MGD pre-1989 average. When OSCO's 4.1 MGD draft rate is considered, total pre-1989 average streamflow was 30.3 MGD. This is significantly higher than the average since 1989. Based on this, the curves labeled "1989-1997" and "89-97 less 4.6 MGD" on Figure 19 can be expected to shift upward on the order of 3 MGD over the long term.

Effects Upstream of the Concrete Weir. The intake pipe of the WP-18 facility is immediately upstream of the concrete weir. Withdrawal of 4.6 MGD at this point would not change the flow upstream, but it would lower the level of water impounded behind the concrete weir. This "backwater" effect of the weir extends to within about 300 feet of the Waipahu Street bridge, a total distance of 2100 feet. Above this point, the weir has no influence on the depth of water in the stream channel. Over the affected 2100-foot long reach, the stream channel is typically about 30 to 40 feet wide and 2 to 4 feet deep. However, there are two pools where the stream widens and is deeper (at the weir and at the sharp bend 900 feet upstream). There are also two short sections where overgrowth from the banks has narrowed the stream considerably.

The rating table for USGS Gage 2130 can provide a first order approximation of reductions in water depths over the 2100-foot reach upstream as a result of the 4.6 MGD withdrawal. These changes, which are tallied below, would occur at the weir itself. Water level reductions would be progressively less over the 2100-foot reach upstream. The biggest reduction in water level would occur when streamflow is low. At higher discharge rates, the water level reductions would be progressively less.

Rate of Discharge Over the Weir (MGD)	Flowrate Upstream (MGD)	Water Level Reduction at the Weir* (Feet)
2.5	7.1	0.30
5.0	9.6	0.24
7.5	12.1	0.18
10.0	14.6	0.15
12.5	17.1	0.12
15.0	19.6	0.11

*Based on the current rating table for USGS Gage 2130.

Changes in the Tidal Reach Downstream of the Weir. Potential changes to the surface layer in the downstream tidal reach have been computed with the following assumptions:

(1) Salinity in the surface layer is primarily a function of tide level and not the discharge rate over the weir. At higher phases of the tide, the saltwater wedge extends back to the weir and the plunge over the weir entrains some of the saltwater. At lower levels of the tide, saltwater does not reach the weir and no mixing occurs in the plunge over it. Further mixing of saltwater is relatively minimal until the stream section widens near its mouth.

(2) As a reasonable approximation, the Manning's equation can be used to describe the movement of the surface layer downstream over an essentially stagnant saltwater bottom. For this calculation, the wetted perimeter of the surface layer is its contact with the banks. Hydraulic resistance along the fresh-saltwater interface is not considered.

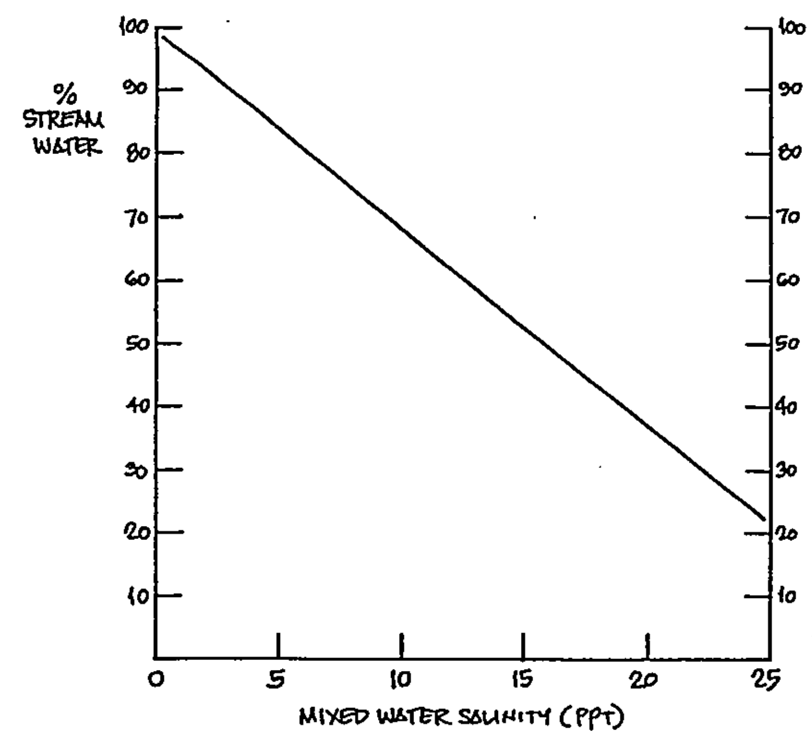
(3) The amount of water moving downstream in the surface layer is the freshwater discharge over the weir plus the saltwater mixed into it. This combined flowrate can be determined using the mixing line on Figure 20. It is based on a freshwater salinity of 0.33 PPT mixing with saltwater of 32.5 PPT.

With those assumptions, the hydraulic gradients and flow velocities in the surface layer delineated by the profiles in Figures 10 to 16 can be calculated. These results are summarized in Tables 6, 7, and 8. Highlights of the results are as follows:

- The stream channel at Sites 1, 2, and 3 are concrete-lined. Gradients are generally flatter (on the order 2 to 4 x 10^{-7}) and velocities are slower (0.3 to 0.5 fps).
- The mangrove-lined stream channel at Sites 4, 5, and 6 has poorer hydraulic efficiency. This results in steeper gradients (2 to 8 x 10^{-6}) and higher velocities (0.5 to 0.9 fps).
- At the mouth of the stream, the channel is substantially wider (from 70 feet at Site 6 to 170 feet at Site 7). Although there is a slight flattening of the gradient, the velocities are generally highest (0.8 to 0.9 fps).

There are some minor irregularities in the results in Tables 5, 6, and 7, some of which are attributable to changes in the tide and freshwater flow over the time it took to measure the salinity profiles at all seven sites. However, the results are generally reasonable and in accord with measured velocities in the surface layer. This provides confidence that the calculation can be used to approximate the change in the surface layer that can be expected to occur due to the proposed withdrawal of 4.6 MGD.

Two flow conditions have been chosen to illustrate this potential change: 11.6 MGD freshwater flow with a 7.0 MGD residual flow over the weir; and 7.1 MGD freshwater flow with 2.5 MGD over the weir. The first of these is the flowrate that would be equaled or exceeded 80 percent of the time (refer to Figure 19). In other words, a lower flowrate would occur one day out of five on average. The second example is the minimum flowrate that has occurred at USGS Gage 2130 since use of WP-18 ended in July 1989. Both of these examples, because they are at the low end of the range of flowrate that actually occurs, illustrate the maximum impact that withdrawing 4.6 MGD would have. At higher flowrates, contraction of the surface layer in the tidal reach downstream would be relatively less.



Note: Mixing line based on stream water salinity of 0.33 PPT and seawater at the upper end of West Loch at 32.5 PPT.

Figure 20

Mixing of Fresh and Saltwater in the Lower Reach of Waikele Stream

Table 6

Hydraulics of the Freshwater Layer in the Tidal Reach of Waikele Stream on May 20, 1998 [Freshwater Flowrate of 13.2 MGD; Tide at 1.1 Ft. (MLLW) and Falling]

Site No.	Surface Layer Salinity (PPT)	Mixed Water Flowrate (MGD)	Thickness of the Top Layer (Feet)	Cross Section Area of Flow (Ft^2)	Computed Hydraulic Gradient (Ft/Ft)	Flow Velocity (FPS)
1	2	14.2	1.35	58.6	4.6×10^{-7}	0.52
2	2	14.4	1.35	65.7	3.0×10^{-7}	0.34
3	3	14.9	1.40	68.2	3.0×10^{-7}	0.34
4	3	15.2	1.10	36.1	6.5×10^{-6}	0.65
5	3	15.9	0.60	29.3	8.0×10^{-6}	0.84
6	4	18.2	0.65	44.6	3.0×10^{-6}	0.63
7	13	26.4	0.25	50.0	1.2×10^{-6}	0.82

Notes:

1. The mixed water flowrate is derived from the freshwater flowrate, weighted salinity in the flow layer, and the mixing line on Figure 20.
2. The hydraulic gradient is computed with the Manning's equation with the wetted perimeter limited to the contact surface at the stream banks (ie. the fresh-saltwater interface has not been included).
3. Cross sectional areas for Sites 1, 2, and 3 are based on construction plans of the flood control project. Manning's "n" of 0.015 was used for these concrete-lined sections. Areas for Sections 4, 5, 6, and 7 are based on estimated top width and assumed 2:1 side slopes. Manning's "n" of 0.025 was used for these sections.

Table 7

Hydraulics of the Freshwater Layer in the Tidal Reach of Waikele Stream on May 31, 1998 [Freshwater Flowrate of 11.0 MGD; Slack Tide at 0.4 Ft. (MLLW)]

Site No.	Surface Layer Salinity (PPT)	Mixed Water Flowrate (MGD)	Thickness of the Top Layer (Feet)	Cross Section Area of Flow (Ft^2)	Computed Hydraulic Gradient (Ft/Ft)	Flow Velocity (FPS)
1	1	11.6	1.25	53.1	2.0×10^{-7}	0.34
2	1	11.6	0.90	44.8	4.0×10^{-7}	0.40
3	1	13.3	1.25	61.3	2.8×10^{-7}	0.34
4	1.5	13.4	0.8	22.7	7.9×10^{-6}	0.91

Notes:

1. The mixed water flowrate is derived from the freshwater flowrate, weighted salinity in the flow layer, and the mixing line on Figure 20.
2. The hydraulic gradient is computed with the Manning's equation with the wetted perimeter limited to the contact surface at the stream banks (ie. the fresh-saltwater interface has not been included).
3. Cross sectional areas for Sites 1, 2, and 3 are based on construction plans of the flood control project. Manning's "n" of 0.015 was used for these concrete-lined sections. Areas for Sections 4, 5, 6, and 7 are based on estimated top width and assumed 2:1 side slopes. Manning's "n" of 0.025 was used for these sections.

Table 8

Hydraulics of the Freshwater Layer in the
Tidal Reach of Waikele Stream on June 6, 1998
[Freshwater Flowrate of 12.6 MGD; Rising Tide at 1.7 Ft. (MLLW)]

Site No.	Surface Layer Salinity (PPT)	Mixed Water Flowrate (MGD)	Thickness of the Top Layer (Feet)	Cross Section Area of Flow (Ft^2)	Computed Hydraulic Gradient (Ft/Ft)	Flow Velocity (FPS)
1	4	14.7	1.55	65.9	2.0×10^{-7}	0.35
2	3	14.3	1.50	73.5	2.3×10^{-7}	0.30
3	3 to 4	14.6	1.80	88.2	1.7×10^{-7}	0.26
4	2 to 3	13.9	1.35	36.9	8.7×10^{-6}	0.59
5	2 to 3	13.9	1.05	39.8	4.8×10^{-6}	0.54
6	4 to 5	14.9	0.75	44.7	2.0×10^{-6}	0.52
7	14	22.8	0.30	51.0	6.6×10^{-7}	0.83

Notes:
1. The mixed water flowrate is derived from the freshwater flowrate, weighted salinity in the flow layer, and the mixing line on Figure 20.
2. The hydraulic gradient is computed with the Manning's equation with the wetted perimeter limited to the contact surface at the stream banks (ie. the fresh-saltwater interface has not been included).
3. Cross sectional areas for Sites 1, 2, and 3 are based on construction plans of the flood control project. Manning's "n" of 0.015 was used for these concrete-lined sections. Areas for Sections 4, 5, 6, and 7 are based on estimated top width and assumed 2:1 side slopes. Manning's "n" of 0.025 was used for these sections.

The calculations for the example of 11.6 MGD of flow above the weir and 7.0 MGD plunging over it are summarized on Tables 9 and 10. Without the 4.6 MGD extraction, a freshwater layer of from 1.05 to 1.20 feet thick at Sites 1 to 3 and then progressively thinning to 0.21 feet at Site 7 is calculated (Table 9). When the freshwater flow is reduced to 7.0 MGD, the surface layer downstream is reduced by 26 to 42 percent (compare results in Table 10 to those in Table 9).

Calculations for the example of 7.1 MGD of streamflow and just 2.5 MGD plunging over the weir are summarized on Tables 11 and 12. These indicate that withdrawing 4.6 MGD would reduce the surface layer in the tidal reach by 40 to 65 percent. At Sites 6 and 7 at the lower end of the reach, the freshwater layer would be very thin, possibly to the point where mixing might result in higher salinities than have been assumed for these calculations.

Salinity Changes in the Upper End of West Loch. Salinities in the surface layer at the upper end of West Loch are a function of the volume of incoming fresh water, the level of the tide, and the strength of the wind. As demonstrated by the water quality data in Table 4 and the salinity profiles in Appendix B, surface salinities ranged from 28.5 to 32.8 on May 25, 1998. Freshwater discharge when these samples were collected was 11.9 MGD and the tide was low (0.2 to 0.5 ft. MLLW). Using a simple mixing model of fresh and saltwater, changes in surface salinities due to reducing the freshwater inflow by 4.6 MGD can be approximated. The data collected on May 25th are for this calculation. It is also assumed that the saltwater in West Loch available for mixing is 33 PPT and the reduction of incoming fresh water is simply replaced by this saltwater. Resulting average surface salinities along the five transects depicted on Figure 17 are tallied below in two ways, first by ignoring and then by including the freshwater input of Honouliuli and Kapakahi Streams. Computed salinity increases range from 0.22 to 0.89 PPT, a not very substantial change. Also, inclusion of the freshwater inflow of Honouliuli and Kapakahi Streams in the calculation does not make a significant difference.

Example of the Expectable Change in Surface Salinity in the
Upper End of West Loch Based on May 25, 1998 Data

Transect	Average Surface Salinity of Sites Along Transect (PPT)	Resulting Surface Salinity With 4.6 MGD Less in Waikele Stream: Ignores Honouliuli and Kapakahi Input (PPT)	Includes Honouliuli and Kapakahi Input (PPT)
A	31.16	31.84	31.82
B	31.48	32.04	32.02
C	32.40	32.62	32.61
D	31.28	31.91	31.89
E	30.58	31.47	31.44

Notes:
1. Waikele Stream input, with a salinity of 0.33 PPT, was 11.9 MGD on May 25, 1998.
2. Honouliuli Stream (salinity of 0.82 PPT) and Kapakahi Stream (salinity of 0.42 PPT) assumed to each be discharging at 0.5 MGD.
3. Average surface salinities on May 25, 1998 taken from Table 4.

Table 9

Computed Flow Section for
11.6 MGD Over the Concrete Weir at Mid-Tide Level

Site No.	Chosen Parameters			Computed Parameter Values		
	Surface Salinity (PPT)	Mixed Water Flowrate (MGD)	Hydraulic Gradient (Ft./Ft.)	Cross Section Area of Flow (Ft^2)	Flow Velocity (FPS)	Thickness of the Top Layer
1	2	12.4	3.0×10^{-7}	44.6	0.43	1.05
2	2	12.6	3.0×10^{-7}	57.3	0.34	1.16
3	3	13.1	3.0×10^{-7}	59.2	0.34	1.20
4	3	13.4	8×10^{-6}	21.7	0.95	0.71
5	3	14.0	6×10^{-6}	22.2	0.98	0.57
6	4	16.0	3×10^{-6}	24.3	1.02	0.35
7	14	23.2	9×10^{-7}	35.6	1.01	0.21

Table 10

Computed Flow Section for
7.0 MGD Over the Concrete Weir at Mid-Tide Level

Site No.	Chosen Parameters			Computed Parameter Values		
	Surface Salinity (PPT)	Mixed Water Flowrate (MGD)	Hydraulic Gradient (Ft./Ft.)	Cross Section Area of Flow (Ft^2)	Flow Velocity (FPS)	Thickness of the Top Layer
1	2	7.5	3.0×10^{-7}	33.0	0.35	0.78
2	2	7.6	3.0×10^{-7}	34.0	0.35	0.68
3	3	7.9	3.0×10^{-7}	35.5	0.34	0.71
4	3	8.1	8×10^{-6}	12.9	0.97	0.41
5	3	8.4	6×10^{-6}	13.0	1.00	0.33
6	4	9.7	3×10^{-6}	14.6	1.03	0.21
7	14	14.0	9×10^{-7}	22.1	0.98	0.13

Table 11

Computed Flow Section for
7.1 MGD Over the Concrete Weir at Mid-Tide Level

Site No.	Chosen Parameters			Computed Parameter Values		
	Surface Salinity (PPT)	Mixed Water Flowrate (MGD)	Hydraulic Gradient (Ft./Ft.)	Cross Section Area of Flow (Ft^2)	Flow Velocity (FPS)	Thickness of the Top Layer
1	2	7.6	3.0×10^{-7}	33.2	0.35	0.78
2	2	7.7	3.0×10^{-7}	34.5	0.34	0.69
3	3	8.0	3.0×10^{-7}	36.0	0.34	0.72
4	3	8.2	8×10^{-6}	13.1	0.97	0.42
5	3	8.6	6×10^{-6}	13.4	0.99	0.34
6	4	9.8	3×10^{-6}	15.3	0.99	0.22
7	14	14.2	9×10^{-7}	22.1	0.98	0.13

Table 12

Computed Flow Section for
2.5 MGD Over the Concrete Weir at Mid-Tide Level

Site No.	Chosen Parameters			Computed Parameter Values		
	Surface Salinity (PPT)	Mixed Water Flowrate (MGD)	Hydraulic Gradient (Ft./Ft.)	Cross Section Area of Flow (Ft^2)	Flow Velocity (FPS)	Thickness of the Top Layer
1	2	2.7	3.0×10^{-7}	17.9	0.23	0.42
2	2	2.7	3.0×10^{-7}	12.1	0.33	0.24
3	3	2.8	3.0×10^{-7}	12.4	0.35	0.25
4	3	2.9	8×10^{-6}	4.8	0.94	0.15
5	3	3.0	6×10^{-6}	4.8	0.97	0.12
6	4	3.5	3×10^{-6}	5.6	0.97	0.08
7	14	5.0	9×10^{-7}	8.5	0.91	0.05

Appendix A

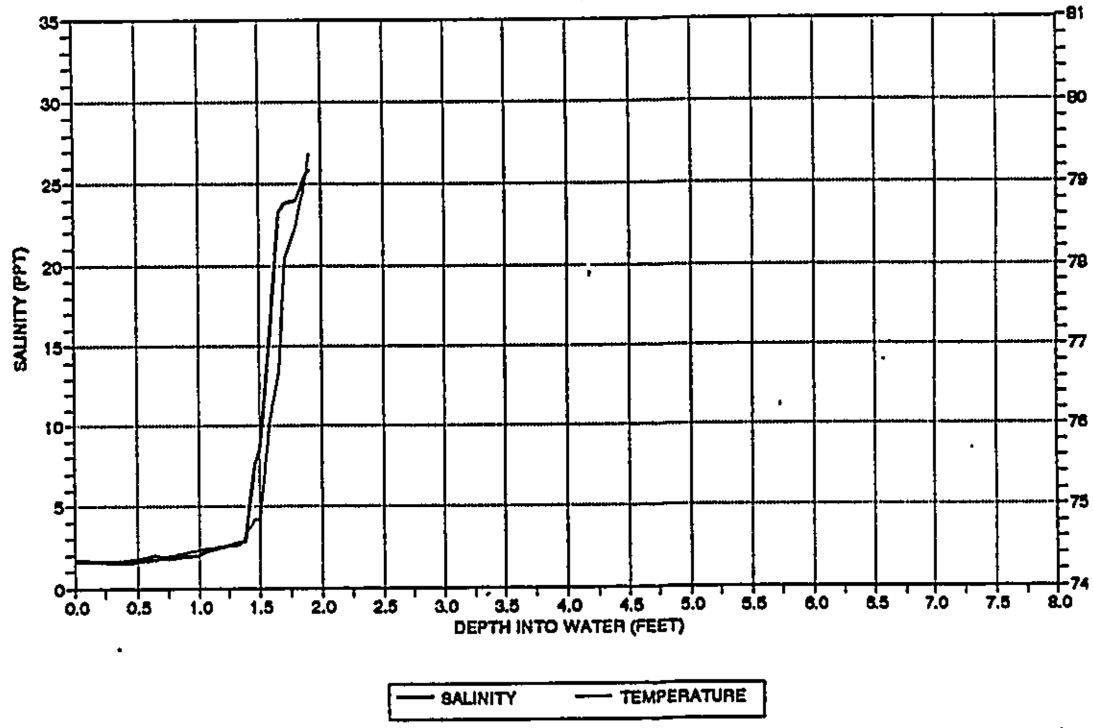
Salinity and Temperature Profiles in the Tidal Reach of Waikele Stream

Notes:
1. All profiles made with an Ocean Sensors Model OS-200 CTD.
2. Refer to Figure 9 for sites locations.

Appendix A-1

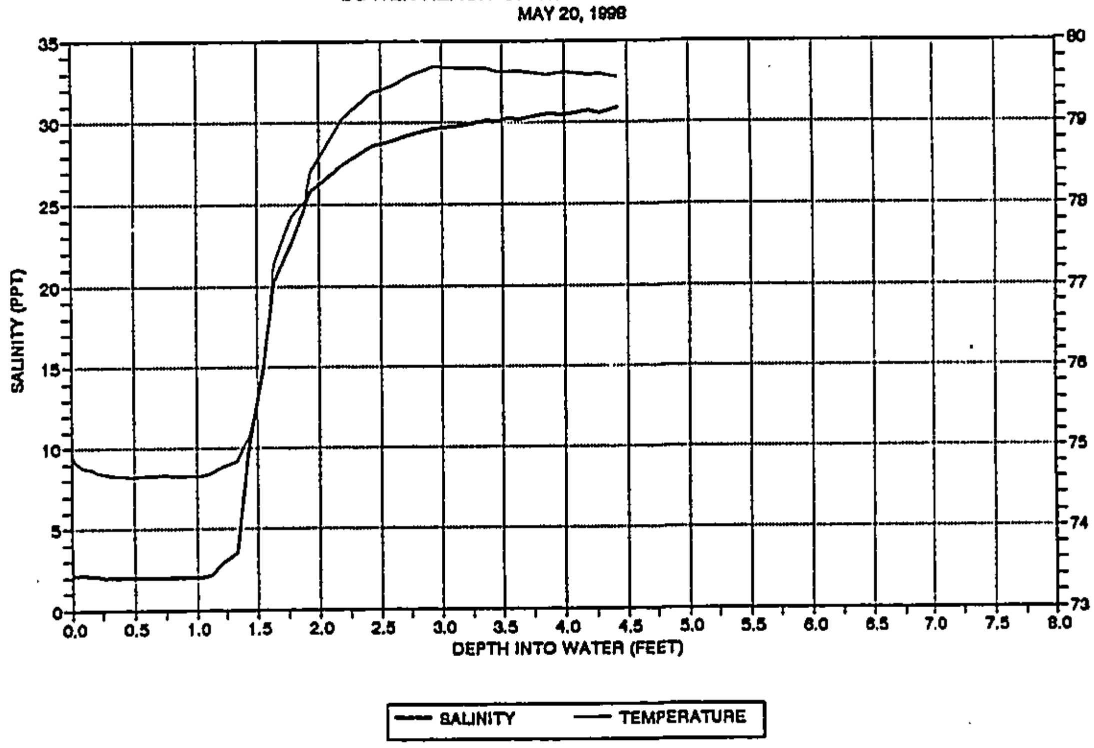
Profiles of May 20, 1998
at 13.2 MGD

LOWER REACH OF WAIKELE STREAM - SITE 1
MAY 20, 1998



A-1: Page 1

LOWER REACH OF WAIKELE STREAM - SITE 2
MAY 20, 1998



A-1: Page 2

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
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LEGIBILITY
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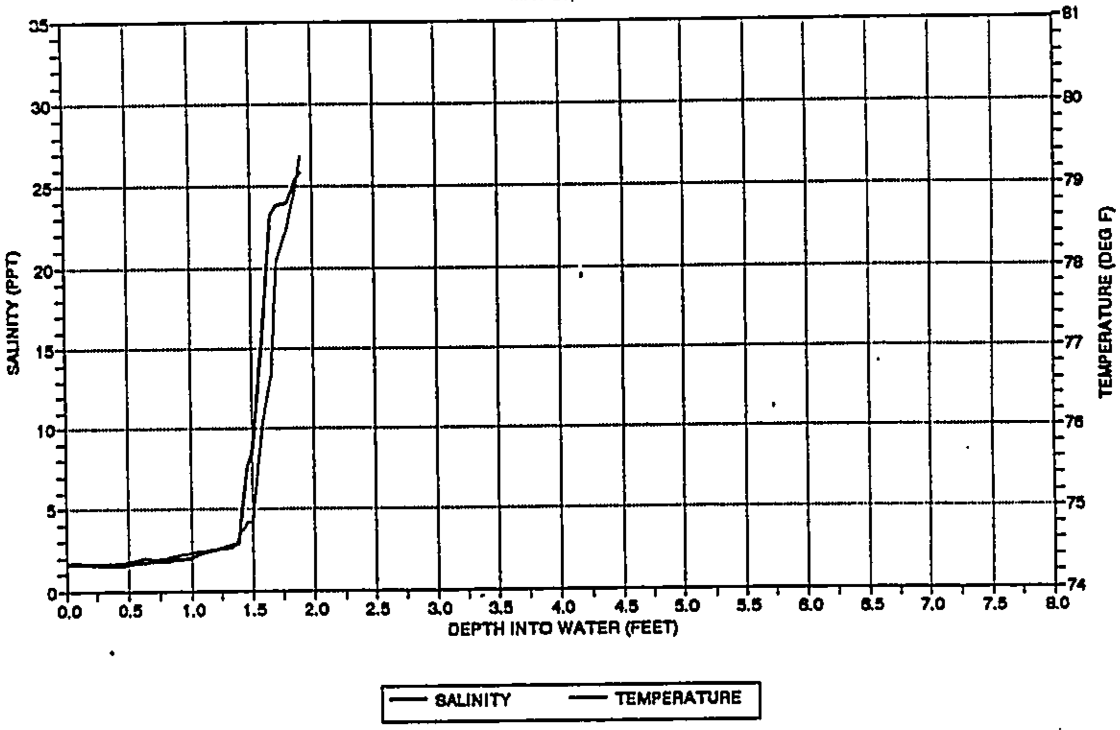
LOWER REACH OF WAIKELE STREAM - SITE 1
MAY 20, 1998



