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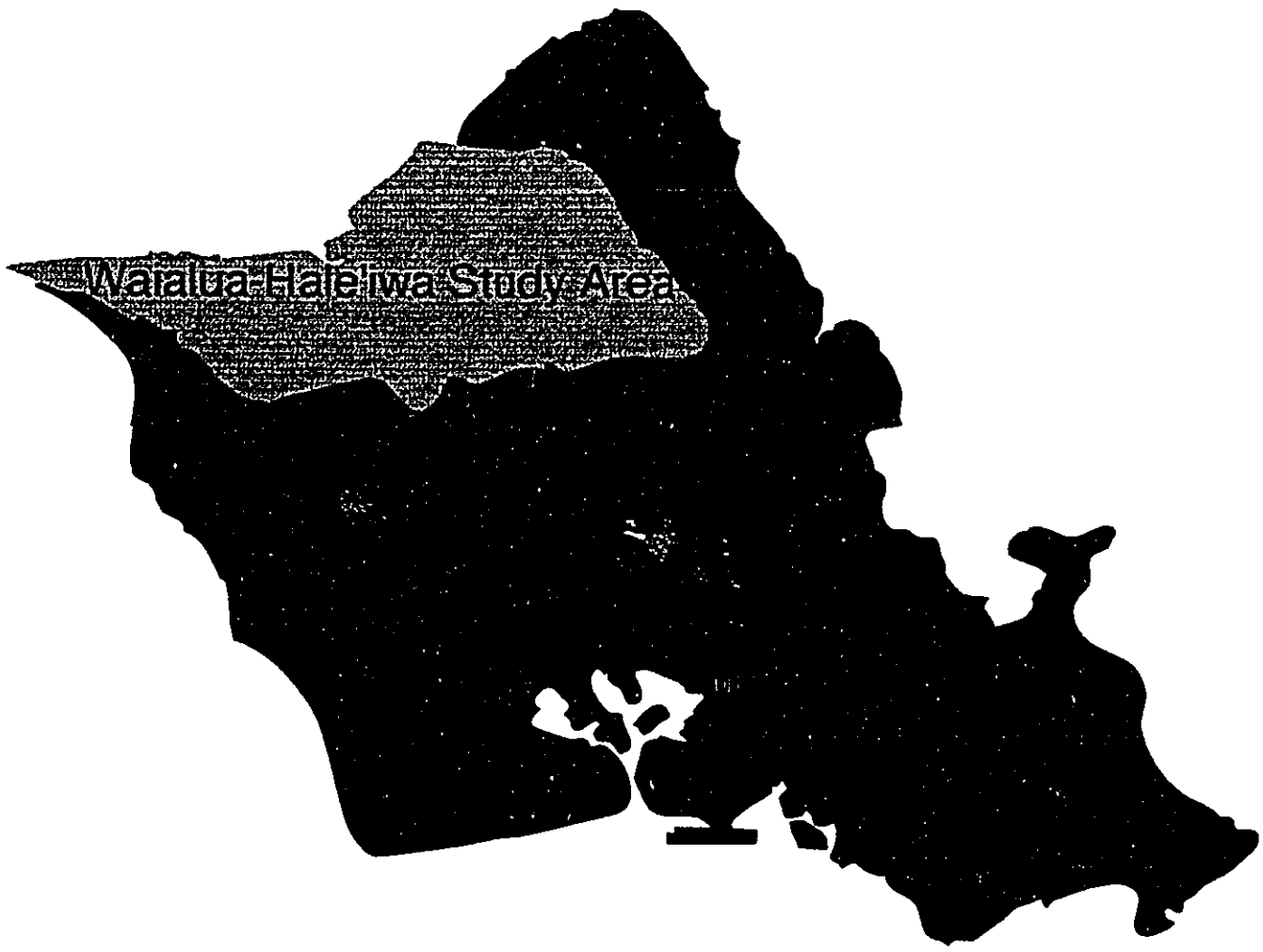
FINAL ENVIRONMENTAL IMPACT STATEMENT
for the
SUPPLEMENTAL WAIALUA-HALE'IWA WASTEWATER FACILITY PLAN