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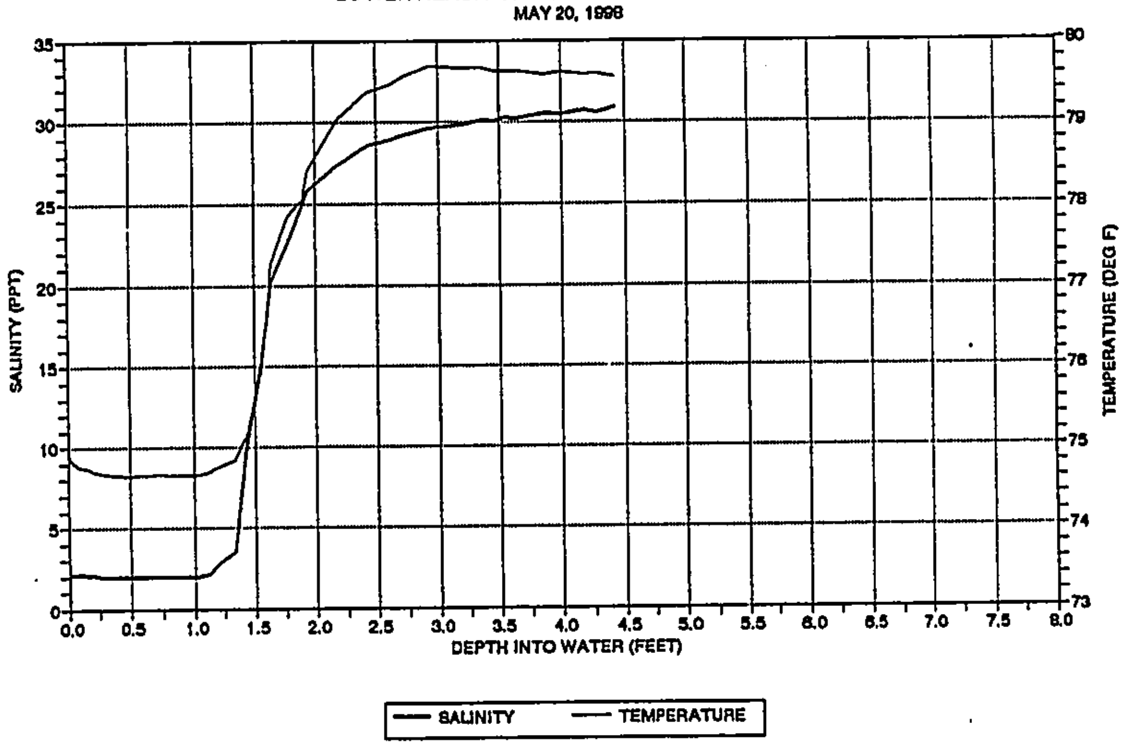
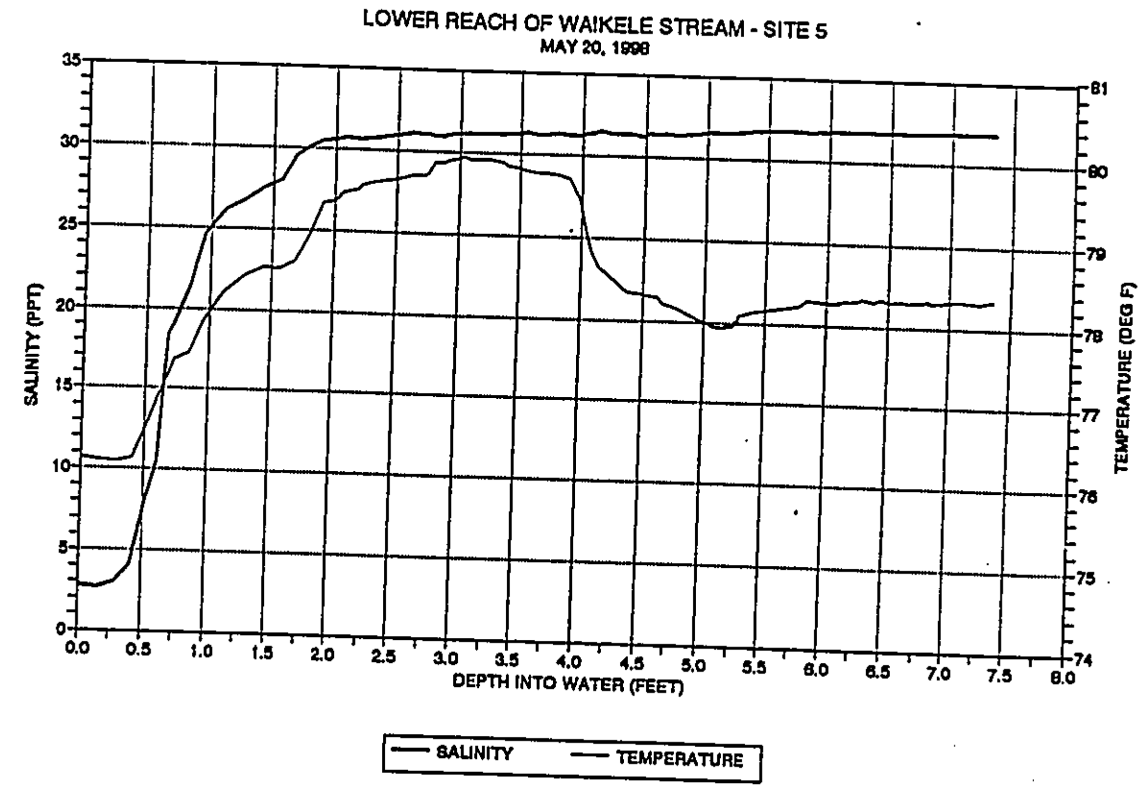
MAY 20, 1998





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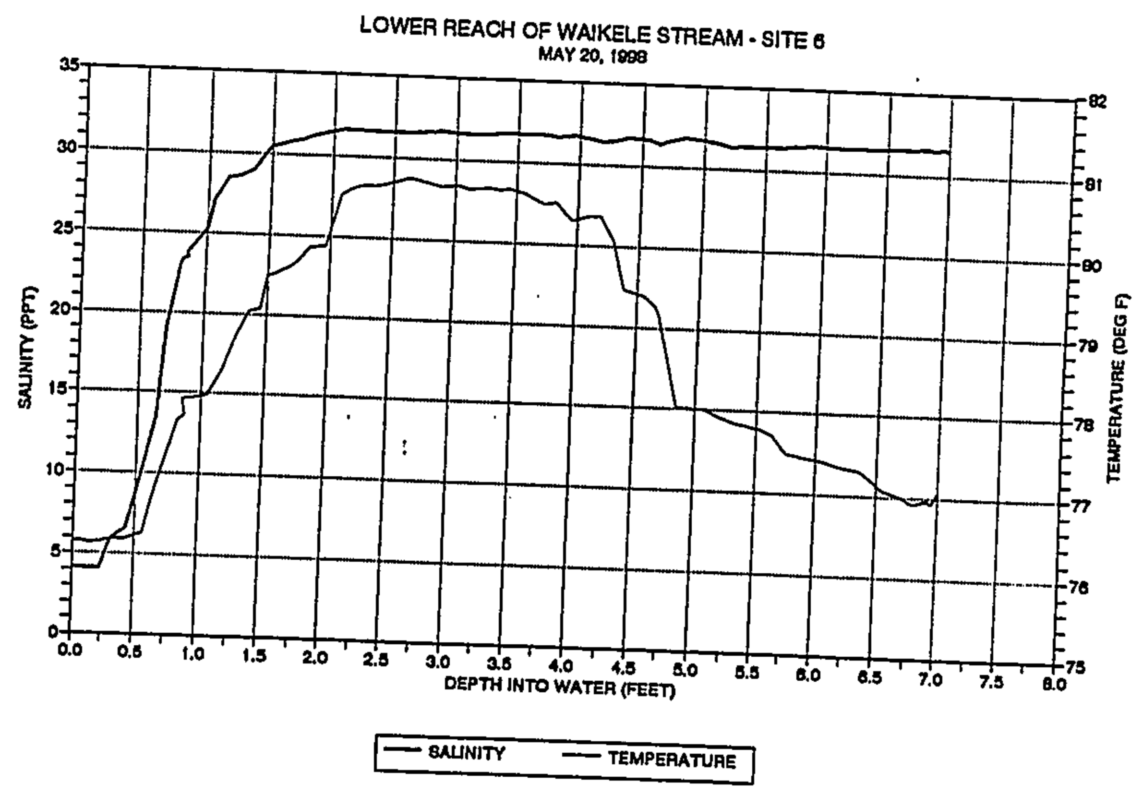
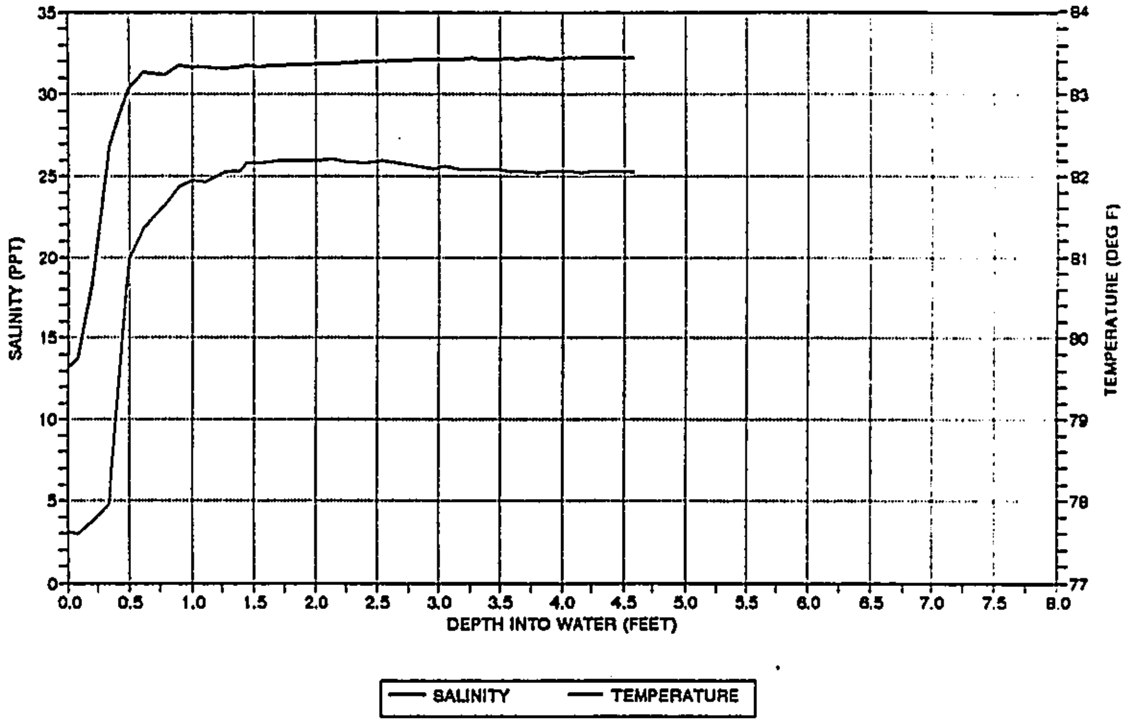


A-1: Page 6

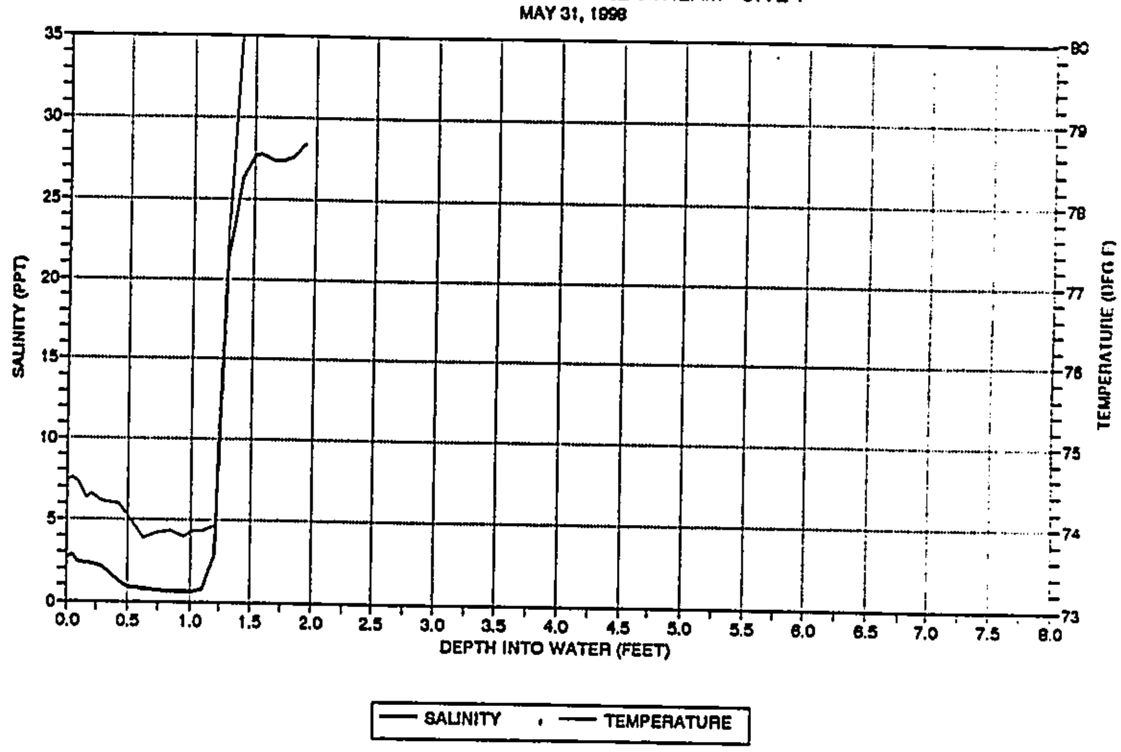
LOWER REACH OF WAIKELE STREAM - SITE 7
MAY 20, 1998



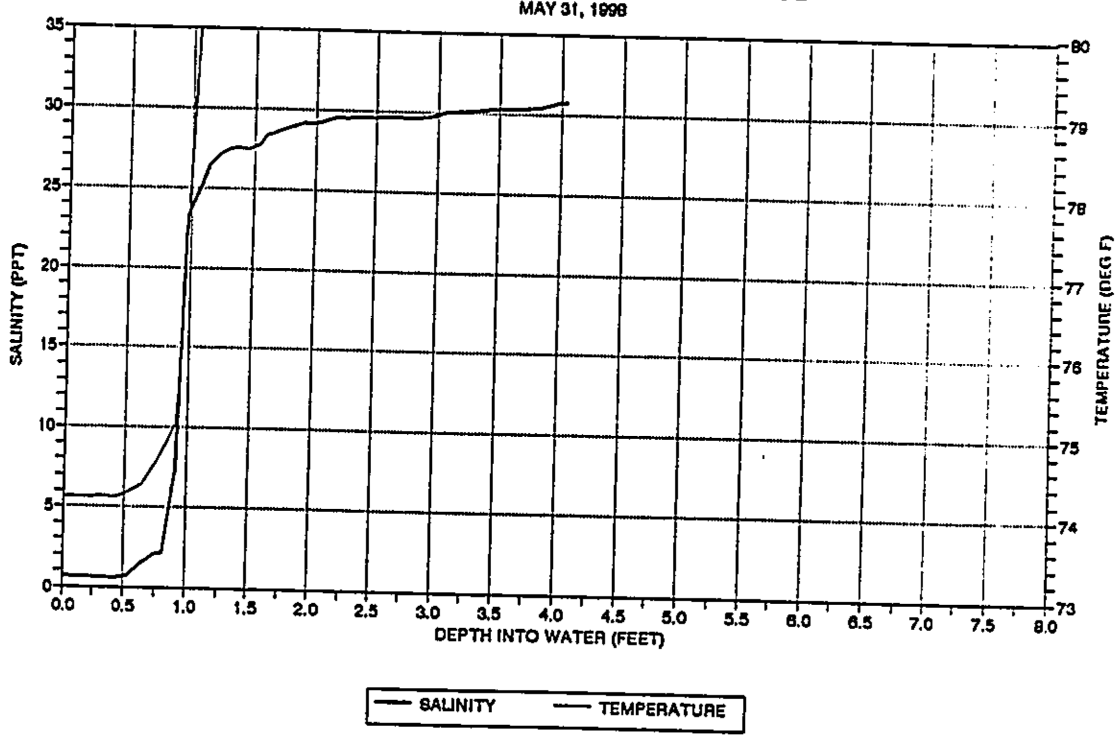
Appendix A-2

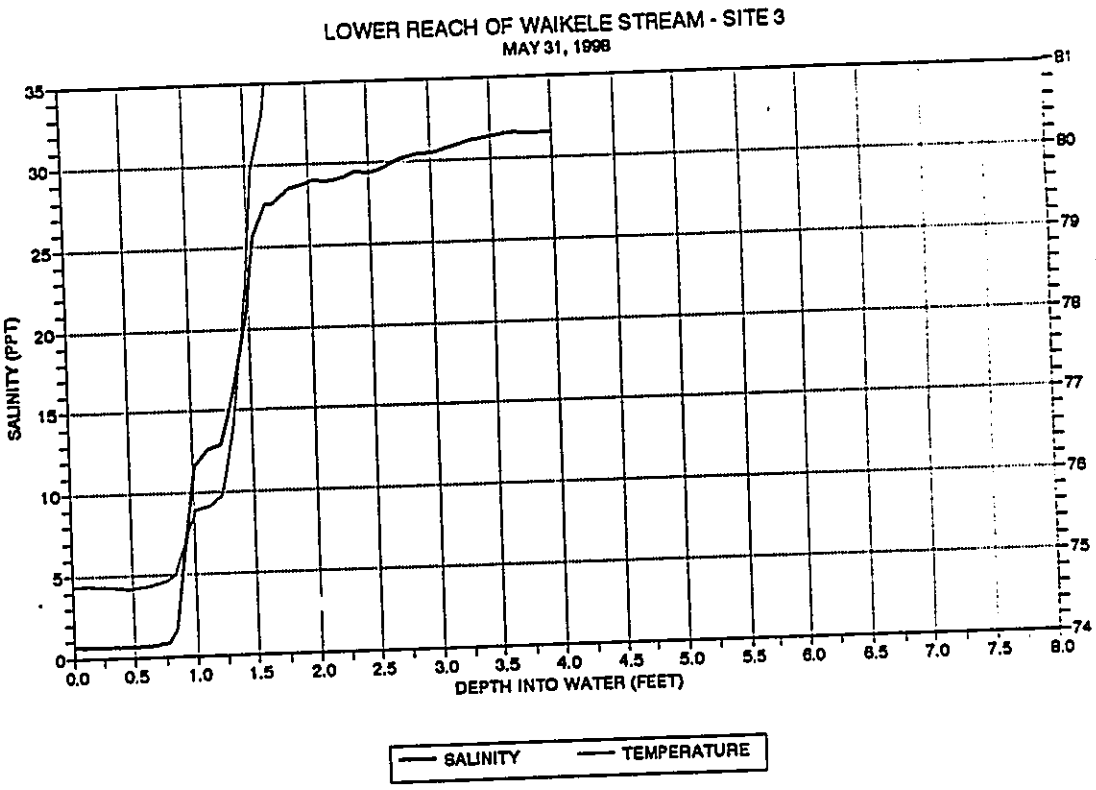
Profiles of May 31, 1998
at 11.0 MGD

LOWER REACH OF WAIKELE STREAM - SITE 1
MAY 31, 1998



LOWER REACH OF WAIKELE STREAM - SITE 2
MAY 31, 1998





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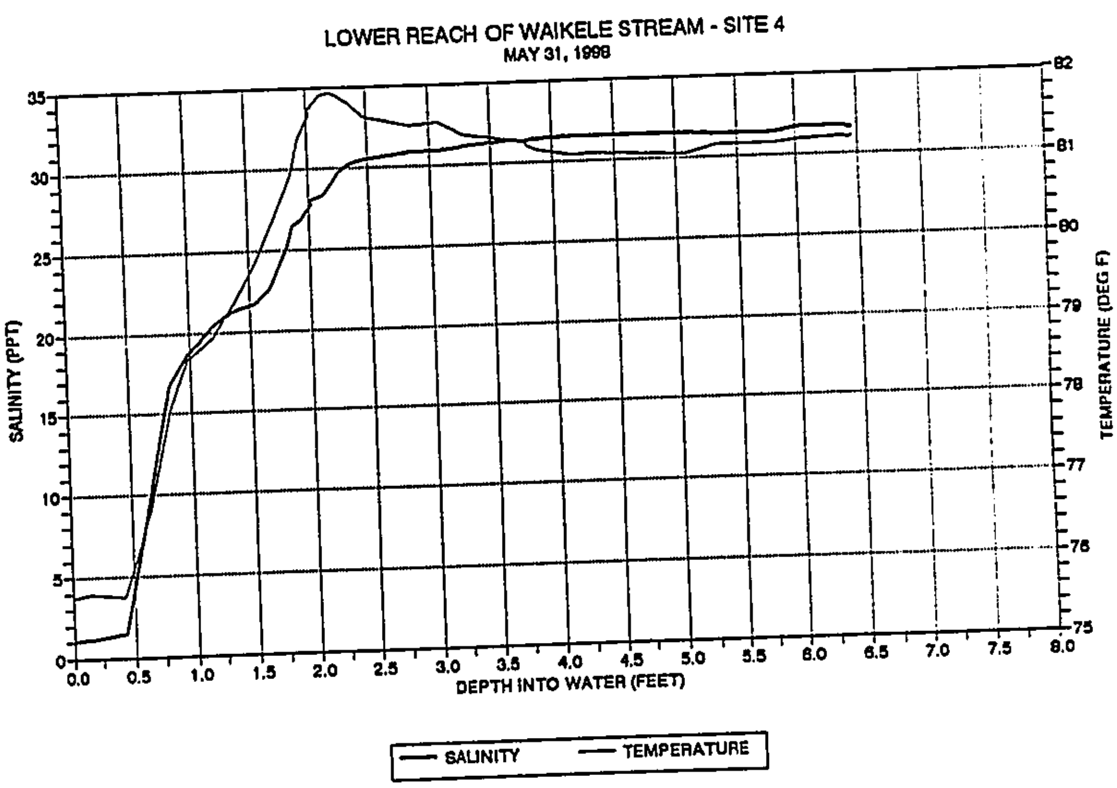
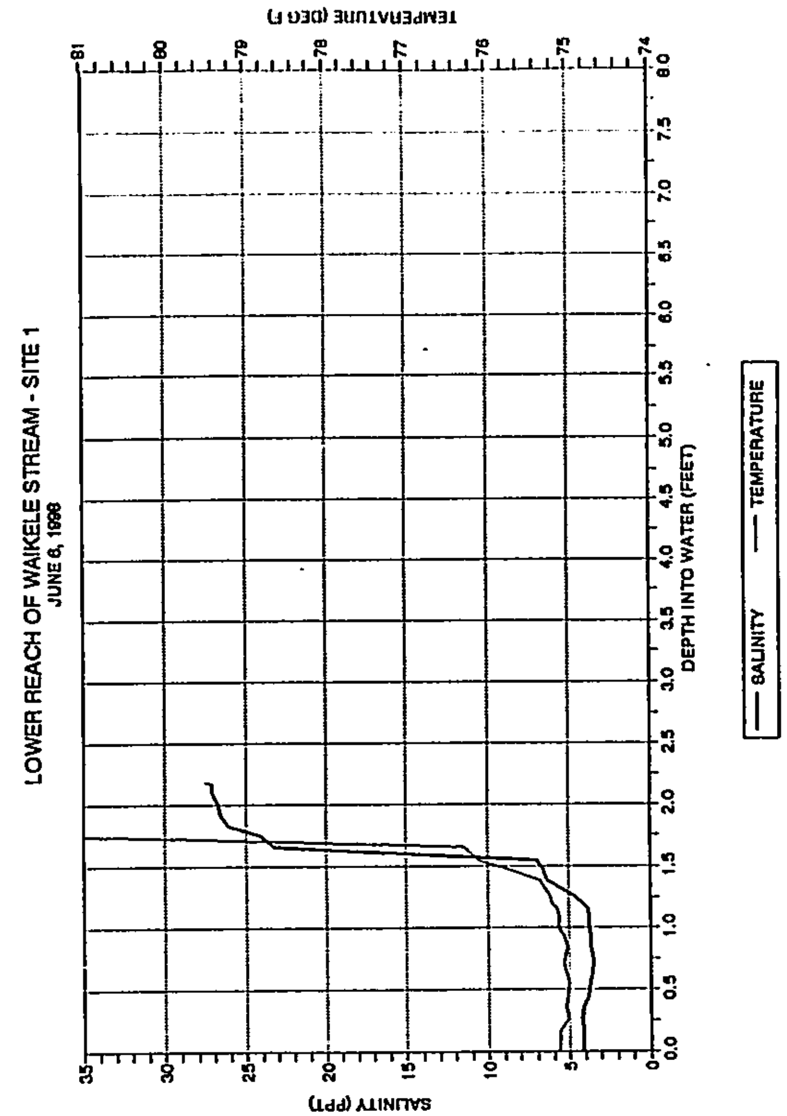
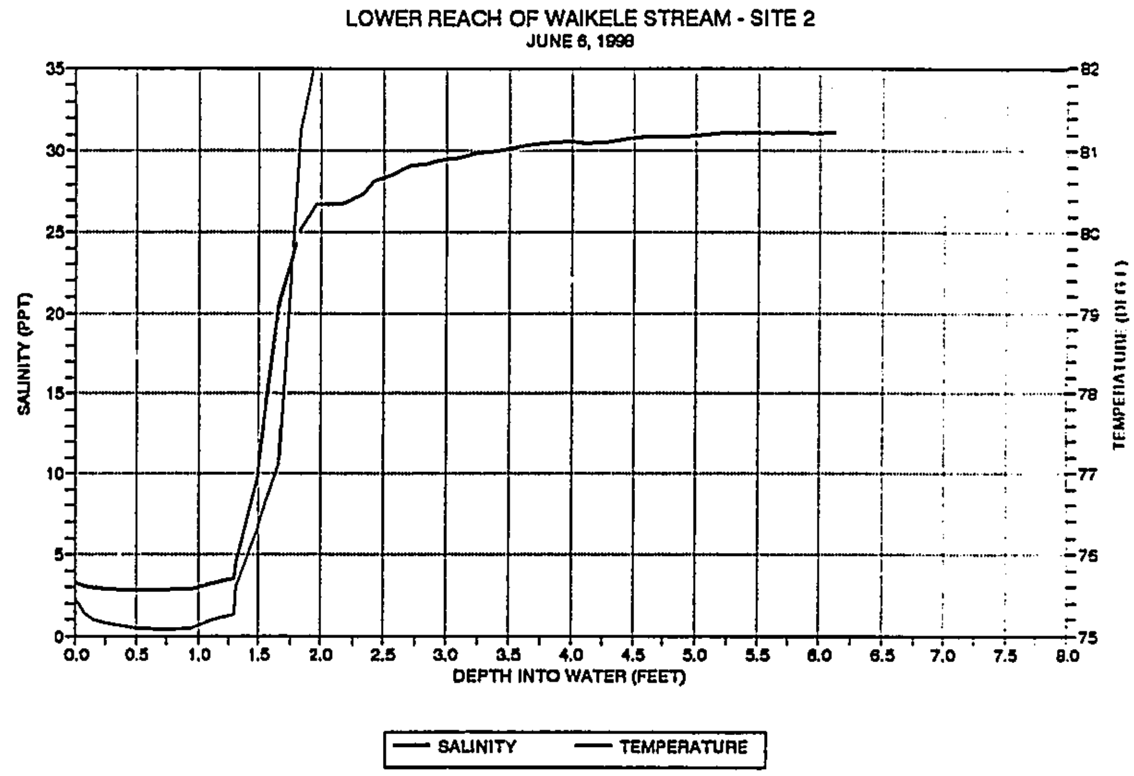


A-2: Page 4

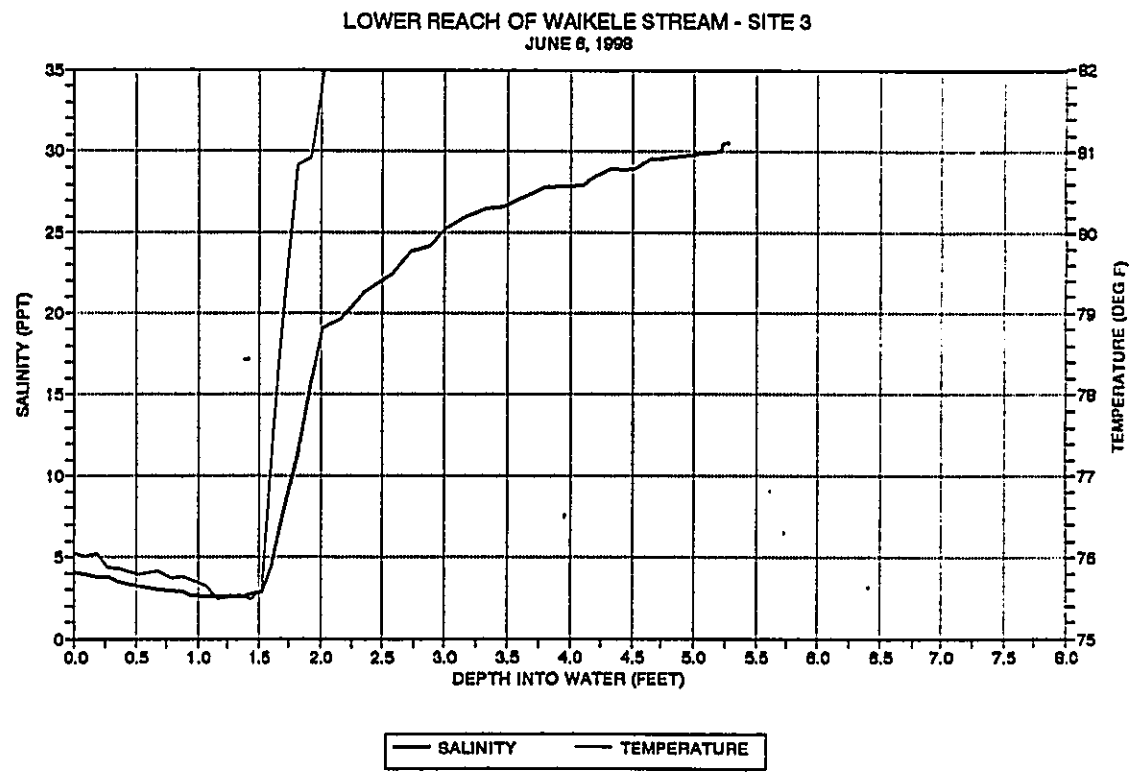
Appendix A-3

Profiles of June 6, 1998
at 12.6 MGD



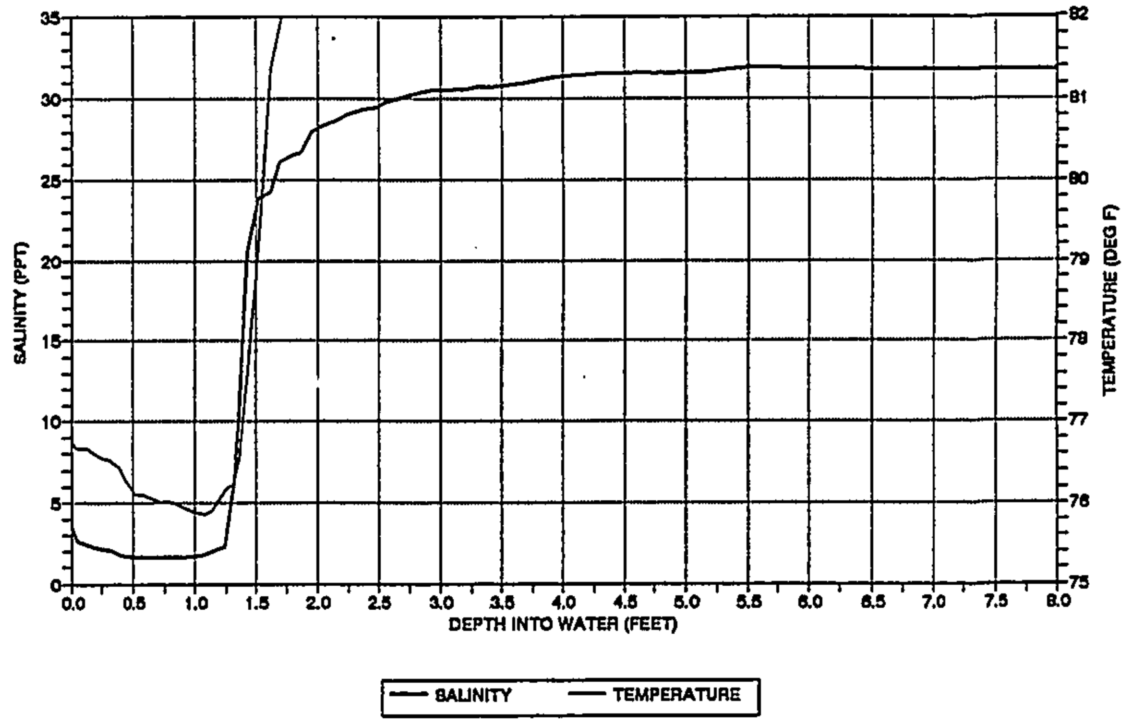


LOWER REACH OF WAIKELE STREAM - SITE 2
JUNE 6, 1998
SALINITY (PPT)
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
0
5
10
15
20
25
30
35
75
76
77
78
79
80
81
82
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
SALINITY
TEMPERATURE

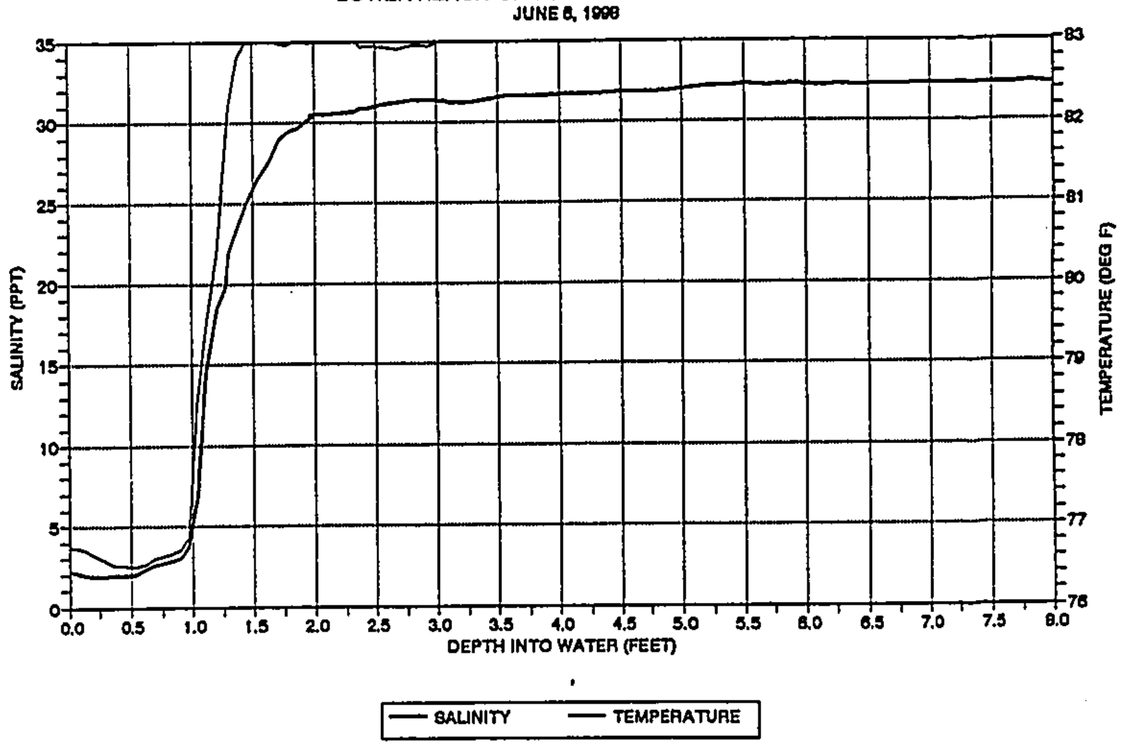


LOWER REACH OF WAIKELE STREAM - SITE 3
JUNE 6, 1998
SALINITY (PPT)
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
0
5
10
15
20
25
30
35
75
76
77
78
79
80
81
82
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
SALINITY
TEMPERATURE

LOWER REACH OF WAIKELE STREAM - SITE 4
JUNE 6, 1998



LOWER REACH OF WAIKELE STREAM - SITE 5
JUNE 6, 1998



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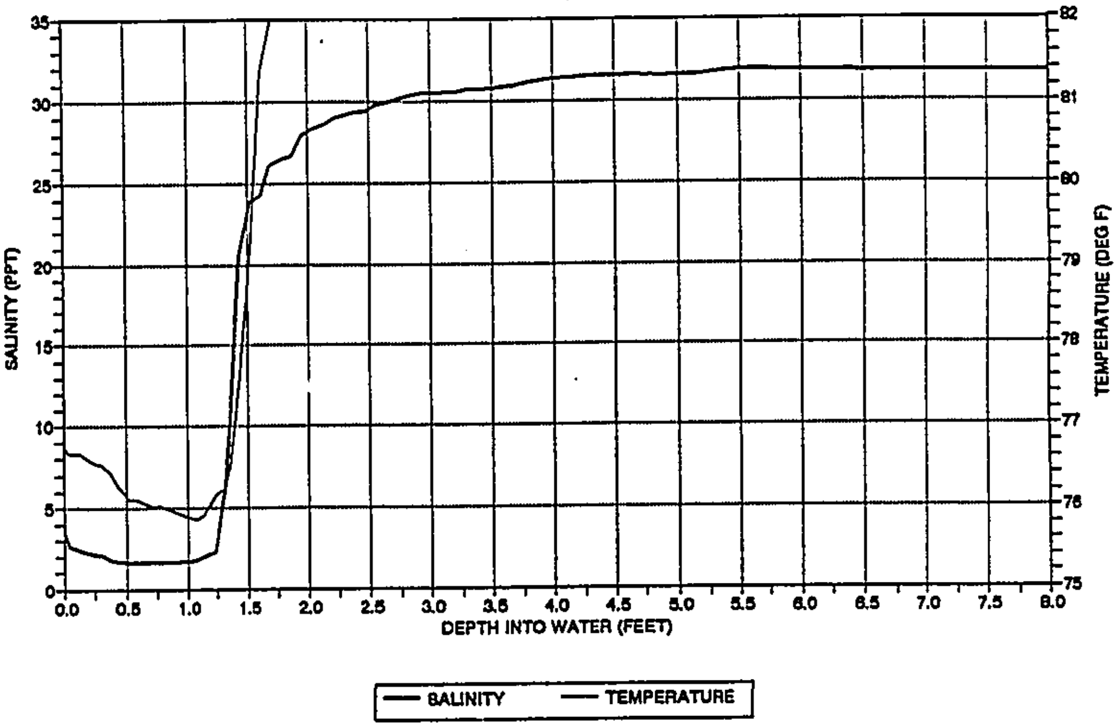
A-3: Page 4

LOWER REACH OF WAIKELE STREAM - SITE 4
JUNE 6, 1998



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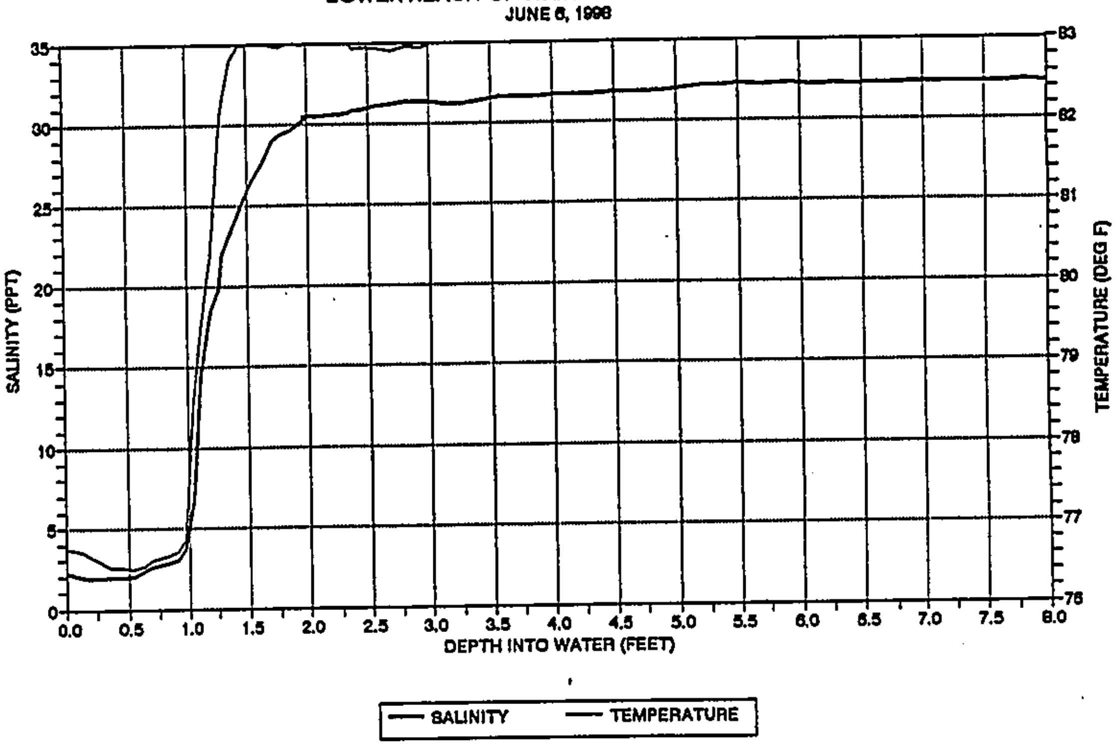
LOWER REACH OF WAIKELE STREAM - SITE 5
JUNE 6, 1998



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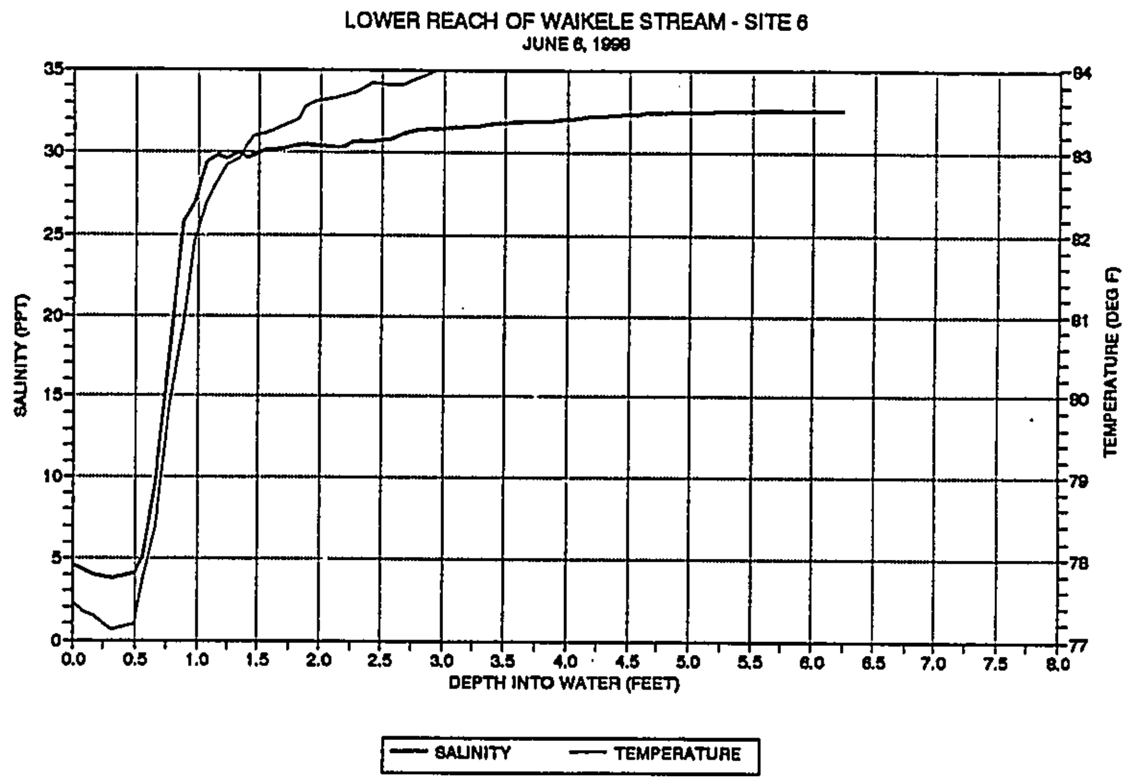

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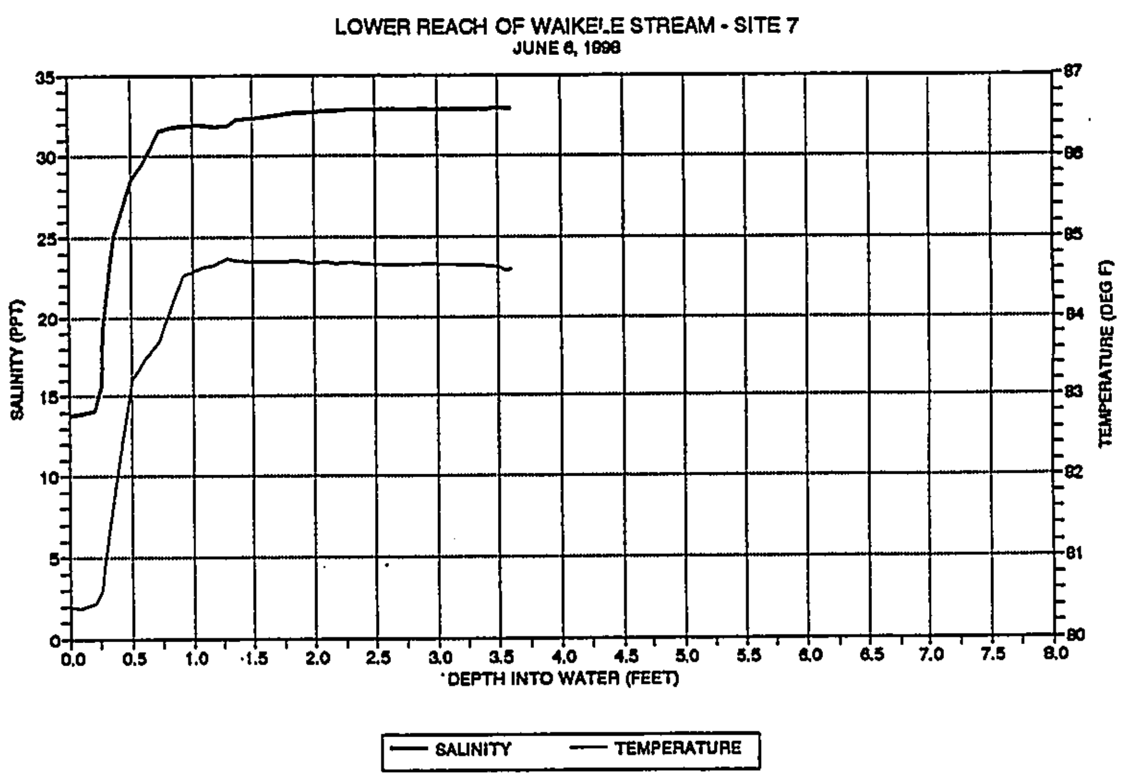
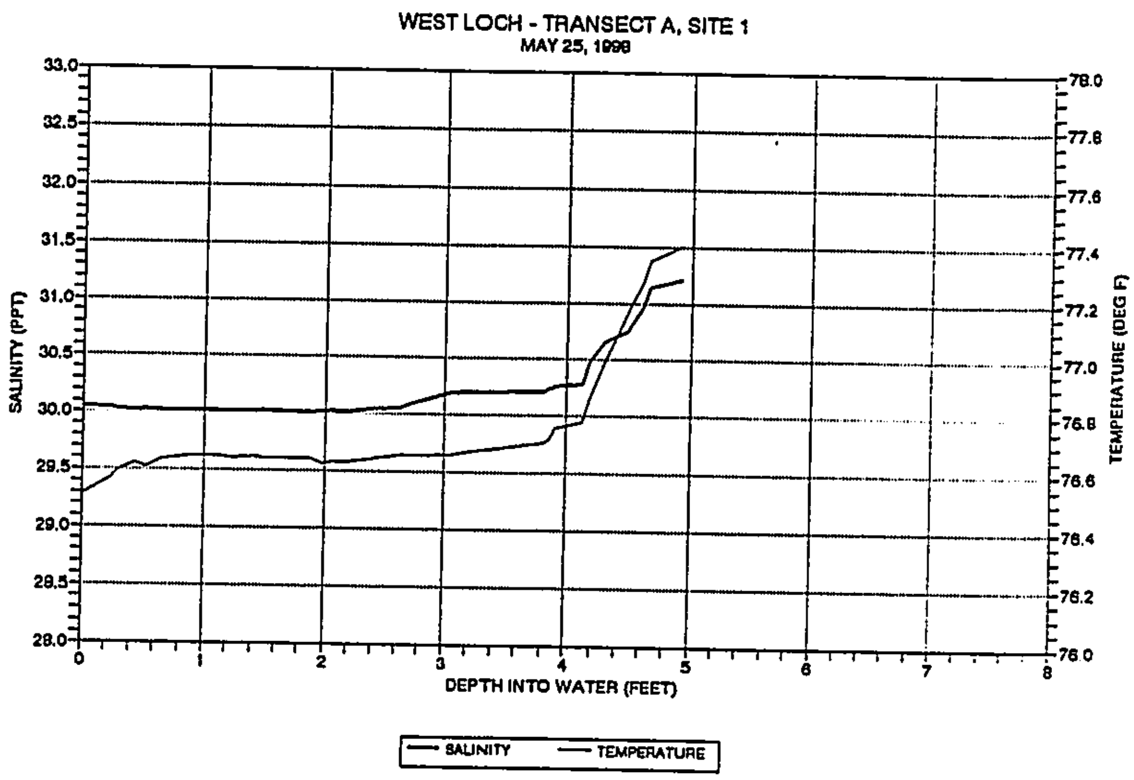


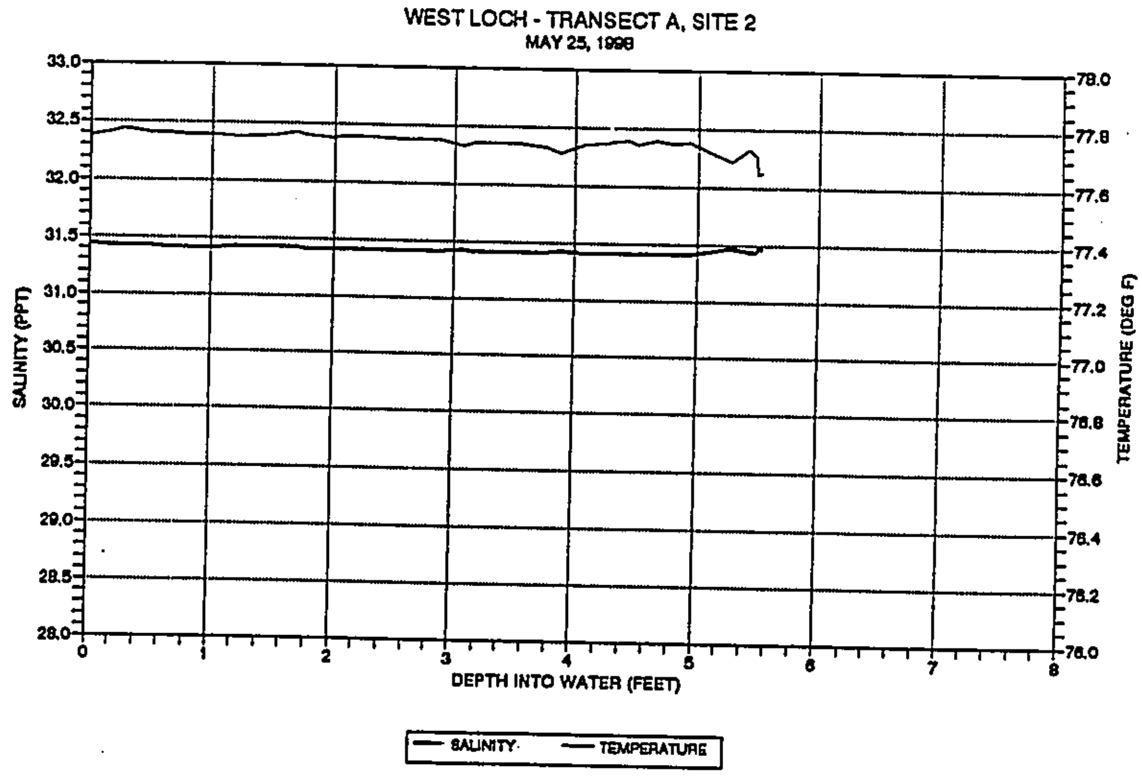
Appendix B

Salinity and Temperature Profiles in the
Upper End of West Loch
May 25, 1998

Notes:

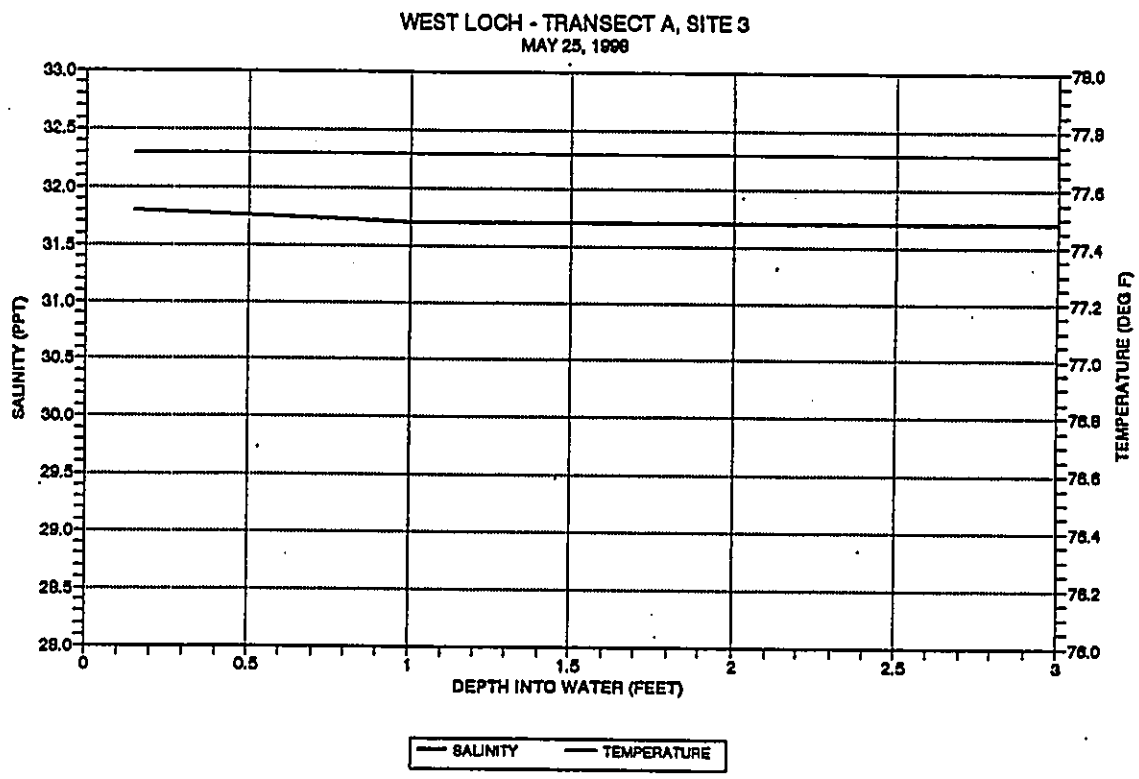
1. All profiles in water depths greater than 3 feet were made with an Ocean Sensors Model OS-200 CTD.
2. Profiles at sites of less than 3 feet water depth made with an Orion Model 130 conductivity meter. These sites are: A3, A4, D1, D2, E1, and E3.
3. Refer to Figure 17 for site locations.





WEST LOCH - TRANSECT A, SITE 2
MAY 25, 1998
SALINITY (PPT)
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
SALINITY
TEMPERATURE

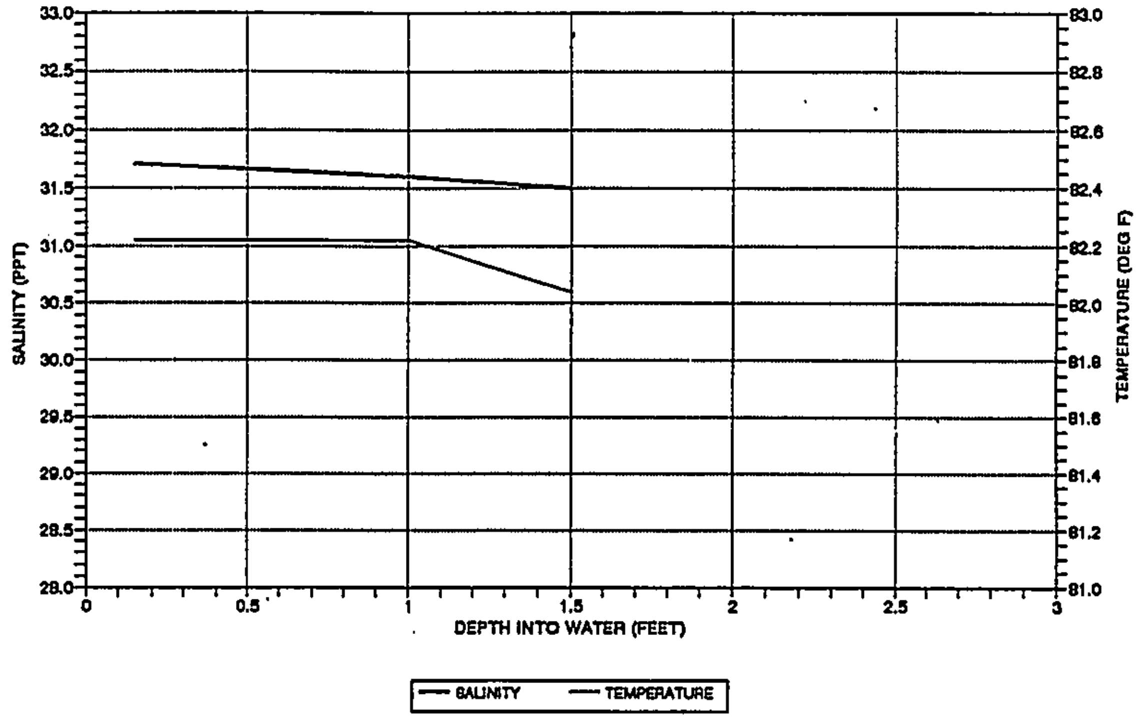
B - 2



WEST LOCH - TRANSECT A, SITE 3
MAY 25, 1998
SALINITY (PPT)
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
SALINITY
TEMPERATURE

B - 3

WEST LOCH - TRANSECT A, SITE 4
MAY 25, 1998



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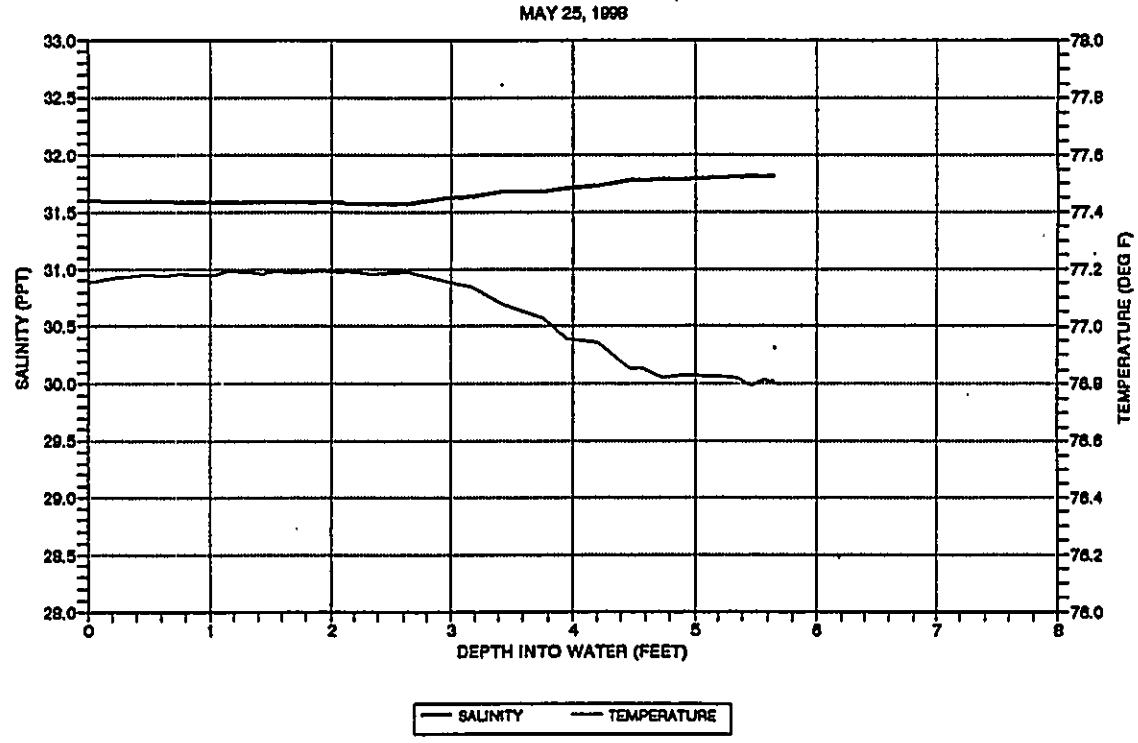

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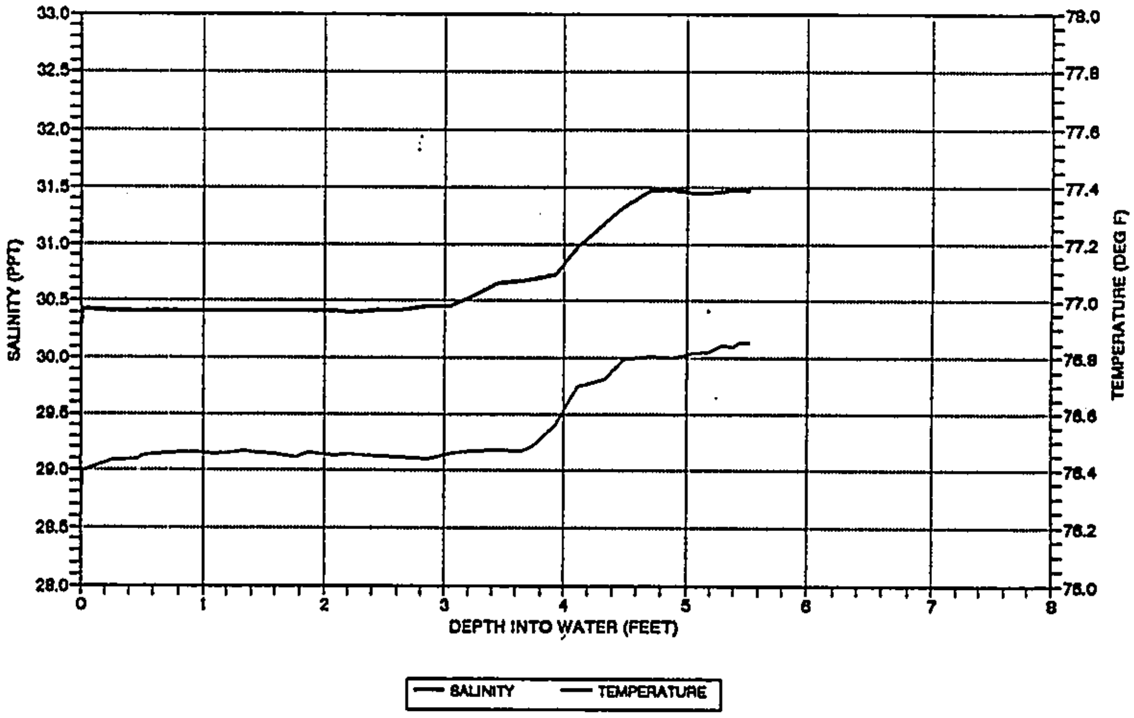

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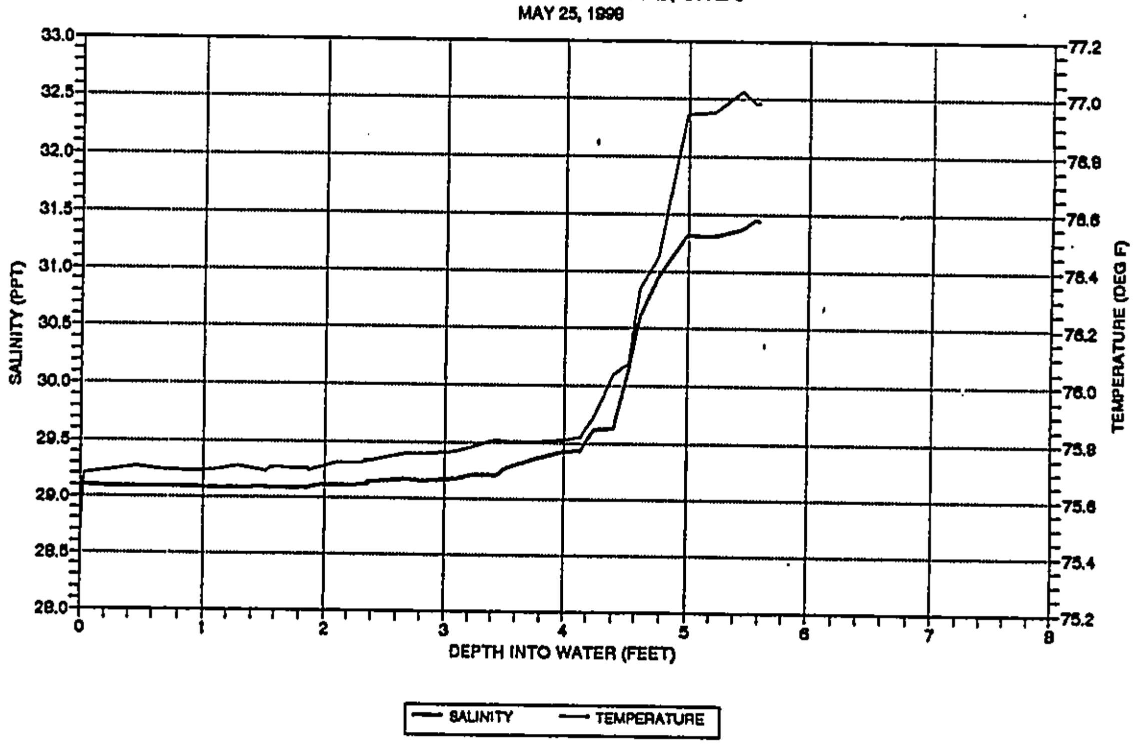

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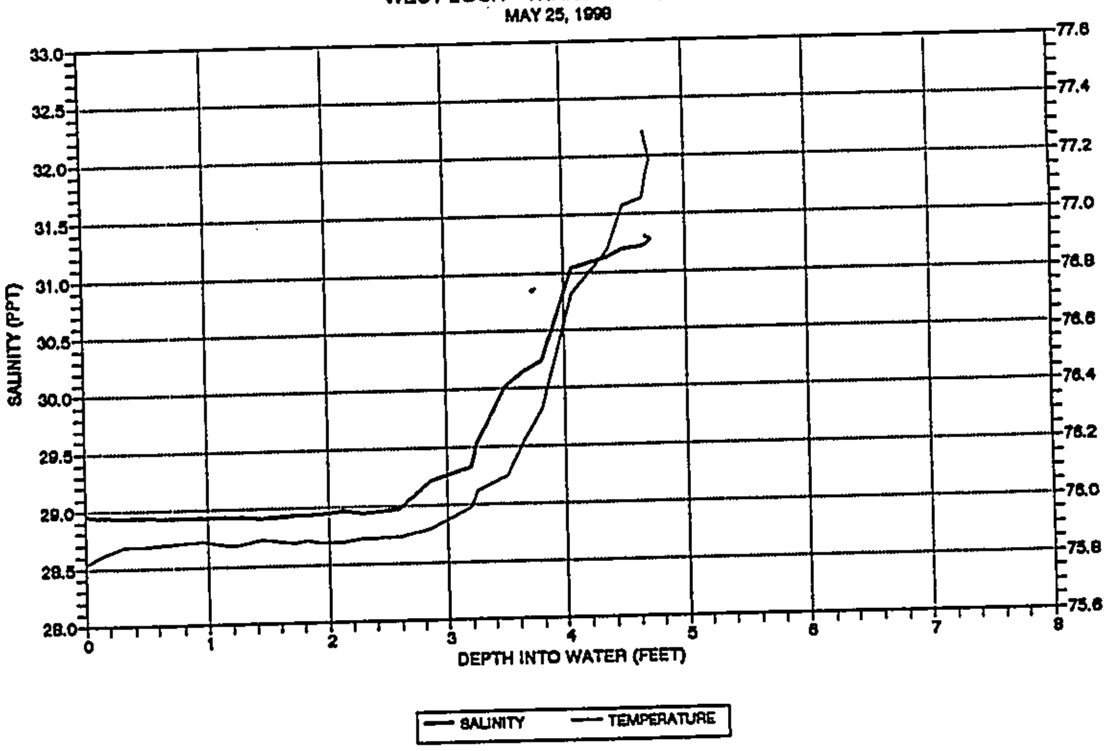

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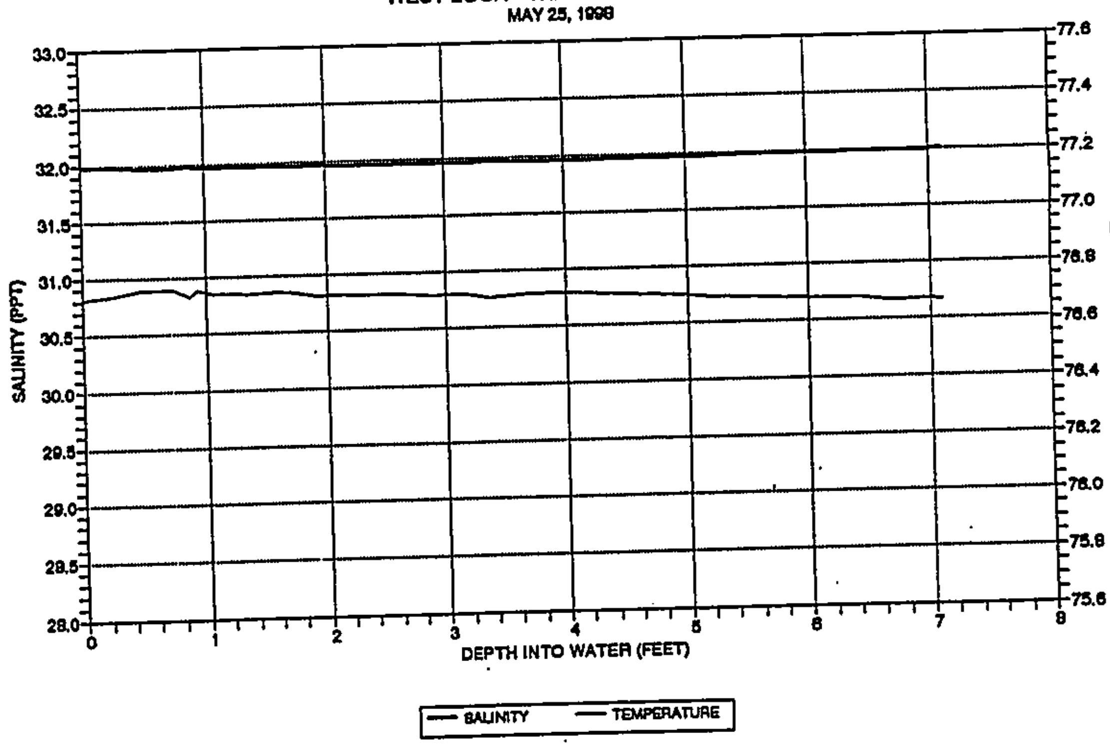

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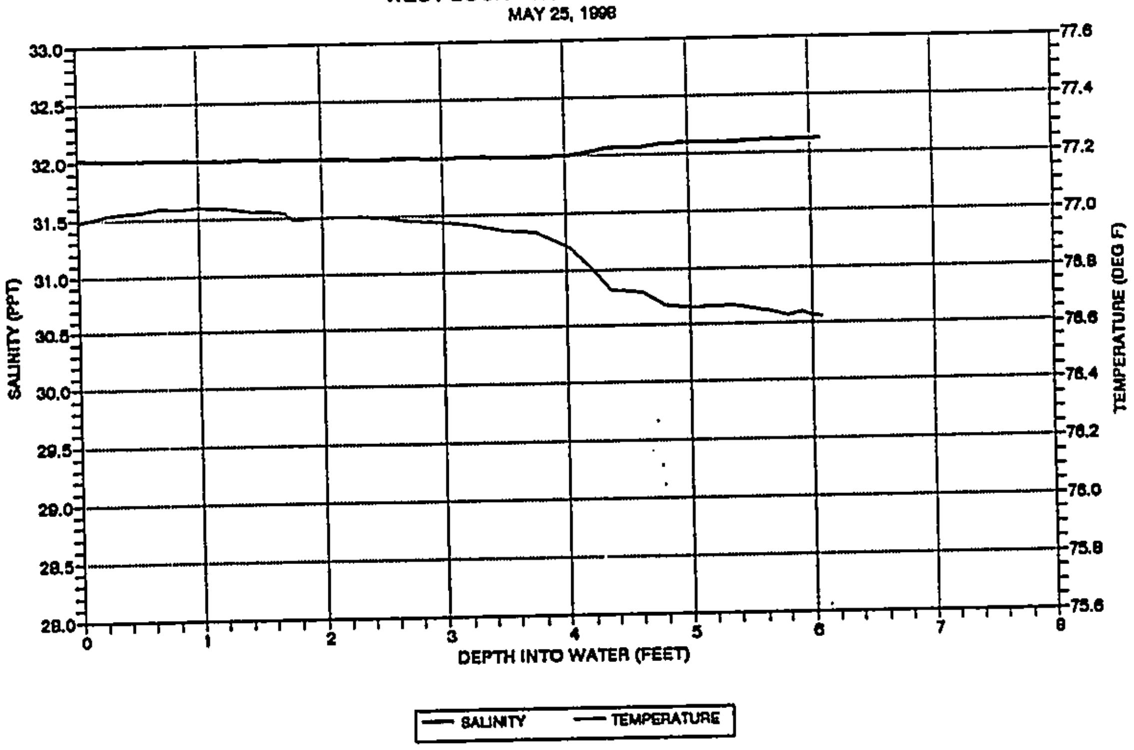

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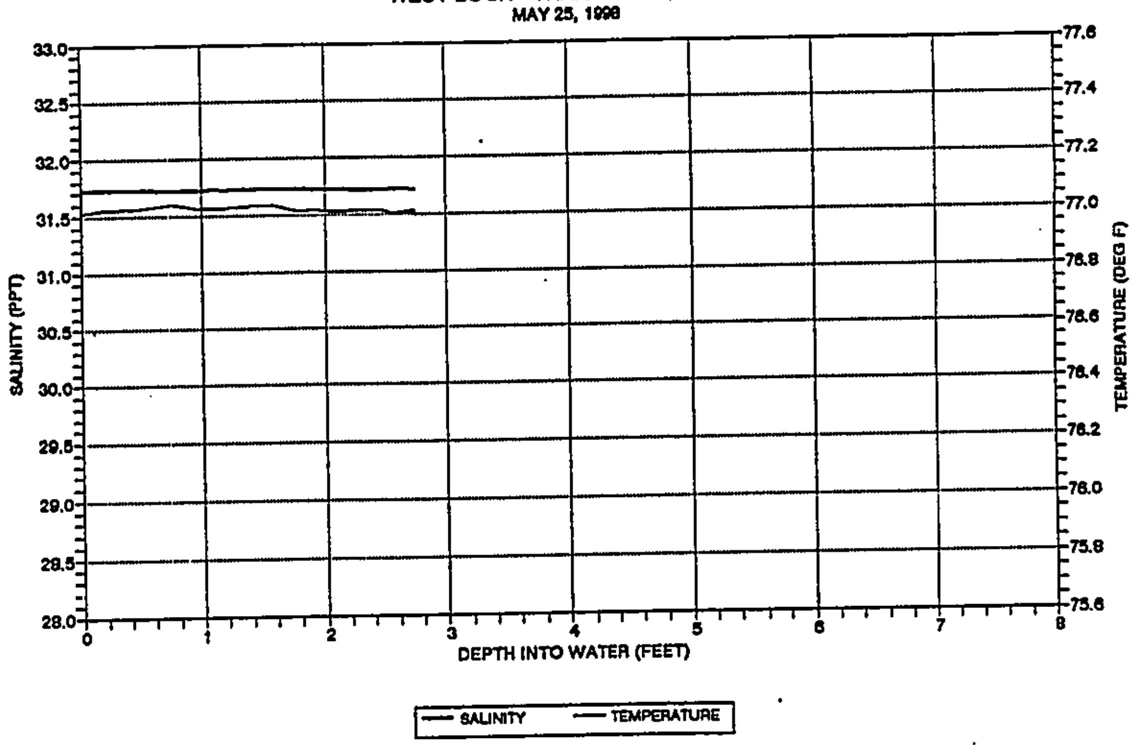

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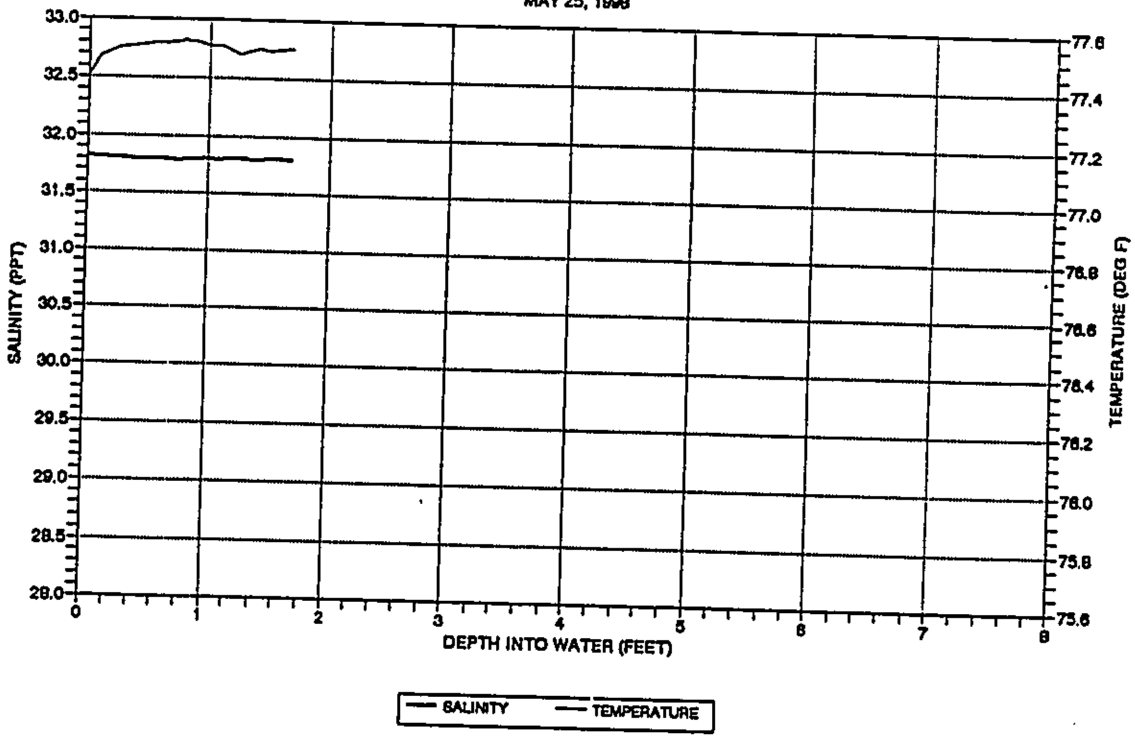

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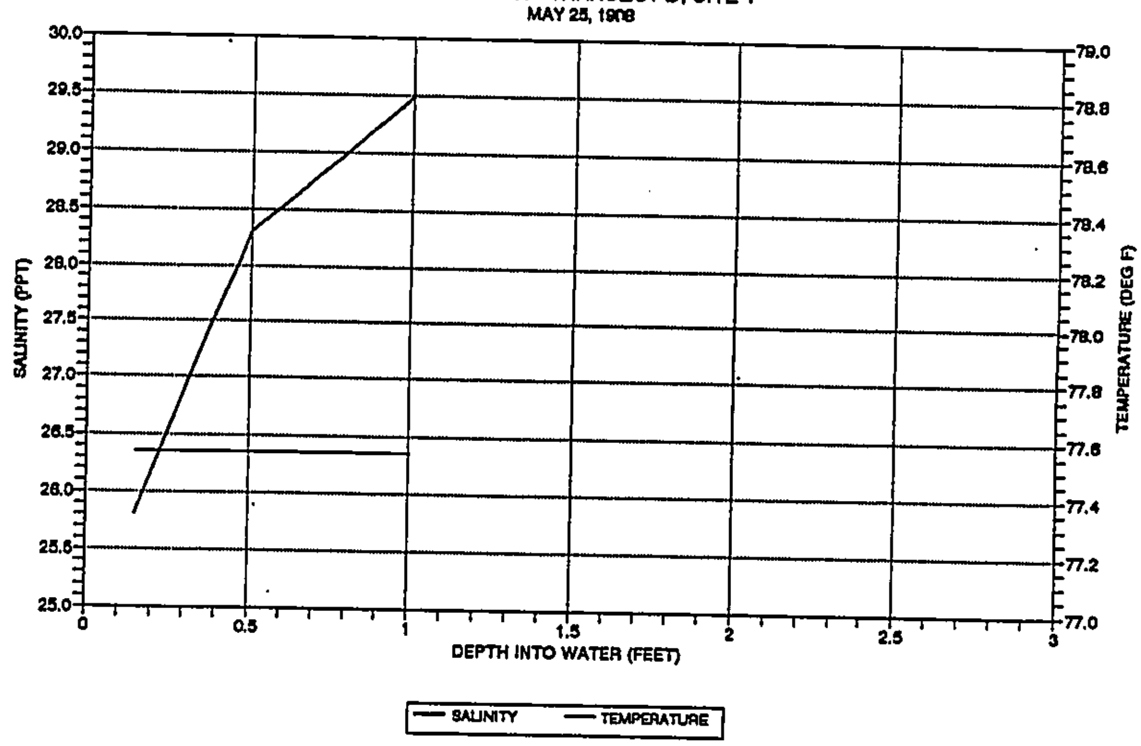

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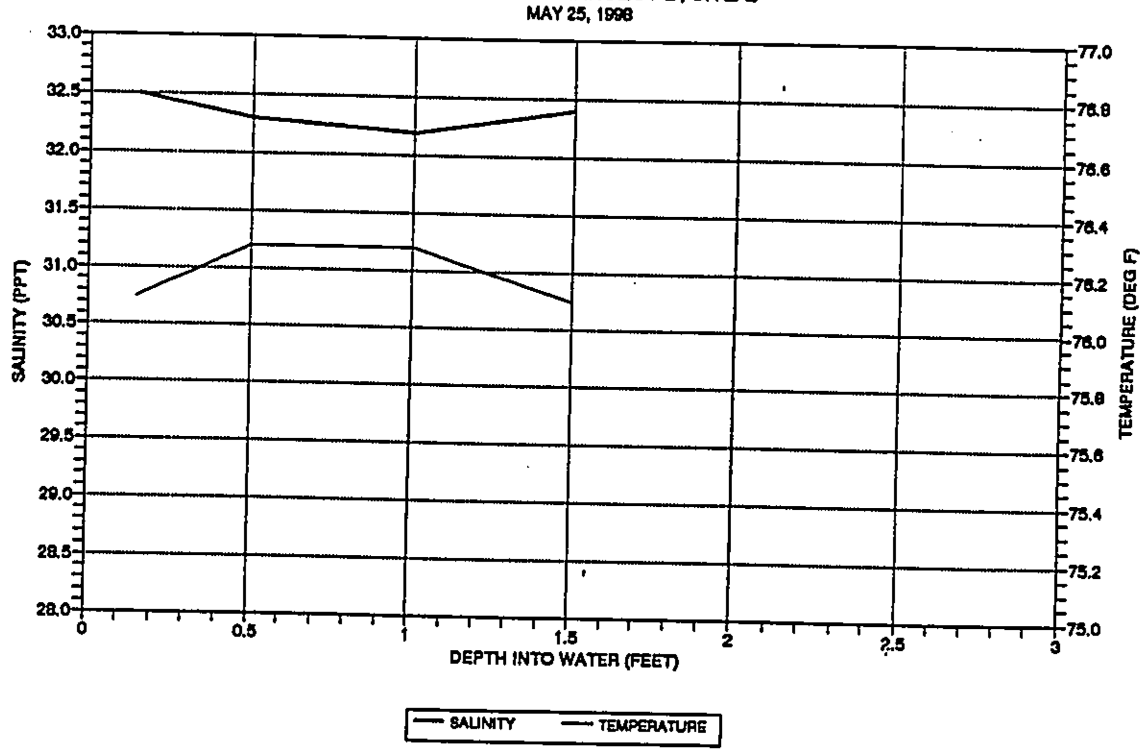

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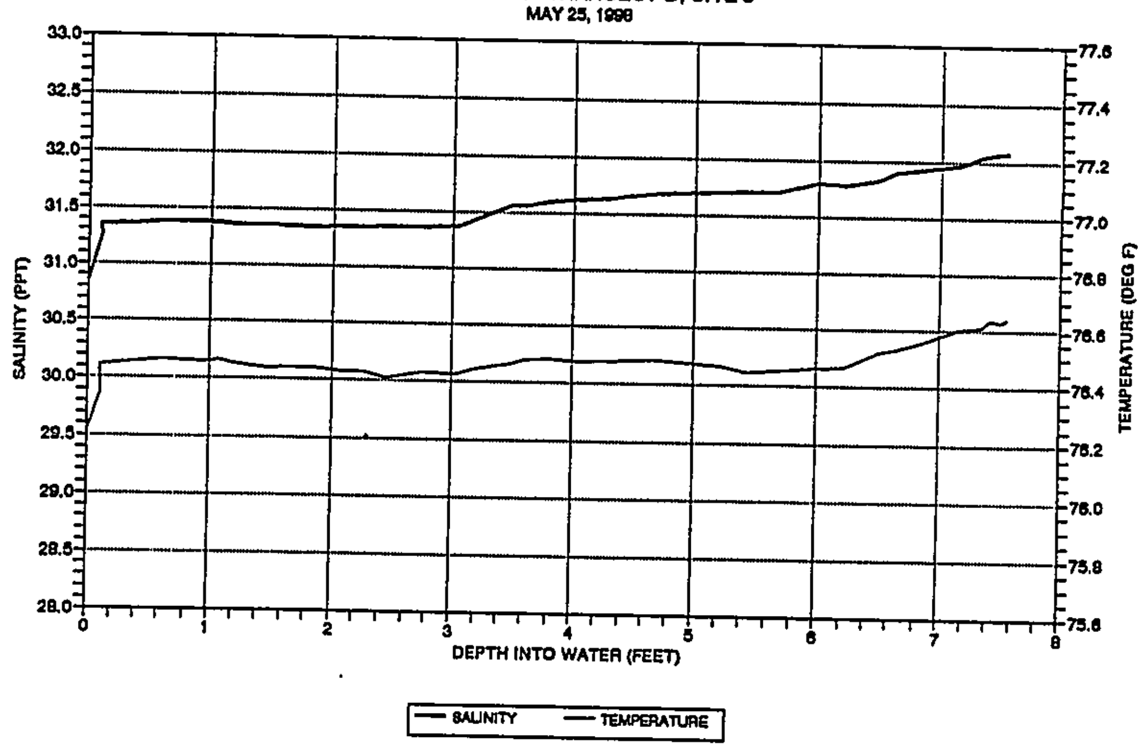

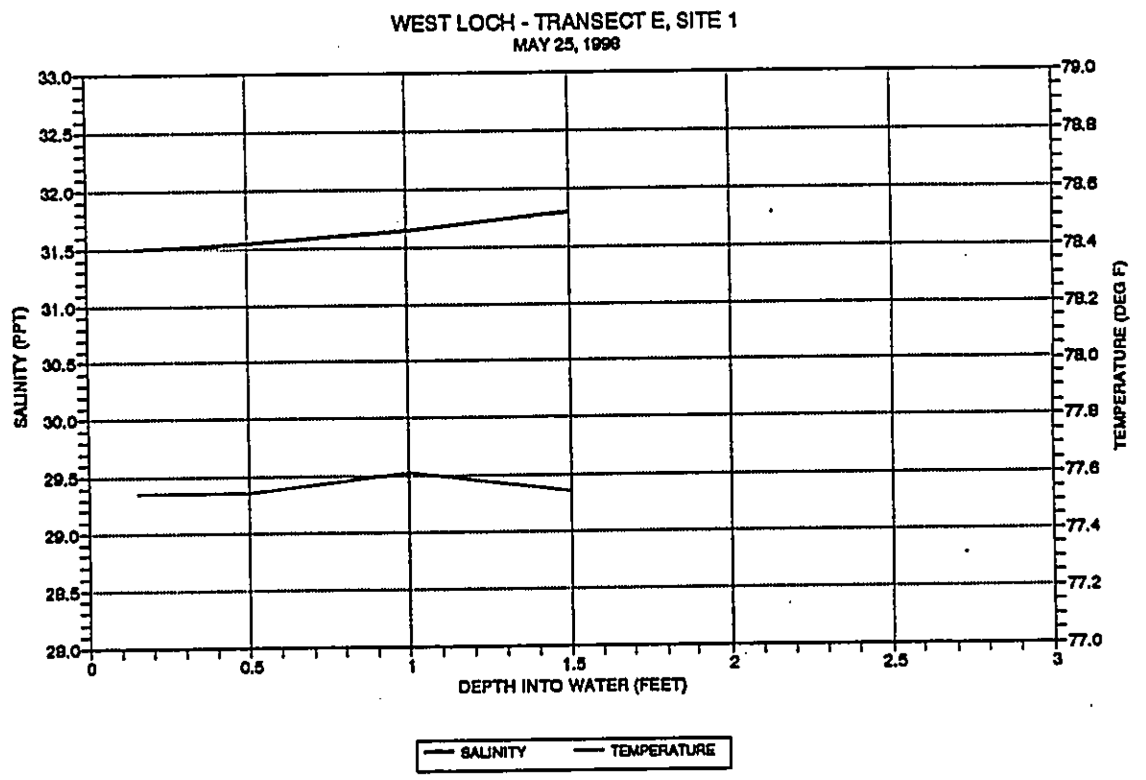
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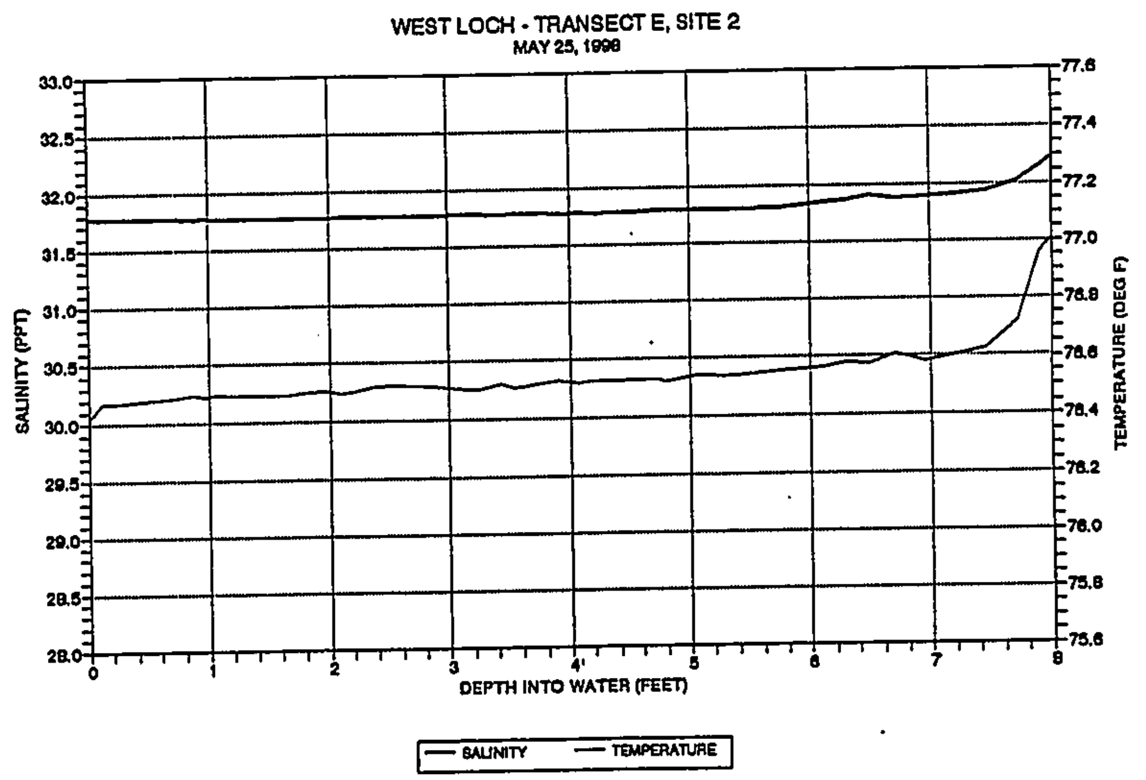
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
SALINITY
TEMPERATURE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SALINITY (PPT)
TEMPERATURE (DEG F)
DEPTH INTO WATER (FEET)
SALINITY
TEMPERATURE

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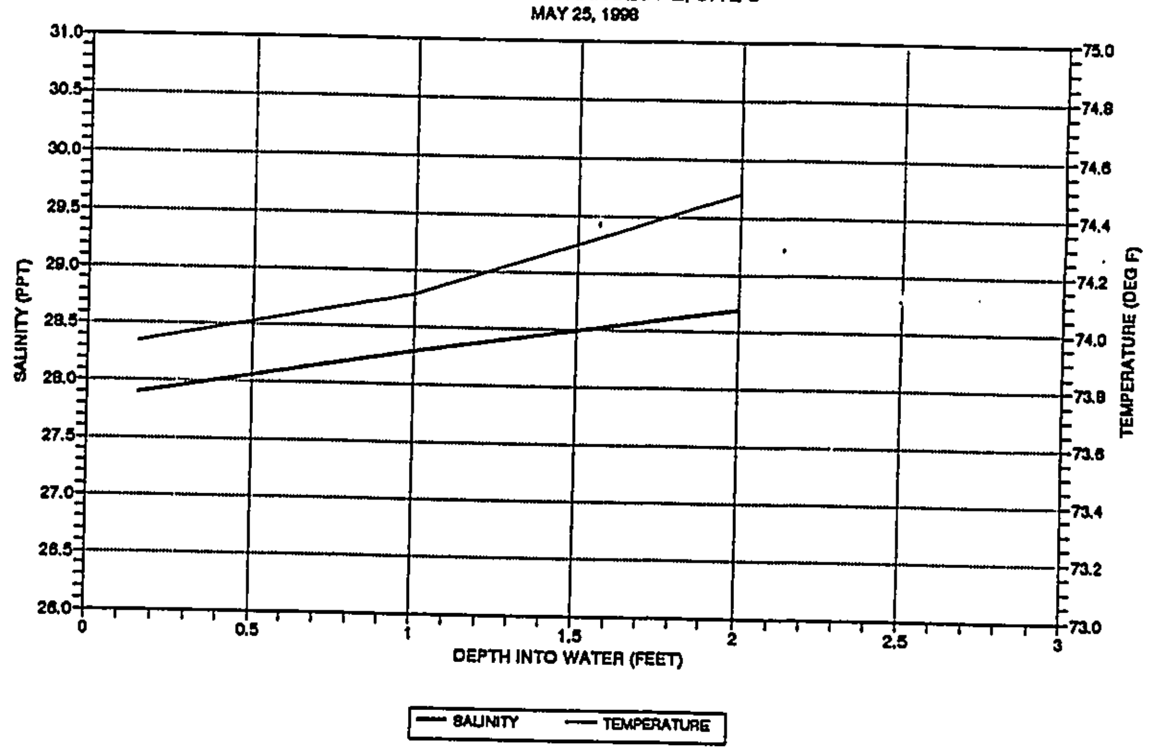

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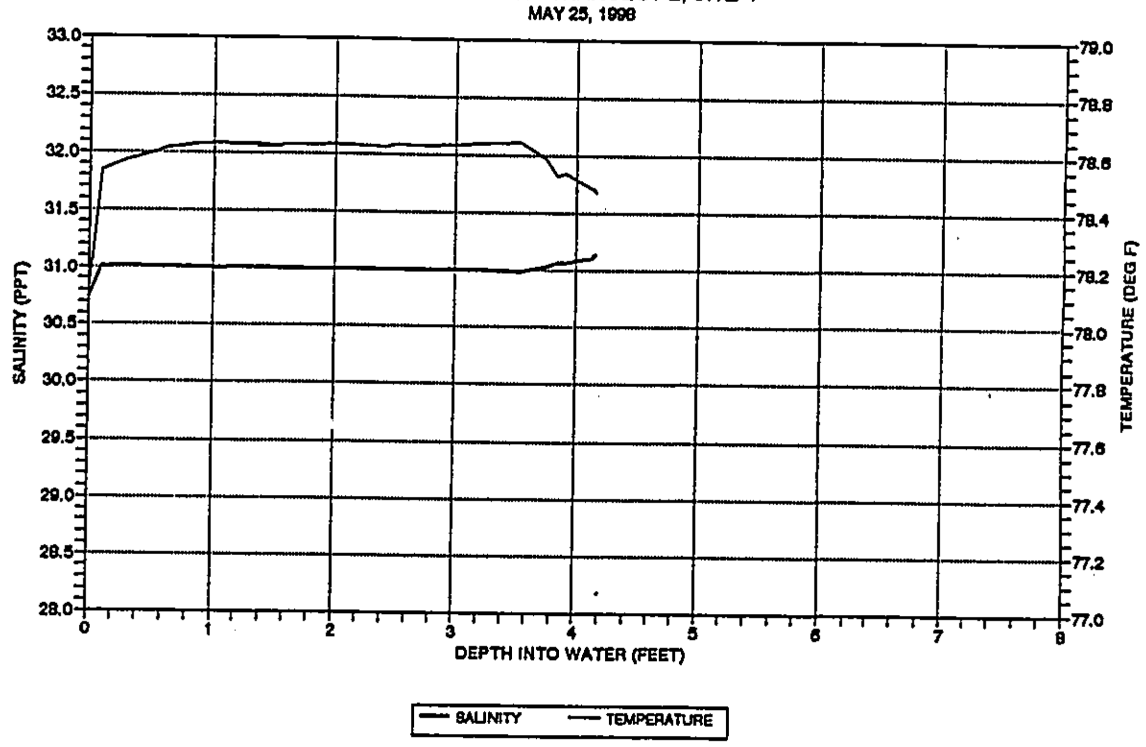


Appendix C

Salinity and Temperature Profiles in the Lower, Navigable End of West Loch

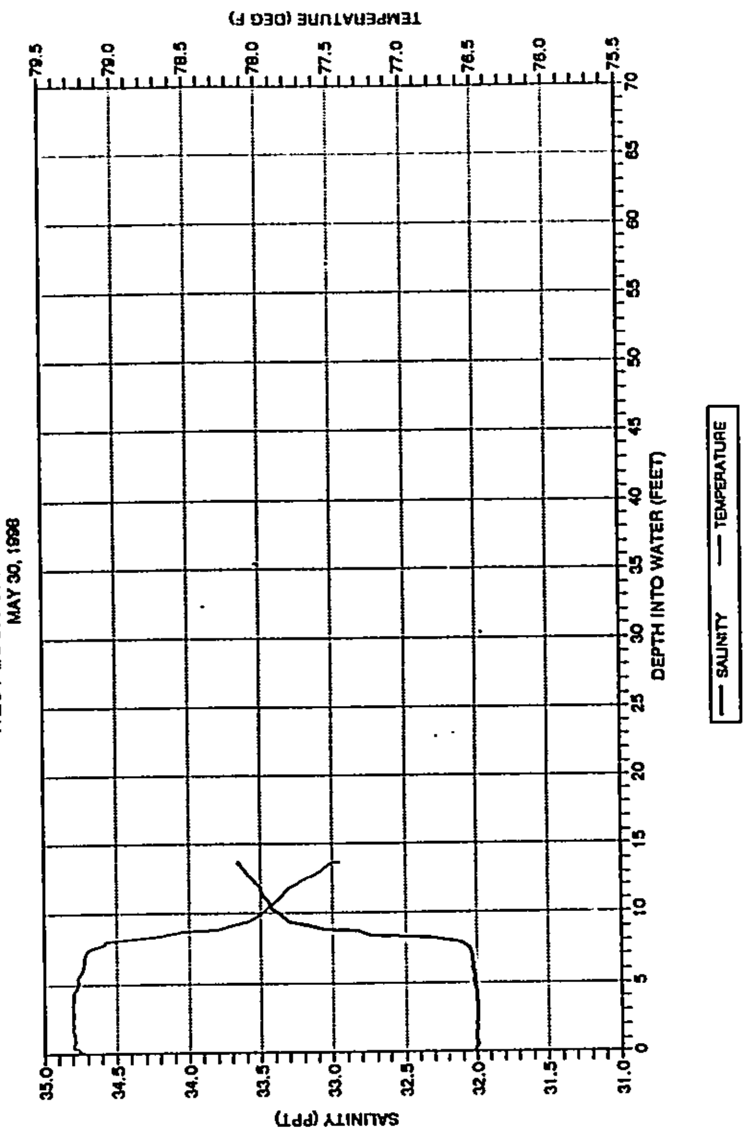
May 30, 1998

__Notes:__ 1. All profiles made with an Ocean Sensors Model OS-200 CTD.

2. Refer to Figure 18 for site locations.

WEST LOCH OFFSHORE - SITE 1

MAY 30, 1998



CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Appendix C

Salinity and Temperature Profiles in the Lower,
Navigable End of West Loch
May 30, 1998

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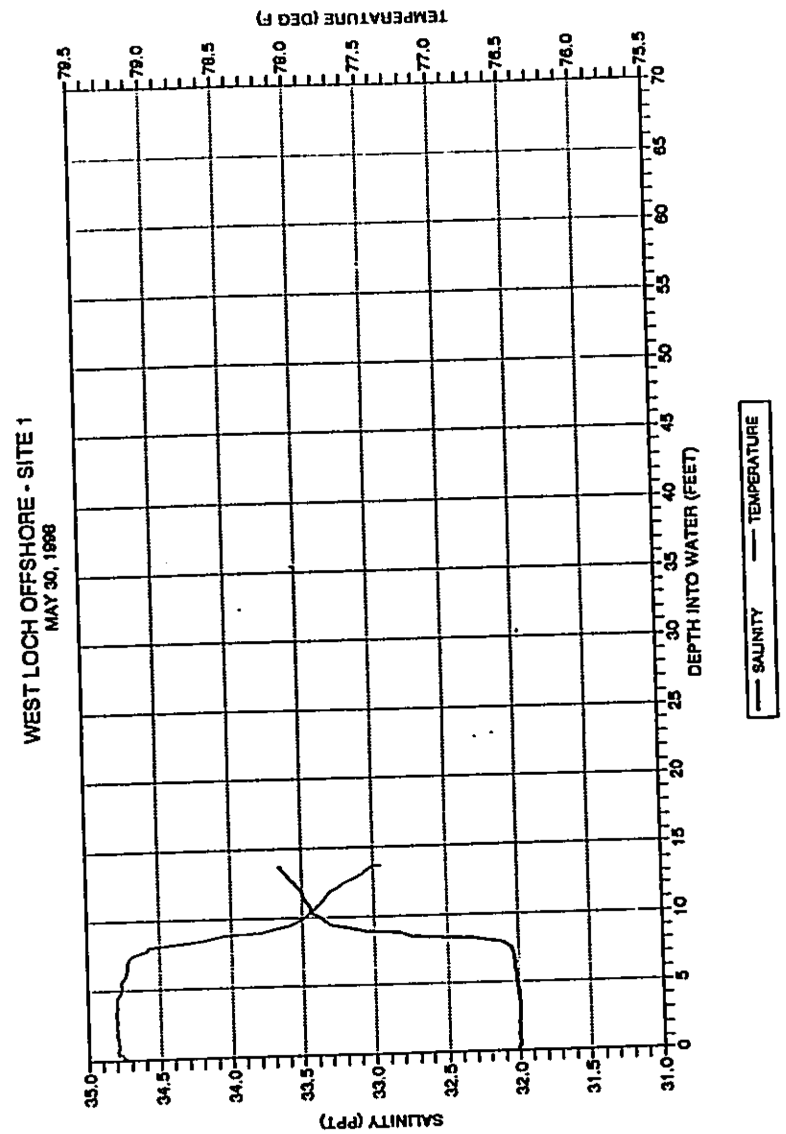

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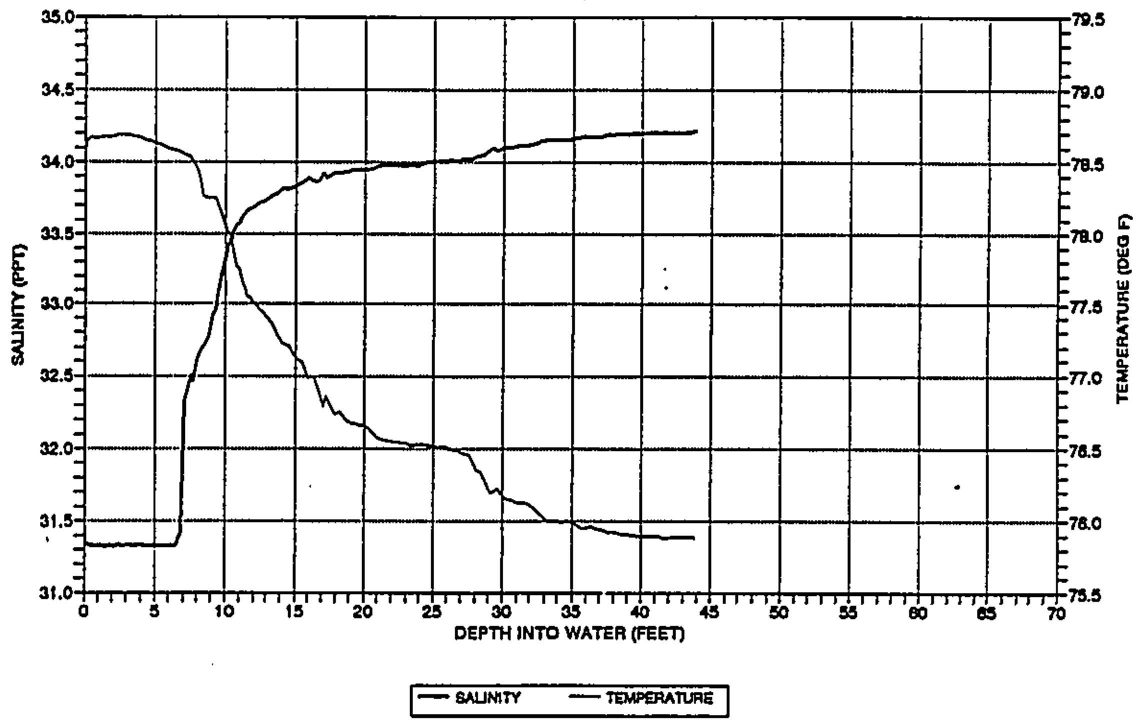

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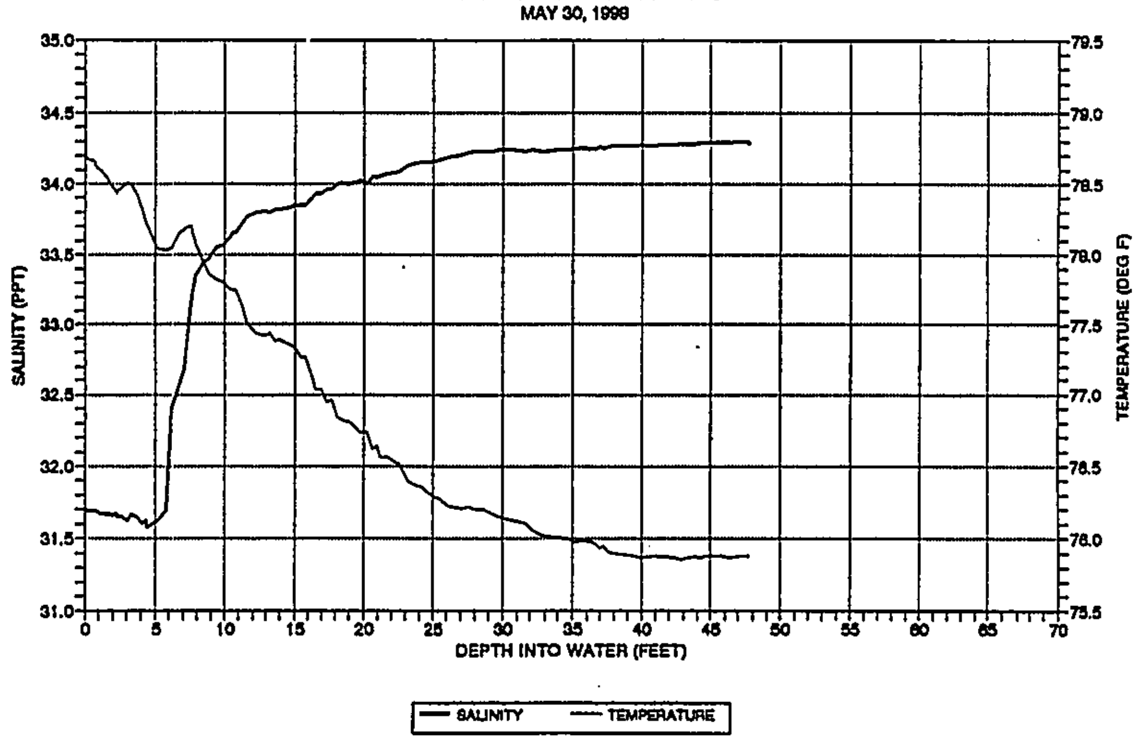

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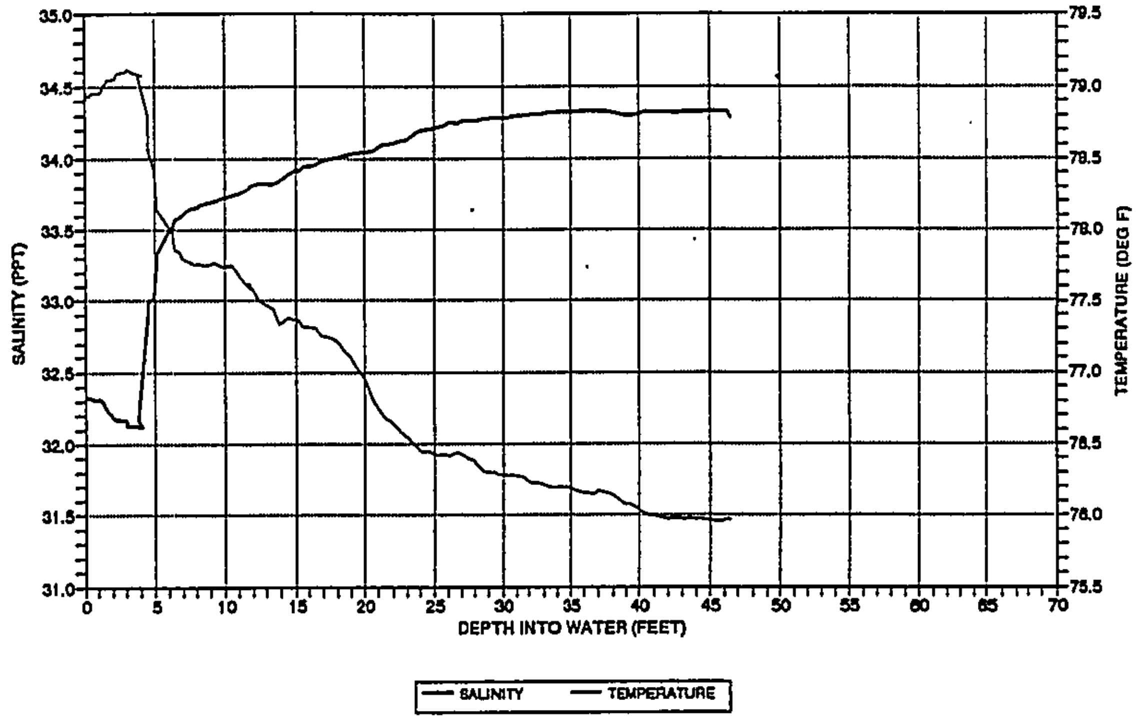

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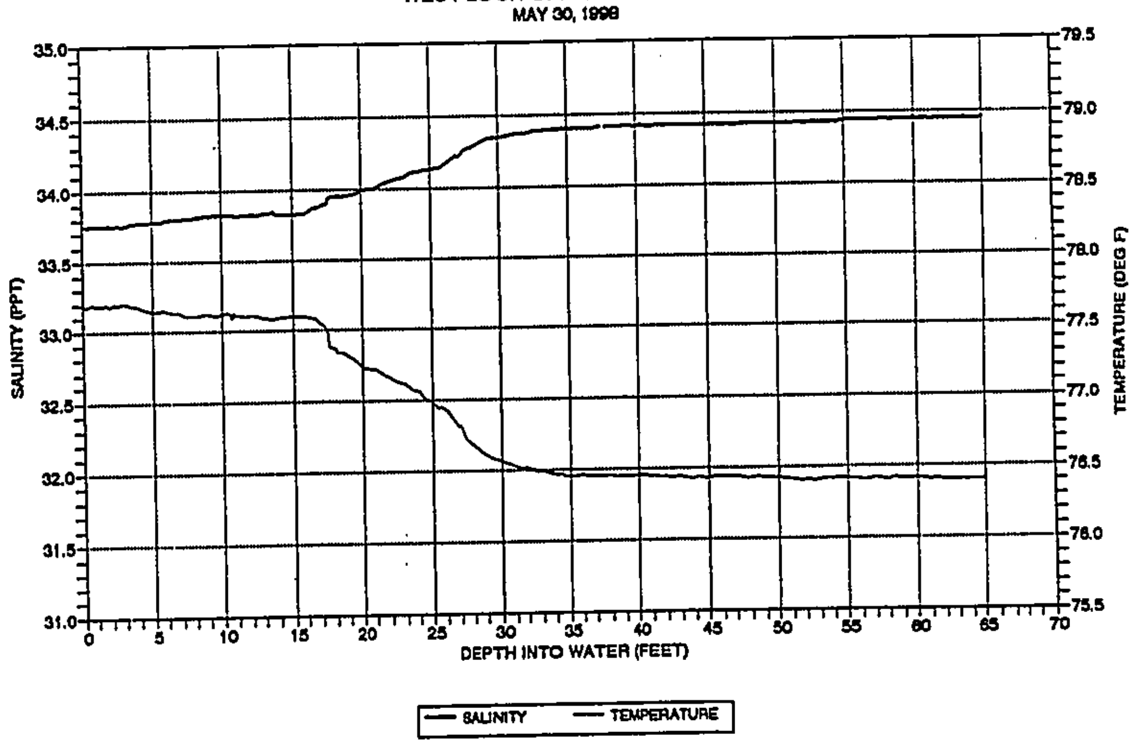

MIDDLE LOCH OFFSHORE - SITE 6
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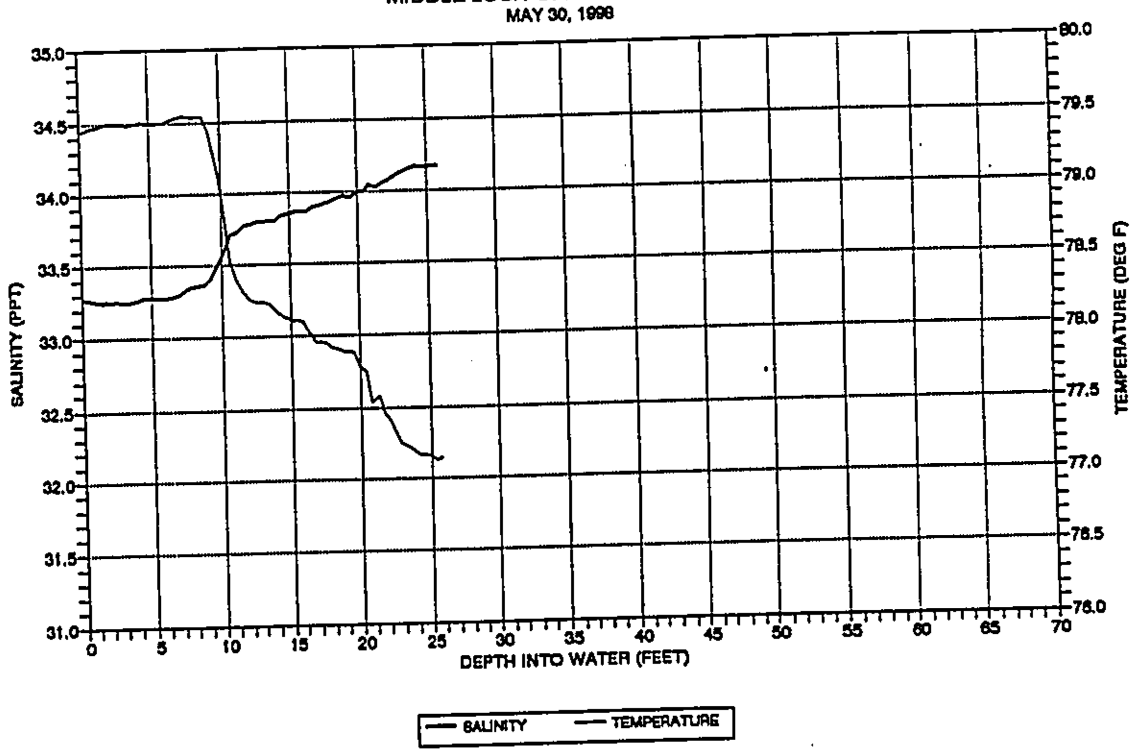

BIOLOGICAL ASSESSMENT AND THE EFFECTS OF WATER WITHDRAWALS ON WAIKELE STREAM, OAHU AQUATIC BIOTA

Prepared for:
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June 1998
Contribution No. 1998-011 to the Hawaii Biological Survey

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EXECUTIVE SUMMARY

The Hawaii Biological Survey (HBS) conducted a preliminary assessment of the effects of water withdrawal on Waikele Stream and the surrounding estuary area in the West Loch of Pearl Harbor. A surface water diversion of approximately 4.6 MGD in Waikele Stream has been proposed in the area of USGS Gaging Station 2130 that is immediately upstream of Farrington Highway. This study assessed the potential effects that long-term water withdrawal would have on native and estuarine aquatic biota in Waikele Stream.

Two primary impacts to the stream and estuary would occur during water withdrawals conducted in the dry season. The first would be a reduction in stream flow (of 4.6 MGD) and aquatic habitat in the Waikele Stream channel downstream of the diversion point. The second impact would be a potential increase in salinity in estuarine habitat in the West Loch of Pearl Harbor. This would potentially occur starting at the upper tidal limit of the Waikele Stream estuary (at the USGS Gaging Station weir) and extend into the West Loch of Pearl Harbor. This analysis mainly addresses the impacts of changes in salinity on estuarine biota. Other potential impacts such as changes in nutrients, phtyoplankton productivity, etc., were beyond the scope of this report.

Reductions in flow just upstream of the USGS Gaging Station weir could affect conditions in the estuary by either altering the chemical environment, primarily salinity, of the estuary or by reducing the physical space (i.e., volume of the freshwater lens). Some impacts to native estuarine biota may occur due to reduction in physical space, and some impacts may occur due to expected salinity changes. These impacts can only be considered to occur when compared to present, short-term (since diversions stopped in 1989) conditions. The proposed diversion is nearly identical to the long-term average sugar cane diversion, but much less than the maximum diversions of up to 14 MGD that commonly took place from 1951-1989. Thus, no net impacts are expected when compared to historical (pre-1989) conditions, but potential impacts may occur when compared to current, undiverted conditions.

Increases in salinity resulting from a reduction of freshwater to the estuary could affect juveniles of two native fish species: ʻamaʻama or striped mullet and aholehole. Other native marine species occurring in the Waikele Stream estuary are tolerant to varying degrees freshwater but do not necessarily prefer or select for low-salinity conditions. Although no discrete threshold has been established, juvenile ʻamaʻama appear to prefer water with salinity below 15 ppt. When salinity becomes > 15 ppt, juvenile ʻamaʻama will abandon an area (e.g., estuary) and move in search of fresher water. During this movement, juvenile ʻamaʻama become increasingly susceptible to predation and possibly reduced

food availability. Salinity preferences for aholehole are less established than that for 'ama'ama, but the seasonal use of estuaries as nursery habitat by aholehole is similar to that of 'ama'ama, and well known in Hawaiian waters. For this analysis it was assumed that juvenile aholehole also prefer water with salinities below 15 ppt. For reference, the salinity of sea water around the Hawaiian Islands is approximately 35 ppt.

Our field survey determined that this area is currently suitable habitat for juvenile aholehole and 'ama'ama (striped mullet). High densities of both juvenile aholehole and 'ama'ama were captured and observed in the tidal mudflat and mangrove area where Waikele Stream enters West Loch. Similar qualitative abundances were observed during 1993 field surveys. However, because the reduction of the area of the fresh-brackish lens (with salinities of <15 ppt) due to the proposed diversion is so small, impacts may not be sufficient to affect the fishery in Pearl Harbor.

Surface salinity in Waikele stream from the upper extent of tidal influence (at the USGS concrete weir) to the Waikele Stream mouth was measured at ≤ 15 ppt. Salinity measurements taken at the Waikele Stream mouth determined a freshwater lens of ≤ 15 ppt extended to a thickness of 0.25 ft (Nance 1998). These measurements were taken during a period of no diversion and at average stream flow levels in May (13.2 MGD) and June (12.6 MGD) 1998. The surface layer of freshwater is quite small in this area, and salinity at the Waikele Stream mouth quickly goes to near sea level conditions (> 30 ppt) at 0.5 ft below the water surface.

Therefore a very thin freshwater lens (<0.25 ft in thickness) exists at the Waikele Stream mouth. This area is suitable habitat for juvenile 'ama'ama and aholehole. During water diversion, the thickness of the freshwater lens (≤ 15 ppt) would be slightly reduced in the immediate vicinity of where Waikele Stream enters the West Loch of Pearl Harbor. According to hydrological models, the thickness of the freshwater lens would be reduced by only 0.08 ft. at the Waikele Stream mouth. This is assuming a 4.6 MGD diversion at a stream flow level that is exceeded 80% of the time (11.6 MGD).

Due to the proposed 4.6 MGD diversion, salinity at the Waikele Stream mouth would exceed 15 ppt and render a 0.08 ft. thick portion of the freshwater lens unsuitable as rearing habitat for juvenile 'ama'ama and aholehole. This habitat loss was calculated from flows that occur in Waikele Stream at least 80% of the time. It is difficult to assess how a reduction of 0.08 ft. of depth in the freshwater lens would influence the 'ama'ama and aholehole fishery at the mouth of Waikele Stream. A reduction in habitat has the potential to adversely effect the 'ama'ama fishery. The stream mouth area is a relatively small, and was 170 ft. wide at the point of the salinity profile measurements. A loss of 0.08 ft. of the freshwater lens appears to be a small amount of lost freshwater habitat

compared to the overall Pearl Harbor and West Loch system. This analysis is of course an oversimplification of a very complex system. Much more research would be required to make more definitive statements on the effects of this or any other proposed diversion in Hawaiian waters. However, the hydrological models verify that that the proposed diversion will normally (80% of the time) minimally impact the physical size and salinity of the estuarine environment at the Waikele Stream mouth, or the West Loch of Pearl Harbor.

No reduction in freshwater habitat quality and quantity would occur in strictly freshwater sections of Waikele Stream due to the proposed diversion. This is because water will be taken from Waikele Stream at a point where the stream flows over the USGS weir and immediately into a tidally influenced region. Thus, only tidally influenced areas will be affected by this diversion. This diversion could therefore potentially adversely affect recruiting stream biota and native stream organisms capable of inhabiting estuarine conditions that are found here such as 'o'opu naniha, 'o'opu akupa, and 'opae 'oeha'a.

Under the proposed diversion of 4.6 MGD, approximately 2000 ft. of Waikele Stream from the diversion point at WP-18 (USGS Gaging Station weir) downstream to West Loch would have a reduction in freshwater and estuarine habitats during low-flow periods. According to the hydrological models, the mostly freshwater areas in the Waikele Stream channel affected by the proposed diversion would have the freshwater layer reduced by a range of 0.27 to 0.5 ft in thickness from current conditions.

The diversion impacts on stream biota in a worst case scenario, or the lowest flow day from 1989 to 1997, was also analyzed. A 4.6 MGD diversion during a nine-year low-flow of 7.1 MGD would decrease the fresh water layer from 0.13 ft to 0.05 ft. in the Waikele Stream mouth area. Thus, even in a worst case scenario, a decrease of 0.08 ft. in thickness of the freshwater lens at the Waikele Stream mouth appears to be a small reduction in overall estuarine habitat. The hydrological analysis also determined that overall salinity levels in the West Loch of Pearl Harbor would only be minimally changed by a maximum of 0.9 ppt due to the proposed 4.6 MGD diversion. There is currently no way to quantitatively assess (unless a long-term study was conducted) if native 'o'opu nakea population in the upper reaches of Waikele/Kipapa Stream would be adversely impacted by the proposed 4.6 MGD diversion. On the other hand, impacts to salinity levels and the size of the freshwater lens even in a worst case scenario have been shown by Nance (1998) to be minimal under the proposed 4.6 MGD diversion. Impacts to 'o'opu nakea would be far less than the former sugarcane diversions that regularly exceeded 4.6 MGD, and often were substantially greater than 10 MGD.

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INTRODUCTION

The Hawaii Biological Survey (HBS) conducted a preliminary assessment of the effects of water withdrawal on Waikele Stream and the surrounding estuary area in the West Loch of Pearl Harbor. A surface water diversion of approximately 4.6 MGD in Waikele Stream has been proposed in the area of USGS Gaging Station 2130 that is immediately upstream of Farrington Highway. This study assessed the potential effects that long-term water withdrawal would have on native and estuarine aquatic biota in Waikele Stream. A biological assessment of Kapakahi Stream was also conducted in the vicinity of the old railroad grade crossing. Potential impacts on native stream fauna due to temporary pipeline construction in the streambed were also assessed. Additionally, a Waikele Stream survey conducted by the author in 1993 allowed for present comparisons to be made with conditions five years ago.

The objectives of these assessments were to 1) describe baseline distribution and abundance of native and introduced fish species both in Waikele Stream and estuary, 2) describe distribution of crustaceans, mollusks, aquatic Odonata (damselflies and dragonflies), and amphibians in the sections of Waikele Stream potentially affected by water withdrawals 3) evaluate potential environmental impacts to stream biota and estuarine fisheries associated with proposed changes in stream flow in Waikele Stream 4) evaluate potential environmental impacts to Kapakahi Stream from proposed channel dredging.

STUDY AREAS

Waikele Stream

Waikele Stream drains the leeward areas of both the Koolau and Waianae mountain ranges in central Oahu. Tributaries of Waikele Stream draining areas in the Waianae mountains are intermittent, and flow only during periods of heavy rains. However, other areas of the Waikele Stream drainage, including the major tributaries of Waikakalaua and Kipapa Streams and the areas of the main Waikele Stream have permanent stream flow mainly in upper elevation areas. These tributaries are connected to the ocean during storms and periods of wet weather.

From its origin in the Koolau mountains, the Waikele/Kipapa system flows for 17.2 mi to the Waikele Stream estuary in Pearl Harbor. Downstream from the junction of Waikele and Kipapa Streams to the southern border of the Kipapa Military reservation, water flow in the stream channel is intermittent, and the

channel contains little or no water during drought periods (Englund 1993). From the Waikele/Kipapa Stream junction, Waikele Stream flows 2.0 mi to its estuary in the West Loch of Pearl Harbor. Figure 1 contains a location for each numbered sampling station.

Station 1 (sea level)

A five ft. high concrete weir ponds up Waikele Stream at the USGS Gaging Station 2130. Downstream of the weir is entirely tidal, while no tidal influence occurs in the ponded area upstream of the weir. At low tide, the stream will spill over the concrete lip of the weir into a 50 ft. wide concrete-lined channel. The bottom of the channel is lined with concrete until just downstream of the Farrington Highway Bridge footings. After the bottom concrete channel lining ends, the stream bottom becomes a typical Pearl Harbor stream with a fine silt bottom lined with concrete sides. Eventually the concrete sides end, and thick growths of mangroves line the stream banks into West Loch.

The estuary area for Waikele Stream was accessed by launching kayaks at the USGS Gaging Station 2130 weir (See Figure 1 for locations). Visual observations of aquatic biota were also made while kayaking to the tidal flats. At the Waikele Stream mouth, a large expanse of tidal mudflats are exposed at low tide. Tree stumps, shopping carts, tires, and other urban debris are found strewn throughout this tidal mudflat area. The substrate in the tidal mudflat area consists of thick layers of fine silts, with many areas firm enough to walk on at low tide. However, in some mudflat areas a person can sink to over 3 ft deep in the fine silt. At low tide many shallow water pockets are found in the mudflats near the mangroves, and these extend out several hundred yards into Pearl Harbor. This concentrated the aquatic biota into shallow, isolated pools and allowed for ideal and effective sampling conditions.

Dense growths of mangroves (*Rhizophora mangle*) line the shoreline of West Loch at the point where Waikele Stream enters Pearl Harbor. According to an analysis by Tom Nance of Tom Nance Water Resource Engineering, mangroves have extended their growth significantly in the West Loch region of Pearl Harbor (Nance 1998). Between the time of the last USGS Waipahu quad map field check (1982), and aerial photographs taken in 1989 and 1994, mangroves appear to have grown seaward at the Waikele Stream mouth at least several hundred feet in some areas (Nance 1998).

Figure 1. Sampling stations in Waikele and Kapakahi Streams, May-June 1998.

Station 2 (5 ft elevation):

This station began at the Waipahu Street Bridge and extended downstream through the Waipahu Cultural Plantation Village, ending immediately upstream of the USGS Gaging Station 2130 concrete weir. Stream habitat in this area consisted largely of a series of backwater pools formed by the concrete weir, with the pools extending upstream nearly to Waipahu Road. Pools ranged in depth from >3-4 ft deep to 1-3 ft deep, and were connected by deep, slow-velocity runs. Substrate at this area consisted of find sand/silt in the deep pools, and small cobble in the limited run habitats. Pools with fine, silty substrate comprise the majority of habitat in Waikele Stream in the vicinity of the Waipahu Plantation Cultural Village. Underwater visibility was quite variable, but in late May 1998, visibility was quite good due to decreasing flows, and was high as 7-8 ft. Riparian vegetation consisted entirely of a dense growth of California grass (*Brachiaria mutica*) growing several feet into the stream channel.

Station 3 (18 ft elevation):

This station started slightly downstream of the H-1 highway upstream to the boundary of the Upper Kipapa Military Reservation. Except for some private property on the west bank of Waikele Stream near Waikele Springs, the current property owner in this area is Amfac JMB Hawaii. In 1998, approximately 200 yds downstream of H-1 highway a large set of springs emerged on the east side of the banks of Waikele Stream, through an old tunnel. The springs dramatically change the character of Waikele Stream, and also influence stream water chemistry (see Nance Hydrology Report). Upstream of these springs Waikele Stream is more turbid, warmer and sluggish. The spring discharge is completely clear and cooler, and water clarity in Waikele Stream improves significantly below the emergence of Waikele springs. Thick growths of aquatic macrophytes line the streambed where Waikele Springs emerge. California grass partially obscures the groundwater tunnel where the springs emerge. Taro (*Colocasia esculenta*) was also growing on both sides of Waikele Stream in the vicinity of the springs, but was more abundant on the west side (near the houses) of the stream.

At low baseflow these springs contribute 80% of the water flow to the lower Waikele Stream (Nance 1998). Up through July 1989 a well and pump system for sugar cane irrigation was operated by Oahu Sugar Company in the vicinity of these springs. These irrigation wells extracted variable but often significant amounts of water during periods of low stream flow from Waikele Stream (Nance 1998). Stream habitat in the vicinity of the most upstream (and largest) of the emergent Waikele Springs consisted of high velocity shallow runs 1-2 ft deep connecting shallow pools 0.75 -2.0 ft in depth. Downstream of the springs, the streambed gradient gradually decreases, and fine substrate predominated in the pool habitats.

Upstream of the spring area the stream gradient increases, with larger gravels and cobbles predominating. In contrast to the 1993 survey, a significant amount of water flow was observed in Waikele Stream close to the border of the Kipapa Military Reservation. In 1998, this area was above the influence of the Waikele Springs, and streamflow here was comprised of mainly surface water runoff (See Nance 1998), and was thus more turbid and warmer than below Waikele Springs. In 1993, stream flow above Waikele Springs was not continuous, as sections of dry streambed containing intermittent pools were observed approximately every 200 yds. above the last Oahu Sugar pump station on Waikele Stream (near the border of Kipapa Naval Reservation). Riparian vegetation in this area was exclusively California grass, with an overgrowth of mainly Chinese banyan (*Ficus microcarpa*) and some mango (*Mangifera indica*)

Kapakahi Stream

Kapakahi Stream begins as a 0.5 MGD spring emerging underneath the Shiro's Food parking lot immediately north of Farrington Highway (Nance 1998). Visible water flow for Kapakahi Stream begins on the north side of Farrington Highway, and terminates into an indistinct set of channels flowing through thick stands of mangrove approximately 0.75 mi downstream into the West Loch of Pearl Harbor. Kapakahi Stream has been channelized but is not lined with concrete. In the area of Farrington Highway the stream channel is shallow and very silty. Houses are situated on the west side of the streambanks from Farrington Highway to the old railroad grade and petroleum pipeline. An auto dealership and other industrial properties lined the east side of Kapakahi Stream. Kapakahi Stream is also adjacent to a City and County refuse pickup station next to the Chevron petroleum pipeline crossing. Water clarity is surprisingly good for such a disturbed urban stream, but the channel and banks are lined with trash. A trash 'dam' has built up underneath the old railroad trestle supporting the Chevron petroleum pipeline.

The banks of Kapakahi Stream are bare dirt from Farrington highway to the pipeline, and appear to be frequently sprayed with herbicide. California grass starts appearing in the area of the Chevron pipeline. Approximately 100 yds downstream of the pipeline mangroves start to line the channel. Mangrove growth eventually becomes so dense that further access to the stream channel is impossible.

METHODS

GENERAL METHODS

Field work for this study was conducted in May and June of 1998. Sampling was conducted under generally clear weather conditions. Representative sampling stations (see STUDY AREA) were established on Waikele Stream and its Pearl Harbor estuary, and Kapakahi Stream. Aquatic macrofauna (fish, crustaceans, mollusks, and amphibians) was assessed at each station. Sampling areas were somewhat dependent upon the constraints of vegetation and local terrain.

Composition of the riparian vegetation and stream substrate were evaluated at each sampling station. Habitat condition for native aquatic organisms was evaluated both within sampling stations and throughout the sections of stream sampled. Altitude at each sampling station was determined by using a combination of USGS topographic maps and a hand-held Casio altimeter. Stream distances were measured with a planimeter on USGS quads.

Fish, Crustacean, and Mollusk Sampling

Fine-mesh fish nets (seines) were the main sampling technique used to assess introduced fish abundance. We used a 15 x 4-foot seine with a $^1/_{16}$-inch mesh. Seines are only marginally effective at capturing native 'o'opu but were useful to quantify the abundance and size distribution of other native and nonnative fish species. Seines used in Waikele Stream were effective and used in slow-water habitats such as pools and deeper runs. Area sampled for each seine haul was determined by measuring the length and width of each sample. Maximum depth was recorded for each seine haul. Small hand seines ('opae nets) and aquatic dip nets were also used to collect and assess fish and other aquatic invertebrates.

Due to poor water visibility in some sections of Waikele Stream, and the entire Kapakahi Stream, snorkeling and above-water observation were only used in Waikele Stream upstream of the USGS Gaging Station 2130. Visual underwater and above water observations were possible in Stations 2 and 3 of Waikele Stream. We did not use electroshocking equipment to collect fish, and likely did not catch some of the more secretive introduced fish species.

Aquatic Insect Sampling

Aquatic insect sampling was conducted according to Polhemus (1995a) and Englund and Filbert (1997a). Collections of both immature and adult specimens were conducted with aerial sweep netting, dip nets and benthic samples. Visual observations of aquatic insects were also conducted around the stream channel. In addition, the sampling of damselflies and dragonflies (Odonata) was emphasized. Six species of *Megalagrion* damselflies are currently held as candidate Threatened, Endangered, or Species of Concern on the Federal Register. Moreover, native Hawaiian damselflies give an indication of the relative 'health' of a stream system; they do not typically occur in highly disturbed areas. The number and species of native damselflies observed during hikes both upstream and downstream were also recorded, and native damselfly catch (or observations) per unit of time was noted.

All insect specimens were stored in 75 percent ethanol and subsequently transported to the Bishop Museum Entomology laboratory for curation and identification. Voucher specimens are currently housed in the Bishop Museum collections.

RESULTS AND DISCUSSION

Waikele and Kapakahi Stream Sampling Effort

Data were collected in Waikele and Kapakahi Streams in May and June of 1998. Sampling was conducted at three stations within Waikele Stream, and the entire Kapakahi Stream. The mudflat area surrounding the Waikele Stream mouth was sampled with seines, dipnets, and aerial nets. Numerous aquatic dip net, opae net, and aerial net samples were used in other sampling stations at Waikele Stream and Kapakahi Stream. Approximately 250 yds of Waikele Stream was snorkeled by two observers up and downstream of the USGS Gaging Station weir upstream of the Farrington Highway bridge. Sampling effort by station and gear type are shown in Table 1.

Table 1. Sampling effort, by gear type and method, for Waikele and Kapakahi Stream, Oahu during May-June 1998 (X = method used).

Station	Seine (m^2)	Kick Net/ Dip Net	Aerial Net	Visual
Waikele 1 (Estuary)	109	X	X	X
Waikele 2 (USGS)	Hand Seine	X	X	X
Waikele 3 (Springs)	104	X	X	X
Kapakahi	Hand Seine	X	X	X

Quantitative seine hauls, approximately 213 m^2, were conducted in Waikele Stream, and numerous other qualitative seines (both 'opae nets and larger 15 ft. seines) were also taken. Visual assessments were made within each sampling

station and along the stream corridor as we hiked between stations. Aerial, kick nets, and 'opae nets (small hand seines) were used at all stations, primarily for collecting insects. Kick nets were also effective in capturing fish in areas we could not effectively seine, such as riffles.

Distribution of Aquatic Biota

Waikele Stream

Three new species of introduced aquatic macrofauna were recorded from Waikele Stream in 1998, compared to 1993 surveys conducted by the author (Table 2). The present survey found fifteen native aquatic species and thirteen introduced aquatic species in Waikele Stream (Table 3). This excludes riparian species such as isopods and spiders, and species with an uncertain identification (amphipods) or geographic status. Most of the observed native species were marine and estuarine species observed in the Waikele estuary area. Important food fish species such as the native aholehole (*Kuhlia sandvicensis*) and 'ama'ama or striped mullet (*Mugil cephalus*) were abundant up to the concrete barrier formed by the USGS Gaging Station weir. However, tilapia (*Sarotherodon melanotheron*) dominated this area both numerically and in biomass. Large schools of tilapia were ubiquitous from Waikele Springs downstream to the marine and estuarine portions of West Loch.

Table 2. New aquatic species found in Waikele Stream in 1998, and introduced since 1993 (compared to Englund 1993).

Species	Location
Atyid shrimp (*Neocaridina denticulata*)	USGS weir and upstream
Scarlet skimmer dragonfly (*Crocothemis servilia*)	Taro fields, USGS weir and upstream
Apple snail (*Pomacea canaliculata*)	Taro fields, at Plantation Village

Only three of the five native 'o'opu species were captured or observed. Neither 'o'opu nopili (*Sicyopterus stimpsoni*) nor 'o'opu alamo'o (*Lentipes concolor*) were encountered during this survey, or during previous surveys. Fish species composition during this study is consistent with results of a 1993 assessment of Waikele Stream (Englund 1993). Somewhat surprisingly, no new alien fish species were observed in the surveyed areas of Waikele Stream as compared to the 1993 surveys. Additionally, a 1997 survey of Kipapa Stream (a major tributary to Waikele Stream) from 280-300 ft elevation level also found no new alien fish or crustacean species (Englund 1997). The 1997 survey was conducted above Kamehameha Highway, and was not far upstream of Station 3 at Waikele Springs. In Kipapa Stream in 1997, only four species of alien fish were observed, all of which were found in the lower Waikele Stream (Englund 1997). In 1998, several alien fish species known to exist in the lower Waikele Stream area such as the Chinese catfish (*Clarias fuscus*) and the rice paddy eel

(*Monopterus albus*) were not observed. This is likely due to their secretive habits and because we did not use electroshocking equipment to collect fish.

'O'opu nakea (*Awaous guamensis*) and 'o'opu naniha (*Stenogobius hawaiiensis*) may have declined in lower Waikele Stream since 1993. In 1993, high densities of post-larvae (hinana) of both of these species were observed below the USGS weir. No post-larval 'o'opu were observed during extensive sampling conducted in May and June 1998, and only one 'o'opu nakea was observed and collected in lower Waikele Stream. Native fish were not observed in the vicinity of Waikele Springs (Station 3). This contrasts with 'o'opu nakea commonly found at this station in 1993 when numerous 'o'opu nakea were observed and netted. A wide range of size classes of 'o'opu nakea were found in 1993, including relatively recent recruits as small as 24 mm.

Introduced bristle-nosed or armored catfish (*Ancistris* sp.) were extremely abundant in faster water run and riffle areas in Station 3. Densities were especially high above the influence of cold-water Waikele Springs, but were also high below the spring input area. Bristle-nosed catfish densities appeared to be similar to that found in Manoa Stream near Manoa Elementary (i.e., very high), and may be a major factor contributing to the complete lack of 'o'opu nakea in this section of stream in 1998. Although not uncommon in 1993, bristle-nosed catfish numbers appeared to have increased markedly since then. More intensive sampling over a longer time period would likely find a few more 'o'opu nakea in lower Waikele Stream. However, extremely high densities of introduced fish are undoubtedly impacting native 'o'opu through factors such as predation, competition for food resources, disease, and other factors.

Although not assessed during this survey, high elevation areas of Waikele/Kipapa Stream only accessible by helicopter contained a significant population of large, 'o'opu nakea (Englund 1993). In contrast to the lower reaches of Waikele Stream, only one introduced species of fish (mollies) was found to co-exist with 'o'opu nakea at elevations above 1200 ft. in Waikele/Kipapa Stream. It is unknown whether recruitment continues to occur in high elevation areas of Waikele/Kipapa Stream, as these refugia from alien fish species have not been resurveyed since 1993.

For the present study, greater effort was placed on sampling aquatic insects in the lower and estuarine reaches of Waikele Stream than in the 1993 assessment. Consequently, a few more aquatic insect species were captured in the lower Waikele Stream and estuary in 1998. The aquatic insect fauna in Waikele Stream was dominated by native and introduced dragonflies and introduced damselflies. Native *Megalagrion* spp. damselflies were not observed in lower Waikele Stream. The scarlet skimmer dragonfly (*Crocothemis servilia*), a recent introduction to the State of Hawaii, was a notable introduced species absent from Waikele Stream in 1993, but common in 1998. These dragonflies

were first collected in Hawaii by R. Englund around taro fields in Waiahole Valley in December 1994 (Polhemus 1995b).

As estuarine shrimp identification is uncertain and problematic in Hawaii, shrimp specimens from the Waikele Stream and estuary were identified in May 1998 by Dr. Brian Kensley of the Smithsonian Institution. A new species of introduced freshwater shrimp (*Neocaridina denticulata*) in the Atyidae family, not present in Waikele Stream in 1993 (Englund 1993) was exceedingly abundant in 1998. *N. denticulata* was found from the USGS Gaging Station upstream to the upper limits of this survey at the border of the Kipapa Naval Reservation. This freshwater shrimp is an apparent aquarium introduction, and its native range is Taiwan, Ryukyu Islands, Korea, mainland China, and Vietnam (Hung et al. 1993). *N. denticulata* has also apparently been found in several windward Oahu streams for the past several years. This is the first definite identification of this freshwater shrimp on Oahu, and the first record from a leeward Oahu stream. Introduced atyid shrimp densities were extremely high, with up to several hundred shrimp captured in one aquatic dip net in the Waikele Springs area. Additionally, *Neocaridina denticulata* were not found in Kipapa Stream in 1997, which is upstream of Waikele Springs (Englund 1997). Indigenous estuarine shrimp identified by the Smithsonian Institution include *Palaemon debilis* and *Periclimenes (Harpilius)* sp. Native crenulated blue crabs (?*Thalamita crenata*) were abundant in the Waikele tidal mudflat area.

Estuarine biota such as 'ama'ama, aholehole, shrimp, and crabs were not observed above the USGS Gaging Station weir at Farrington Highway. This five ft. high concrete weir apparently serves as an effective barrier for organisms lacking the ability to climb over barriers, such as some of the native and introduced 'o'opu. Additionally, 'o'opu akupa (*Eleotris sandwicensis*), the native eleotrid and the introduced goby *Mugilogobius cavifrons* were not observed above the weir. *M. cavifrons* was abundant in Waikele Stream from the concrete weir to the tidal flats at the stream mouth.

Apple snails (*Pomacea canaliculata*) were not observed within the confines of the lower Waikele Stream channel area in both 1993 and 1998. Large quantities of taro were observed growing in and along the streambed in the area of the emergent Waikele Springs just downstream of H-1. Apples snails and their bright red egg cases were not observed on any of these taro plants, or any other riparian vegetation in the Waikele Springs of stream area in June 1998. However, extremely high densities of adult and immature apple snails were observed in the large taro field area of the Waipahu Plantation Cultural Village in May and June 1998. Apple snails will undoubtedly soon spread to the Waikele Stream riparian corridor as the taro fields are spring fed and immediately adjacent to Waikele Stream. Red apple snail egg masses were observed on up to 25% of all taro plants in these taro fields, and many taro stalks were observed to be damaged by the adult snails.

Kapakahi Stream

'O'opu akupa was the only native species of fish found in Kapakahi Stream and was uncommon, while eight species of introduced fish were found (Table 3). Introduced fish species were dominant in Kapakahi Stream and included tilapia, *Mugilogobius cavifrons*, and numerous species of livebearing fish (Poeciliidae). Despite its short length of <0.75 mi, Kapakahi Stream contains more species of introduced fish than many Oahu streams. Excluding amphipods and isopods, only one species of introduced crustacean, *Procambarus clarki*, was found in Kapakahi Stream. Nine species of aquatic insects were collected at Kapakahi Stream. Several species of native indigenous dragonflies such as the common green darner (*Anax junius*) and the wandering glider (*Pantala flavescens*) were abundant, as were the introduced scarlet skimmer (*Crocothemis servilia*), and roseate skimmer (*Orthemis ferruginea*) dragonflies. Native damselflies (*Megalagrion* spp.) were not observed, but Rambur's forktail (*Ischnura ramburi*) and the fragile forktail (*Ischnura posita*) were common. Several species of introduced aquatic beetles were also collected in Kapakahi Stream.
Kapakahi Stream also has the unfortunate distinction of being the first stream in the Pearl Harbor area in which apple snails were found. Apple snails are a serious pest to island agriculture, and cause serious economic damage to wetland crops such as taro and watercress (*Nasturtium microphyllum*) (Eldredge 1994, Cowie In Press).

Overall, aquatic habitat conditions were quite poor in this short stream, and native stream biota (with the exception of the common indigenous dragonflies) was almost non-existent.

Table 3. Distribution of native and introduced aquatic animals in Waikele and Kapakahi Streams, Oahu, May-June 1998.

	Waikele[A]				
Taxon	1 Estuary	2 USGS Gage[B]	3 Waikele Springs	Kapakahi Stream	Geographic Status
Fish					
'O'opu nakea (*Awaous guamensis*)		X	X		Indigenous
'O'opu naniha (*Stenogobius hawaiiensis*)		X	X		Endemic
'O'opu akupa (*Eleotris sandwicensis*)	X	X		X	Endemic
Goby (*Mugilogobius cavifrons*)	X	X		X	Introduced
Aholehole (*Kuhlia sandvicensis*)	X	X			Endemic
'Ama'ama (*Mugil cephalus*)	X	X			Indigenous
Mullet (*Moolgarda engeli*)	X				Introduced
Barracuda (*Sphyraena barracuda*)	X				Indigenous
Lizardfish (*Saurida gracilus*)	X				Indigenous
Armored catfish (*Ancistris* sp.)		X	X		Introduced
Blackchin tilapia (*Sarotherodon melanotheron*)	X	X	X	X	Introduced
Guppy (*Poecilia reticulata*)		X	X	X	Introduced
Shortfin molly (*P. mexicana*)[1]	X	X		X	Introduced
Sailfin molly (*P. latipinna*)				X	Introduced
Cuban topminnow (*Limia vittata*)[1]				X	Introduced
Western mosquitofish (*Gambusia affinis*)	X	X	X	X	Introduced
Platy (*Xiphophorus maculatus*)[1]				X	Introduced
Green swordtail (*Xiphorphous helleri*)		X	X		Introduced
Crustaceans					
'Opae 'oeha'a (*Macrobrachium grandimanus*)		X	X		Endemic
Crayfish (*Procambarus clarki*)		X	X	X	Introduced
Tahitian Prawn (*Macrobrachium lar*)		X	X		Introduced
Atyid shrimp (*Neocaridina denticulata*)		X			Introduced
Marine shrimp (*Periclimenes (Harpilius) sp.*)	X				Indigenous?
Marine shrimp (*Palaemon debilis*)	X				Indigenous?
Crenulated blue crab (*Thalamita crenata*)	X				Indigenous
Scuds (Amphipoda)					
Hyalella azteca (prob.)		X		X	Indigenous
Gammaridae	X				Unknown
Sow Bugs (Isopoda) (riparian)					
Armadillidae		X	X	X	Unknown
Ligia hawaiiensis		X	X	X	Endemic
Mollusks					
Corbicula fluminea		X	X	X	Introduced
Apple snail (*Pomacea canaliculata*)		X[2]		X	Introduced
Snail (Thiaridae)		X	X	X	Introduced
Hirudinea (leeches)					
Myzobdella lugubris		X	X	X	Introduced
Aquatic Insects					
Damselflies/dragonflies (Odonata)					
Rambur's forktail damselfly (*Ischnura ramburi*)	X	X	X	X	Introduced
Fragile forktail damselfly (*Ischnura posita*)	X	X		X	Introduced
Familiar Bluet (*Enallagma civile*)		X	X		Introduced

[A]See study area for description of locations. [B]Includes area above and below USGS gage. [1]Taxonomic status in Hawaii currently under review. [2]Apple snails in taro field next to stream, but not yet in stream channel (see Results).

Table 1 (cont.). Distribution of native and introduced aquatic animals in Waikele and Kapakahi Streams, Oahu, May-June 1998.

Taxon	Waikele[A] 1 Estuary	2 USGS Gage[B]	3 Waikele Springs	Kapakahi Stream	Geographic Status
Damselflies/dragonflies (Odonata) - cont.					
Wandering glider (*Pantala flavescens*)		X	X	X	Indigenous
Common green darner dragonfly (*Anax junius*)	X	X	X	X	Indigenous
Scarlet skimmer dragonfly (*Crocothemis servilia*)	X	X	X	X	Introduced
Roseate skimmer dragonfly (*Orthemis ferruginea*)		X	X	X	Introduced
True flies (Diptera)					
Chironomidae					
Orthocladius sp.		X			Unknown
Chironomus hawaiiensis		X			endemic
Culicidae					
Mosquito (*Aedes albopictus*)		X	X	X	Introduced
Dolichopodidae	X	X			Unknown
Ephydridae					
Scatella sexnotata	X				Indigenous
Tipulidae (*Limonia advena*)			X		Introduced
Aquatic Coleoptera (Hydrophilidae)					
Enochrus sayi				X	Introduced
Tropisternus lateralis		X			Introduced
Tropisternus salsamentus		X		X	Introduced
Trichoptera (Caddisflies)					
Cheumatopsyche pettiti			X		Introduced
Spiders (riparian)					
Tetragnathidae (*Tetragnatha mandibulata*)		X			Introduced
Amphibians					
Giant marine toad (*Bufo marinus*)		X	X	X	Introduced
Bullfrog (*Rana catesbeiana*)		X	X	X	Introduced

[A]See study area for description of locations. [B]Includes area above and below USGS gage.

ECOLOGICAL REQUIREMENTS OF STREAM 'O'OPU

Five species of native 'o'opu occur in streams in the Hawaiian Islands. Four species (*Stenogobius hawaiiensis, Awaous guamensis, Lentipes concolor, Sicyopterus stimpsoni*) are in the family Gobiidae (goby) and one species (*Eleotris sandwicensis*) is a member of the family Eleotridae (sleeper). Hawaiian 'o'opu have recently been reclassified: four species are now considered endemic, and one species 'o'opu nakea (*A. guamensis*) is considered indigenous (Watson 1992).

'O'opu have an amphidromous life cycle; they migrate to and from the sea but do not use the ocean for reproduction (Meyers 1949). 'O'opu spend their entire adult lives in freshwater streams. They reproduce in the stream, laying their eggs on the upper surfaces of rocks and hatch within 48 hours (Ego 1956). Larvae then drift out to the ocean and spend up to 160 days in a planktonic state. Returning post-larval 'o'opu, called hinana, may ascend randomly to streams and at times in great numbers.

Species such as 'o'upu nakea, 'o'opu nopili (*Sicyopterus stimpsoni*), and 'o'opu hi'ukole (*L. concolor*) are capable of climbing waterfalls and areas of rapids. 'O'opu hi'ukole is the strongest climber and is capable of ascending very large waterfalls. Individuals have been reported to ascend single waterfalls as high as 1000 ft (Englund and Filbert 1997b).

'O'opu nakea is known to migrate downstream to spawn on riffles located just upstream of the ocean (Kido and Heacock 1991). Downstream spawning runs are believed to be triggered by the first large rainstorm in the fall. However, postlarvae have been found throughout the year, indicating that some degree of spawning occurs throughout the year.

A major ecological requirement for 'o'opu is the need to pass through a stream mouth at two times during the individual's life (Kinzie 1990). The most important factor for the existence of endemic 'o'opu in streams is that access to and from the ocean is maintained. Stream channelization and diversions can eliminate or significantly limit native fish populations within a stream.

'O'opu hi'ukole is listed as a Candidate species on the Federal Register, and was considered 'threatened' by the American Fisheries Society (AFS) (Deacon et al. 1979). 'O'opu nakea and 'o'opu nopili were considered to be species of special concern by the AFS (Deacon et al. 1979).

POTENTIAL ENVIRONMENTAL CONSEQUENCES

Waikele Stream

As described in the INTRODUCTION section of this report, the proposed location of the water diversion in Waikele Stream is located immediately upstream of the concrete weir at the USGS Gaging Station above Farrington Highway. A detailed hydrological analysis is contained in a report prepared by Tom Nance Water Resource Engineering (Nance 1998). Biological impacts associated with water withdrawal from Waikele Stream are based on projections contained in the hydrology report. Impacts are based on changes in base-flow conditions, because that is when maximum water withdrawal from Waikele Stream would likely occur. From 1951 to 1989 (during diversions) flow in Waikele Stream averaged 26.2 MGD. After stream diversions ended in July 1989, flow averaged 27.0 MGD from August 1989 to 1997 (Nance 1998). Although this is only a 0.8 MGD difference in the average post diversion flow rate, the cessation of diversions did influence Waikele Stream flows. For example, during times of lowered precipitation minimum stream flows were higher in the last eight years than from 1951-1989 (Nance 1998). The higher minimum flows still occurred even though the period from 1989 to 1997 was substantially drier on average when compared to 1951-1989. This is reflected in the pre-1989 average streamflow of 30.5 mgd (including diversions), which is 3.5 MGD more than the undiverted 27.0 MGD average from 1989 to 1997 (Nance 1998). Thus, the proposed diversion of 4.6 MGD at the WP-18 pump station would reduce average Waikele Stream flow (based on 1989 to 1997 data) to 22.4 MGD.

The following impact analysis is divided into two sections: native amphidromous biota (stream fisheries) and estuarine fisheries. This impact analysis is predicated upon current conditions in Waikele Stream. Historical diversions such as the stream diversions by Oahu Sugar until July 1989 are not considered. Previous impacts to stream and estuarine biota would have been on a much greater and long-term scale as historical diversions were often greater than the presently proposed diversion. From 1951-1989, a highly variable average of 4.3 MGD (which is nearly the same as the 4.6 MGD proposed diversion) was diverted from Waikele Stream (Nance 1998). However, diversions of greater than 14 MGD also occurred from 1951-1989. The historical diversions were frequently greater than the proposed 4.6 MGD diversions, especially during dry periods (see Nance 1998).

Two primary impacts to the stream and estuary would occur during water withdrawals conducted in the dry season. The first would be a reduction in stream flow (of 4.6 MGD) and aquatic habitat in the Waikele Stream channel downstream of the diversion point. The second impact would be a potential

increase in salinity in estuarine habitat in the West Loch of Pearl Harbor. This would potentially occur starting at the upper tidal limit of the Waikele Stream estuary (at the USGS Gaging Station weir) and extend into the West Loch of Pearl Harbor. This analysis mainly addresses the impacts of changes in salinity on estuarine biota. Other potential impacts such as changes in nutrients, phtyoplankton productivity, etc., are beyond the scope of this report.

Estuarine fisheries

Reductions in flow just upstream of the USGS Gaging Station weir could affect conditions in the estuary by either altering the chemical environment, primarily salinity, of the estuary or by reducing the physical space (i.e., volume of the freshwater lens). Some impacts to native estuarine biota may occur due to reduction in physical space, and some impacts may occur due to expected salinity changes. These impacts can only be considered to occur when compared to present, short-term (since diversions stopped in 1989) conditions (see below). As stated previously, the proposed diversion is nearly identical to the long-term average sugar cane diversion, but much less than the maximum diversions of up to 14 MGD that commonly occurred between 1951-1989. Thus, no net impacts are expected when compared to historical (pre-1989) conditions, but potential impacts may occur when compared to current, undiverted conditions.

Our field survey determined that this area is currently suitable habitat for juvenile aholehole and 'ama'ama (striped mullet). High densities of both juvenile aholehole and 'ama'ama were captured and observed in the tidal mudflat and mangrove area where Waikele Stream enters West Loch. Similar qualitative abundances were observed during 1993 field surveys by Englund (1993). However, because the reduction of the area of the fresh-brackish lens (with salinities of <15 ppt) due to the proposed diversion is so small, impacts may not be sufficient to affect the fishery in Pearl Harbor.

Increases in salinity resulting from a reduction of freshwater to the estuary could affect juveniles of two important native fish species: 'ama'ama or striped mullet (*Mugil cephalus*) and aholehole (*Kuhlia sandvicensis*). Other native marine species occurring in the Waikele Stream estuary are tolerant to varying degrees freshwater but do not necessarily prefer or select for low-salinity conditions. Although no discrete threshold has been established, juvenile 'ama'ama appear to prefer water with salinity below 15 ppt (Blabber 1987, Dr. Ken Leber, Mote Marine Lab, Sarasota, Florida, personal communication). When salinity becomes > 15 ppt, juvenile 'ama'ama will abandon an area (e.g., estuary) and move in search of fresher water. During this movement, juvenile 'ama'ama become increasingly susceptible to predation and possibly reduced food availability. Any adverse effects on juvenile fish can translate into a reduction in Pearl Harbor (and Oahu) fisheries. Salinity preferences for aholehole are less established than that for 'ama'ama, but the seasonal use of estuaries as nursery habitat by aholehole is similar to that of 'ama'ama, and well known in Hawaiian waters (Filbert and Englund 1995, Tate 1997). For this analysis I have assumed that juvenile aholehole also prefer water with salinities below 15 ppt. For reference, the salinity of sea water around the Hawaiian Islands is approximately 35 ppt.

Surface salinity in Waikele stream from the upper extent of tidal influence (at the USGS concrete weir) to the Waikele Stream mouth (see Station 7 *in*: Nance 1998) was measured at ≤ 15 ppt. Salinity measurements taken at the Waikele Stream mouth determined a freshwater lens of ≤ 15 ppt extended to a thickness of 0.25 ft (Nance 1998). These measurements were taken during a period of no diversion and at fairly average stream flow levels in May (13.2 MGD) and June (12.6 MGD) 1998. The surface layer of freshwater is quite thin in this area, and salinity at the Waikele Stream mouth quickly goes to near sea level conditions (> 30 ppt) at 0.5 ft below the water surface.

A very thin freshwater lens (<0.25 ft in depth) exists at the Waikele Stream mouth (Site 7 in Nance (1998)). This area is suitable habitat for juvenile 'ama'ama and aholehole. During water diversion, the depth of the freshwater lens (≤ 15 ppt) would be slightly reduced in the immediate vicinity of where Waikele Stream enters the West Loch of Pearl Harbor. According to hydrologic models (see page 38, Tables 9 and 10, Nance 1998) the thickness of the freshwater lens would be reduced by only 0.08 ft at the Waikele Stream mouth. This is assuming a 4.6 MGD diversion at a stream flow level that is exceeded 80% of the time (11.6 MGD).

Due to the proposed 4.6 MGD diversion salinity at the Waikele Stream mouth would exceed 15 ppt and render a 0.08 ft. thick portion of the freshwater lens unsuitable as rearing habitat for juvenile 'ama'ama and aholehole. This habitat loss was calculated from flows that occur in Waikele Stream at least 80% of the time. It is difficult to assess how a reduction of 0.08 ft of depth in the freshwater lens would influence the 'ama'ama and aholehole fishery at the mouth of Waikele Stream. The stream mouth area is a relatively small, and was 170 ft. wide at the point of the salinity profile measurements. A reduction of 0.08 ft. in the depth of the freshwater lens appears to be a small amount of lost freshwater habitat compared to the overall Pearl Harbor and West Loch system. This analysis is of course an oversimplification of a very complex system. Much more research would be required to make more definitive statements on the effects of this or any other proposed diversion in Hawaiian waters. However, the hydrological models verify that that the proposed diversion will normally (80% of the time) minimally impact the physical size or salinity of the estuarine environment at the Waikele Stream mouth, or the West Loch of Pearl Harbor.

Additional impacts to changes in salinity in the upper north end of the West Loch of Pearl Harbor, and not only the very limited region of the Waikele Stream mouth, were also addressed by Nance (1998). The area modeled encompasses the portion of West Loch from the Laulaunui Fishpond north to the Waikele and Kapakahi Stream mouths. Surface salinities within West Loch, including inputs from Honouliuli and Kapakahi Streams, were computed to increase as a result of the proposed diversion from 0.22 to 0.89 ppt, and ranged from 31.44 to 31.82 ppt (Nance 1998). This is likely not a major or even noticeable biological change to the West Loch estuarine system. Strong winds often push the freshwater input of Waikele Stream to the western side of West Loch, thus any slight reduction in surface salinity due to the proposed diversion will often be masked by the mixing effect of strong winds.

Although difficult to assess, a reduction of the freshwater lens by 0.08 ft. in thickness due to the 4.6 MGD proposed diversion may provide little negative impacts to native estuarine fish at the Waikele Stream mouth area. Changes in salinity due to the proposed withdrawal may not adversely impact physical habitat for juvenile estuarine fish such as aholehole and 'ama'ama, as less than one-tenth of a foot (in depth) of critical habitat will be lost. Cumulative impacts of the numerous wells and diversions in the watershed, along with the effects of urbanization have undoubtedly reduced the fisheries of Pearl Harbor in the past 100 years. The proposed diversion is far less than diversions of over 14 MGD that occurred on a regular basis during sugarcane cultivation. Thus, any adverse impacts would be far substantially less than what occurred during periods of recent diversions.

Native Amphidromous (Stream) Biota

There are two ways in which withdrawal of water from Waikele Stream could affect native amphidromous biota: reduction of habitat quality and quantity within the stream, and diminished freshwater signature (due to reduced freshwater flow) in the West Loch of Pearl Harbor. The freshwater plume, or signature, attracts native post-larval amphidromous biota to stream mouths so that they can migrate upstream and recruit to the adult population. Amphidromous refers to organisms that migrate between the ocean streams to complete their life cycles (see Ecological Requirements of Stream 'O'opu). Native amphidromous organisms include not only 'o'opu, but 'opae 'oeha'a (*Macrobrachium grandimanus*), 'opae kuahiwi (*Atyoida bisulcata*), hihiwai (*Neritina granosa*), and hapawai (*Theodoxus vespertinus*). Under present, non-diverted conditions, estuarine nursery fish habitats are available at the Waikele Stream mouth and lower stream channel area. In Waikele Stream we collected native post-larval stream fish and crustaceans such as 'o'opu naniha, 'o'opu akupa, and 'opae 'oeha'a that were attracted to the stream due to the freshwater plume.

No reduction in freshwater habitat quality and quantity would occur in strictly freshwater sections of Waikele Stream due to the proposed diversion. This is because water will be taken from Waikele Stream at a point where the stream flows over the USGS weir and immediately into a tidally influenced region. Thus, only tidally influenced areas will be affected by this diversion. This diversion could therefore potentially adversely effect recruiting stream biota and native stream organisms capable of inhabiting estuarine conditions that are found here such as 'o'opu naniha, 'o'opu akupa, and 'opae 'oeha'a.

Under the proposed diversion of 4.6 MGD, approximately 2000 ft. of Waikele Stream from the diversion point at WP-18 (USGS Gaging Station weir) downstream to West Loch would have a reduction in freshwater and estuarine habitats during low-flow periods. According to the hydrological models, the mostly freshwater areas in the Waikele Stream channel (Sites 1-4 in Nance 1998) affected by the proposed diversion would have the freshwater layer reduced by a range of 0.27 to 0.5 ft. in thickness from current conditions. The model is based on periods of 'normal' flows occurring >80% of the time. Although there would be stream flow over the USGS weir and into the concrete channel section virtually all the time, a reduction in estuarine, tidally influenced habitats would nevertheless occur under the projected withdrawal scenario. At low tide, the stream normally flows as a thin layer of completely fresh water to just downstream of the Farrington Highway Bridge. With the proposed diversion this freshwater layer (Site 1 in Nance 1998) would be reduced from 1.05 ft. in thickness to 0.78 ft. This would be a reduction in the thickness of the freshwater lens by 0.27 ft. in the area of the Farrington Highway Bridge. Waikele Stream maintains its integrity of freshwater surface flow downstream to the Chevron petroleum pipeline crossing area (Site 4 in the Nance report). This area would have the freshwater layer reduced in thickness by 0.3 ft. due to the proposed diversion.

A reduction in habitat potentially could adversely affect amphidromous biota that occupy the lower portion of the stream such as 'o'opu naniha, 'o'opu akupa and 'o'opu nakea. Overall impacts to native amphidromous biota due to reduction in available estuarine/tidal habitat or the freshwater plume are presently impossible to quantify. However, as mentioned previously, the slight decrease in thickness of the freshwater lens appears to be a relatively small reduction in estuarine habitat. Three native 'o'opu species were present in low numbers during surveys conducted in this section Waikele Stream. It is important to point out that introduced fish species dominated this section of Waikele Stream, as well as areas above the USGS Gaging Station weir. Lower Waikele/Kipapa Stream is highly biologically degraded, and native stream fish (excluding 'ama'ama and aholehole in estuarine regions) appear to be quite uncommon (Englund 1993, Englund 1997).

Although low numbers of native fish are found in the lower reaches of Waikele Stream, a significant population of large, mature 'o'opu nakea was found in the upper reaches of the Waikele Stream watershed (Englund 1993). During withdrawals conducted at 'normal' stream flows (> 80% of the time) the current freshwater signature in Pearl Harbor at the mouth of Waikele Stream would be slightly reduced. Again, the thickness of the freshwater lens at the Waikele Stream mouth would be reduced by 0.08 ft.

At flows less than the 'normal' (80% of the time) there would be a greater effect on the freshwater plume at the Waikele Stream mouth. A worst case scenario, or the lowest flow day from 1989 to 1997, was also analyzed in Tables 11 and 12 by Nance (1998). These tables show that a 4.6 MGD diversion during a nine-year low-flow of 7.1 MGD would decrease the fresh water layer from 0.13 ft to 0.05 ft. in the Waikele Stream mouth area (Site 7 in Nance 1998). A decrease of 0.08 ft. in the freshwater lens at the Waikele Stream mouth appears to be a small reduction in habitat. The hydrological analysis also determined that overall salinity levels in the West Loch of Pearl Harbor would only be minimally changed by a maximum of 0.9 ppt due to the proposed 4.6 MGD diversion. There is currently no way to quantitatively assess (unless a long-term study was conducted) if the native 'o'opu nakea population in the upper reaches of Waikele/Kipapa Stream would be adversely impacted by the proposed 4.6 MGD diversion. On the other hand, impacts to salinity levels and the size of the freshwater lens even in a worst case scenario have been shown by Nance (1998) to be minimal under the proposed 4.6 MGD diversion. Impacts to 'o'opu nakea would be far less than the former sugarcane diversions that regularly exceeded 4.6 MGD, and often were substantially greater than 10 MGD.

Kapakahi Stream

No adverse impacts are anticipated to occur to native Hawaiian stream biota in Kapakahi Stream resulting from the proposed channel dredging in the area of the Chevron petroleum pipeline. This is due to the small scale and temporary nature of impacts channel dredging that is required to install a pipeline under the stream channel. Additionally, with the exception of one native 'o'opu species that was uncommon, Kapakahi Stream contains almost no native aquatic stream biota, and must be considered one of the most biologically degraded Oahu streams. Even if Kapakahi Stream was in a better condition, dredging a small section of stream channel would likely lead to no serious short-term or long-term impacts. Impacts would probably be no worse than sediment input from a large rainstorm. However, best management practices should be employed during construction to minimize soil erosion into downstream and nearshore ocean areas. This project is not proposing to divert water from Kapakahi Stream, thus no impacts due to water diversion from this project are possible.

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APPENDIX I - ENGLUND (1993) SURVEY RESULTS

Distribution of native and introduced aquatic biota collected in 1993 in Waikele/Kipapa Stream and estuary, Pearl Harbor (from Englund 1993).

	Elevation (ft)					
Taxon	0 (estuary & USGS)	400	800	1250	1600	Geographic Status
Amphibians						
Giant marine toad (*Bufo marinus*)	X	X	X	X	X	Introduced
Bullfrog (*Rana catesbeiana*)	X	X	X	X	X	Introduced
Wrinkled frog (*Rana rugosa*)					X	Introduced
Turtles (red-eared slider)						
Chrysemys scripta elegans	X					Introduced
Fish						
Eleotris sandwicensis	X					Endemic
Stenogobius hawaiiensis	X					Endemic
Awaous guamensis	X	X	X	X		Endemic
Mugilogobius cavifrons	X					Introduced
Mugil cephalus	X					Indigenous
Kuhlia sandvicensis	X					Endemic
Ancistris sp.	X	X				Introduced
Poecilia sphenops (currently mexicana)	X	X	X	X		Introduced
Poecilia reticulata	X	X	X	X		Introduced
Xiphophorus helleri	X	X	X			Introduced
Tilapia (Sarotherodon) melanotheron	X					Introduced
Clarias fuscus			X			Introduced
Misgurnus anguillicaudatus			X	X		Introduced
Crustaceans						
Macrobrachium grandimanus	X					Native
Macrobrachium lar	X	X	X			Introduced
Procambarus clarkii	X	X				Introduced
Mollusks						
Lymnaea reticulata?	X	X				status uncertain
Thiaria tuberculata	X	X				Introduced
Corbicula fluminea	X					Introduced
Insects						
Damselflies and dragonflies (Odonata)						
Dragonfly (*Anax junius*)	X					Indigenous
Dragonfly (*Anax strenuus*)				X	X	Endemic
Dragonfly (*Pantala flavescens*)	X					Indigenous
Dragonfly (*Orthemis ferruginea*)	X					Introduced
Fragile forktail (*Ischnura posita*)				X		Introduced
Rambur's forktail (*Ischnura ramburi*)	X					Introduced
True flies (Diptera)						
Chironomidae						
Cricotopus bicinctus				X		Introduced

Table 1 (cont.). Distribution of native and introduced aquatic biota collected in 1993 in Waikele/Kipapa Stream and estuary, Pearl Harbor (Englund 1993).

	Elevation (ft)					
Taxon	0 (estuary & USGS gage)	400	800	1250	1600	Geographic Status
Dolichopodidae						
Campsicnemus miritibialis				X	X	Endemic
Chrysotus pallidipalpus				X		Endemic
Ephydridae						
Neoscatella hawaiiensis				X	X	Endemic
N. warreni				X		Endemic
Tipulidae						
Limonia jacoba					X	Endemic
Limonia stygipennis					X	Endemic
True bugs (Heteroptera)						
Mesoveliidae						
Mesovelia amoena				X		Introduced
Saldidae						
Saldula exulans				X	X	Endemic
Veliidae						
Microvelia vagans				X	X	Endemic
Caddisflies (Trichoptera)						
Cheumatopsyche pettiti	X			X		Introduced

EFFECT OF THE PROPOSED USE OF WP-18 PUMP STATION ON WEST LOCH, PEARL HARBOR

NUTRIENTS AND BIOTIC PRODUCTIVITY

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INTRODUCTION

This report is a an addendum to the document entitled "Effect of the Proposed Use of the WP-18 Pump Station on Waikele Stream and West Loch" prepared by Tom Nance Water Resource Engineering (TNWRE), June 1998. The purpose of the TNWRE report is to estimate the effects to Waikele Stream and West Loch, Pearl Harbor that would result from the proposed pumpage of 4.6 mgd of irrigation water from Well WP-18 in Waikele Stream.

The methodological approach described by TNWRE was to collect a series of water samples from a point in Waikele Stream well above WP-18, through the lower reaches of the stream between WP-18 and the point of entry into West Loch, Pearl Harbor, and within West Loch. The samples provided a data set from which the present dynamics of freshwater input and dispersion within the stream and loch could be evaluated. Based on the application of simple mixing models to the data set, Nance was able to estimate the increase in salinity in the upper end of West Loch that would result from the removal of 4.6 mgd of stream water. Computed salinity increases range from 0.22 to 0.89 ppt, considered a small change within the range of about 33 ppt that exists within the sampling scheme. The Nance report also points out that this estimated change would constitute the largest change (e.g. maximal impact), since sampling was done during a dry period when freshwater inflow was minimal. Hence, during wetter conditions, the depression in salinity would be even smaller.

As freshwater typically contains higher concentrations of plant nutrient than marine waters, the decreased flow of stream water also has the potential to affect biotic productivity in the receiving habitats of inner West Loch. The purpose of this addendum is to evaluate the potential changes to nutrient dynamics and productivity within West Loch as a result of the proposed pumpage. All of the data discussed below, as well as the sampling locations are presented in the TNWRE report.

RESULTS

Descriptively, the shoreline of the inner portion of West Loch consists predominantly of dense stands of red mangroves (*Rhyzophora mangle*). Offshore of the mangroves, the entire inner area consists entirely of a shallow-bottom mud flat. Depth of the mud was not measured, but appeared to be at least several feet thick, and was anearobic within several inches of the surface. Turbidity of the water was consistently high throughout the study area. Detailed inventories of biota were beyond the scope of this report. On mudflats exposed at high tide, however, several areas were observed to contain dense aggregations of oysters (*Crassostra spp.*).

Figures 1-3 show schematic plots of nutrient concentrations as functions of distance from the shoreline inward up Waikele Stream (above and below the concrete weir described by Nance), and outward in West Loch. The plot of salinity (Figure 1) shows sharp distinctions in horizontal gradients at each of the boundaries. Above the weir, salinity is near zero, as all waters are either surface water or spring water (groundwater). Below the weir, the water column is strongly vertically stratified; salinity in the surface layer increases slightly as a result of tidal mixing between marine waters from Pearl Harbor and fresh stream water. The salinity of the bottom water is nearly oceanic indicating little mixing between the layers. At the juncture of Waikele Stream and West Loch, there is a sharp horizontal halocline, with waters in the shallow inner portion of the Pearl Harbor estuary of near oceanic salinity (27-31‰). In outer West Loch, the water column is slightly stratified, with all surface samples 1-4‰ lower than the corresponding bottom water.

These patterns indicate several important points relevant to the effects of lowering volume of stream water reaching Pearl Harbor. First, it can be seen by the sharp gradient at the juncture of Waikele stream and West Loch that the system is dominated by water of oceanic salinity. Even in the most landward reaches of West Loch, the volume of inflowing stream water is so small compared to the volume of marine water that there is essentially no mixing gradient with distance offshore. The constancy of salinity through the entire range of sampling in West Loch (including the outer loch) further indicates that the effect of stream water on salinity of the loch is small and uniform, rather than exhibiting a gradient with distance from the mouth of the stream.

Plots of Si, NO_3^- and PO_4^{3-} as functions of distance all show nearly identical patterns that are the mirror images of salinity (Figures 1 and 2). The one exception to the mirror images is the concentrations of nutrients in the two most upstream samples that contain no groundwater. Nutrient concentrations in these samples are low, as is salinity. In the remaining stream samples which contain groundwater, nutrient concentrations in the surface layer are consistently elevated. These elevated levels reflect the high volume contribution of groundwater to the stream water (estimated at 80% by Nance). Water in the tidal reach of the stream also displays distinct vertical stratification, with bottom water containing substantially lower concentrations than corresponding surface samples.

As with salinity there is a sharp nutricline at the juncture of the stream and West Loch with essentially no zone of mixing. As with salinity, there are no substantial horizontal or vertical gradients of nutrient concentrations along the length of West Loch. These patterns provide consistent evidence that the volume of stream water is small compared with the volume of oceanic water that mixes near the mouth of Waikele stream.

The patterns of horizontal and vertical gradients of NH_4^+, DON and DOP are distinctly different than the inorganic nutrients discussed above (Figures 2 and 3). These

constituents do not occur in high concentrations in groundwater, hence the distributions are substantially different than the constituents that are found in abundance in groundwater. Concentrations of NH_4^+ in surface water are relatively consistent across the sampling range. DON and DOP are elevated in stream water above the weir, at the lowest levels in surface stream water below the weir, and increase with distance from shore in West Loch. Such a pattern suggests that the concentrations of DON and DOP are reflections of biotic activity (recycling of inorganic nutrients) within the water column. In zones where residence time is long, biotic processes result in high concentrations of organic nutrients. Where residence time is relatively short, such as in the lower reach of Waikele stream, concentrations of organic nutrients are relatively low.

Figure 4 shows plots of concentrations of four nutrients (Si, NO_3^-, NH_4^+ and PO_4^{3-}) as functions of salinity. Also shown on the plots are regression statistics (Regression equation, Error Mean Square (EMS), and regression coefficient (R^2) for each nutrient. The R^2 for Si, NO_3^- and PO_4^{3-} are all significant ($P<0.05$). These significant correlations indicate that concentrations of these nutrients are functions of mixing of groundwater and marine waters. On the other hand, the regression coefficient of zero for NH_4^+ indicates that the concentrations of this nutrient is independent of the mixing between groundwater and oceanic water. Rather, the concentrations of NH_4^+ appear to be a result of biotic activity within the water column.

DISCUSSION and CONCLUSIONS

Estuaries, such as Pearl Harbor, are typically areas of high productivity as a result of several factors. One factor is that estuaries are often areas of high nutrient delivery from riverine input; another factor is that the enclosed physical structure of estuaries leads to increased residence time, allowing biotic processes to effectively cycle nutrients with relatively low rates of washout. The goal of this study is to gain an understanding of the biotic effects of reducing delivery by 4.6 mgd of stream water to the estuarine area of West Loch. While it is not possible to actually measure the change in productivity with such a reduction in freshwater input, it is possible to use the data at hand to make several calculations which can provide a good idea of the magnitude of the potential alterations.

Modeling by Nance estimates that the change in salinity within West Loch by the proposed pumpage will range from 0.22‰ to 0.89‰. The mean salinity from all of our samples collected in surface waters of West Loch was 31.66‰. Thus, the reduction in pumpage could result in an increase in mean salinity to a maximum of 32.55‰. It can be seen in tables 4 and 5 in the Nance report that several of the samples collected within the inner part of West Loch, and all but one of the samples collected in the outer part of West Loch exceed this salinity during present conditions. As shown by the plots of nutrient concentrations as functions of salinity, there is good correlation between salinity and inorganic nutrients. Hence, the community is presently exposed to concentrations of salinity and nutrients that would be similar to the worst case scenario that might occur with the proposed pumpage.

It is also possible to predict what the possible theoretical decrease in productivity might be with the reduced loading of high nutrient groundwater that would occur with the proposed pumpage. Such as estimate assumes that all of the available nutrients in stream water are taken up by plankton within the estuarine system. Pumpage of 4.6 mgd is equivalent to approximately 18 x 10^6 liters (l) per day. Mean dissolved inorganic nitrogen (NO_3^- and NH_4^+) and dissolved inorganic phosphorus (PO_4^{3-}) in surface stream water was 94 µM and 4.7 µM, respectively. This input equals a loading to West Loch of approximately 1,700 moles N and 85 moles of P per day. The ratio of C:N:P in plankton is 106:16:1 (Redfield ratio). Assuming that all influxing nutrients are taken up by plankton there could by 11,000 moles carbon production by the ratio of C:N, and 9,000 moles by the ratio of C:P per day. Such productivity equals approximately 125 kg (275 lbs) of plankton per day. At a ecological efficiency of 10%, productivity of a planktivorous fish would be approximately 27 lbs per day, and of a first level predator (e.g. carnivorous fish that feeds on small crustaceans within the sediment) would equal about 3 lbs per day. In other words, if all of the nutrients that would be removed from delivery to West Loch owing to pumpage were instantaneously incorporated into organic productivity, there is a potential theoretical losses of on the order of 30 lbs per day of fishery resources.

However, it must be understood that these calculations are clearly overestimates because it is assumed that all of the nutrient input is incorporated only once into biomass, and that the growth rate of plankton is infinitely fast. Interpretation of the data set, however, shows that this is clearly not the case. The elevated levels of organic nutrients within Inner West Loch indicate that there is substantial cycling between inorganic and organic nutrients within the system. While plants preferentially utilize inorganic nutrients, numerous studies have shown that marine algae can utilize urea or amino acids as nitrogen sources. When phosphorus limited, many marine algae are capable of producing phosphatases, which enable them to strip off phosphate groups from organic moities (Edward Laws, personal communication).

As stated above, one of the structural functions of an estuary is to enhance productivity by increasing residence time. Such a situation appears to be clearly in operation in the inner reaches of West Loch. While uptake of inorganic nutrients (NO_3^-) appears to lower concentrations to near detection limits, the corresponding elevation of organic nutrients suggest active cycling within the relatively confined system. Hence, it is likely that there will be no effect to productivity as the reservoir of organic nutrients within the sediment column of the nearshore area is far larger than the reduction in nutrient input that would occur from well pumpage.

In conclusion, there appears to be no evidence that the pumpage of 4.6 mgd of stream water would affect the biotic composition of Inner West Loch. Mangroves that border the Loch have been observed by the author in many locations in Hawaii growing in full salinity seawater (e.g. South Molokai, Kaneohe Bay) and even in hypersaline environments such as Nu'upia Pond at Marine Corps Base Hawaii, where salinities reach greater values than 50‰. The proposed reduction in stream flow likely will not cause changes to physical or chemical conditions that presently occur within the envelope of natural variability. Nutrient distributions in West Loch appear to be controlled primarily by mixing of oceanic water and stream water. Owing to the much larger volume of oceanic water compared to stream water, there is little or no discrete zone of mixing which could be affected by the diminution in stream flow. The active cycling of nutrients by the biotic community between the water column and sediments that presently appears to be controlling productivity would not likely show any effect as a result of reduction in stream flow.

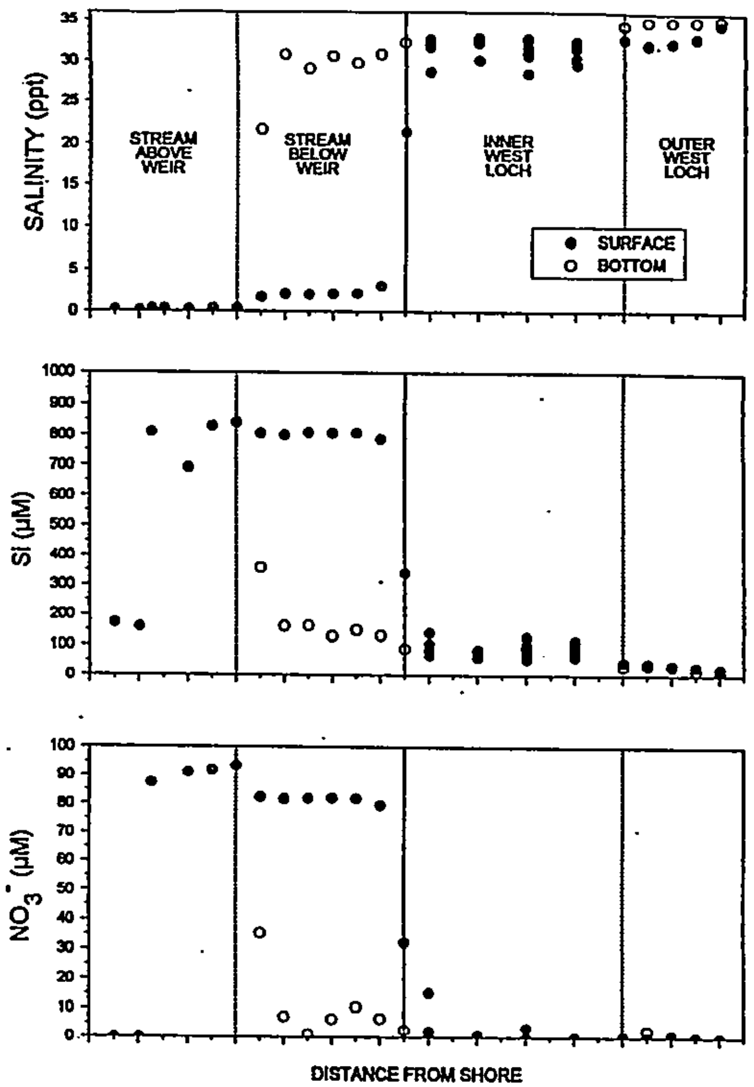

FIGURE 1. Plots of salinity, silica and nitrate as functions of distance from shore in Waikele Stream and West Loch (note distance is not to scale). Samples in Waikele stream were collected above and below a concrete weir near WP-16. See Nance (1998) for explanation of sample collection sites.

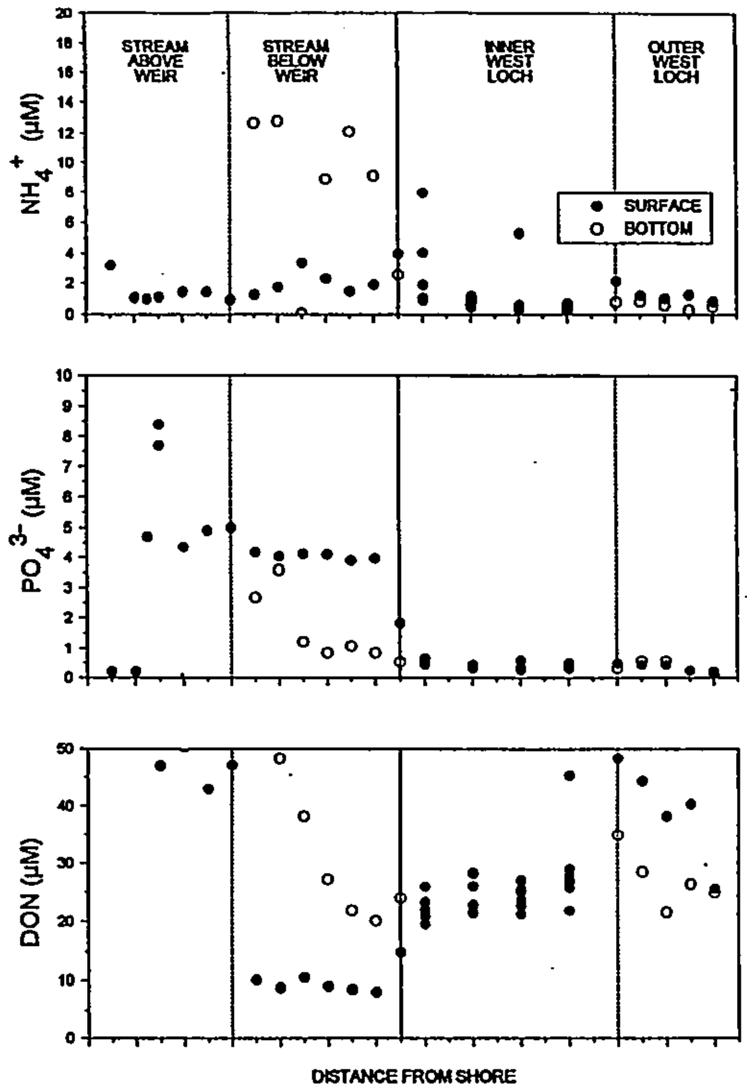

FIGURE 2. Plots of ammonium, phosphate and DON as functions of distance from shore in Waikele Stream and West Loch (note distance is not to scale). Samples in Waikele stream were collected above and below a concrete weir near WP-16. See Nance (1998) for explanation of sample collection sites.

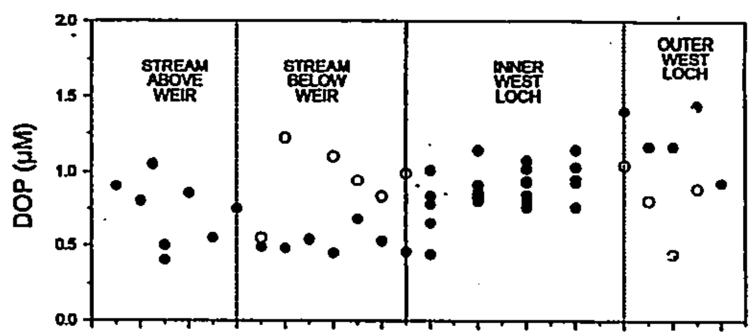

FIGURE 3. Plot of DOP as a function of distance from shore in Waikele Stream and West Loch (note distance is not to scale). Samples in Waikele stream were collected above and below a concrete weir near WP-16. See Nance (1998) for explanation of sample collection sites.

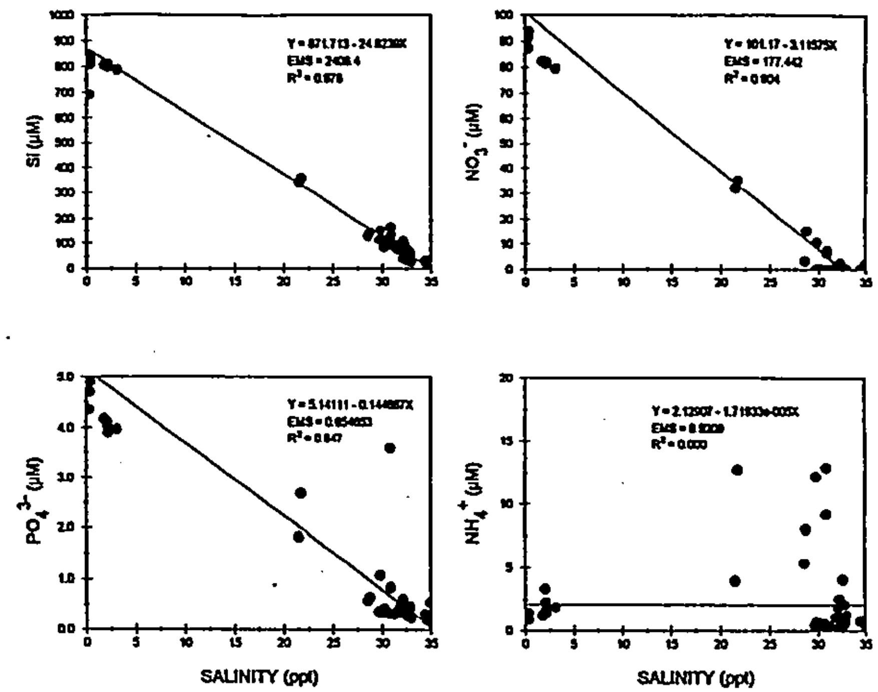

FIGURE 4. Regression statistics of Si, NO3, PO4 and NH4 vs salinity samples collected from Waikele Stream and West Loch, Pearl Harbor. Data points are from surface and deep samples collected in May and June 1998.

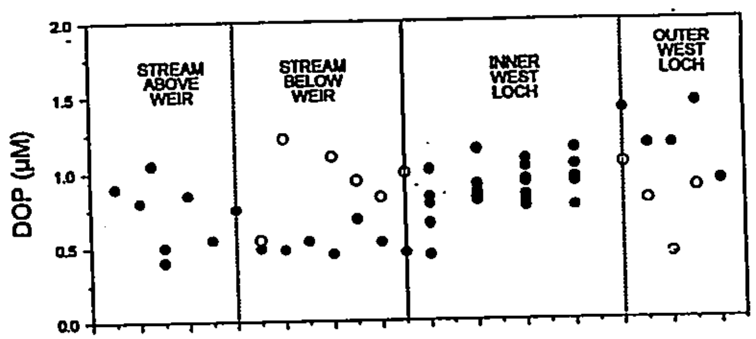

FIGURE 3. Plot of DOP as a function of distance from shore in Waikele Stream and West Loch (note distance is not to scale). Samples in Waikele stream were collected above and below a concrete weir near WP-18. See Nance (1998) for explanation of sample collection sites.

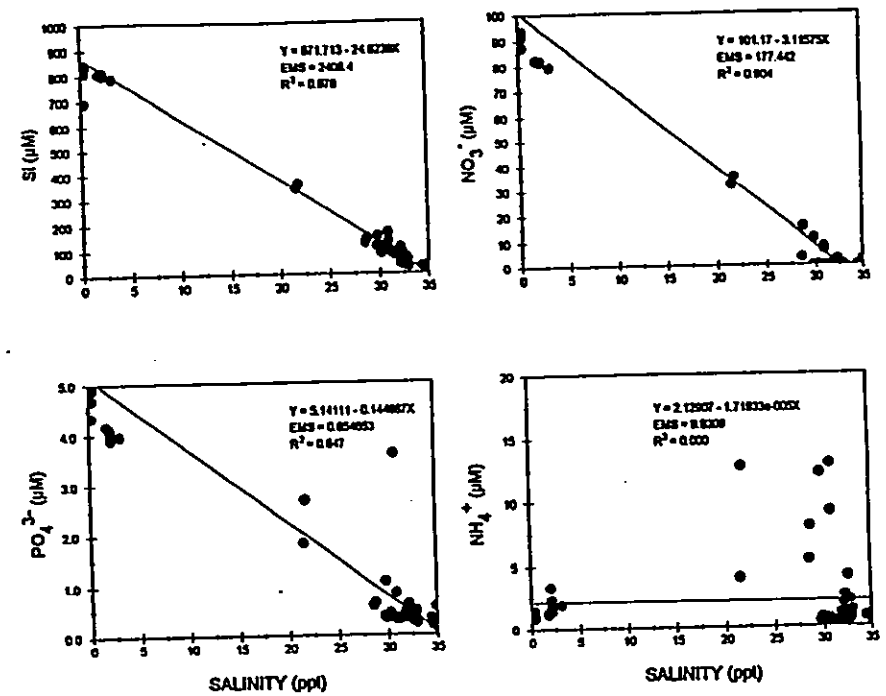

FIGURE 4. Regression statistics of Si, NO3, PO4 and NH4 vs salinity samples collected from Waikele Stream and West Loch, Pearl Harbor. Data points are from surface and deep samples collected in May and June 1998.

END

CERTIFICATION

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