Prepared For
Department of Wastewater Management
City and County of Honolulu

Prepared By
Hydro Resources International
Arcata, California 95521

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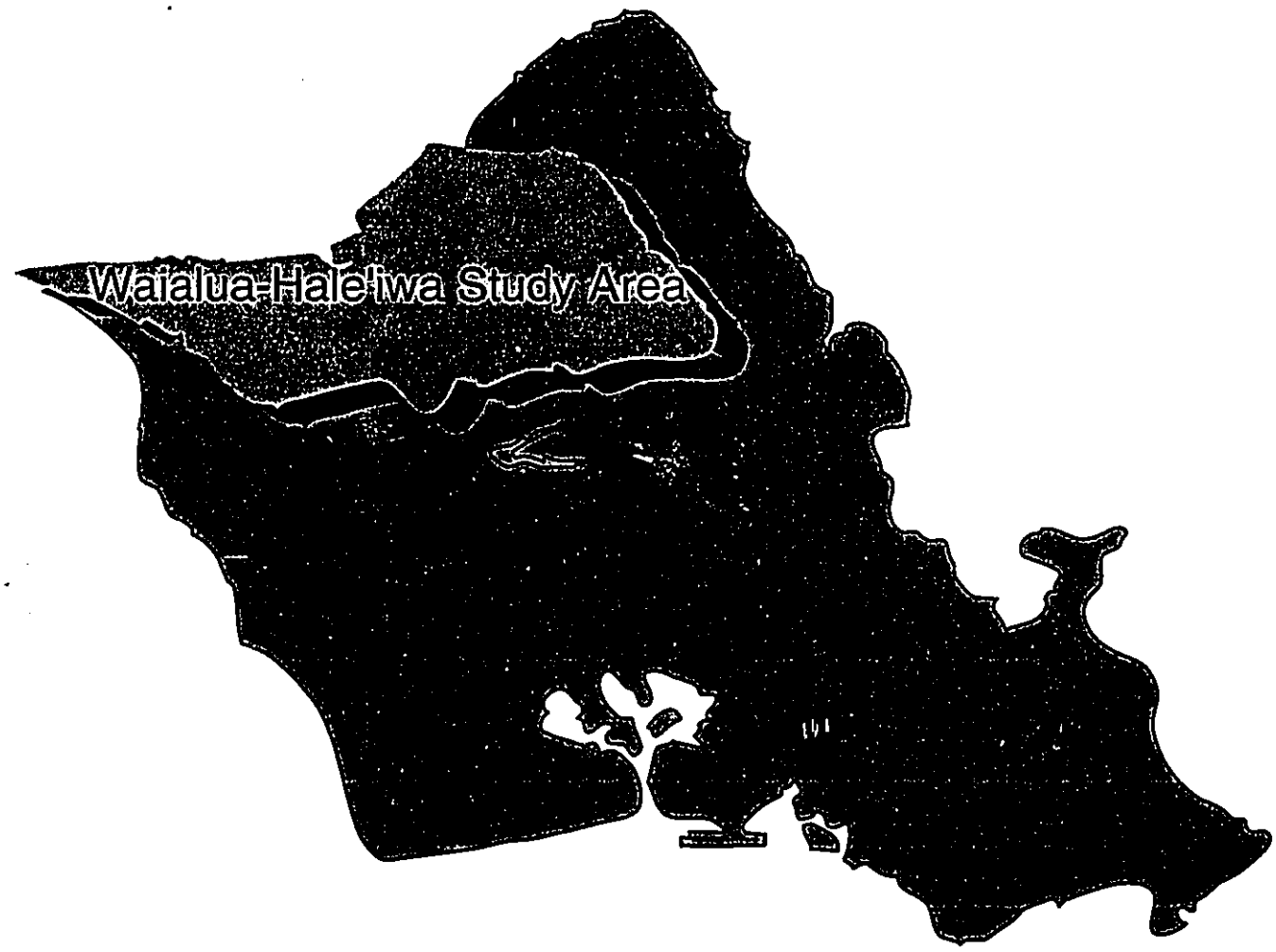

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SUMMARY

A. PURPOSE

The need for improved wastewater collection, treatment, and disposal facilities in the Waialua-Hale'iwa area (see Figure 1) was identified in the 1972 Water Quality Plan for O'ahu and in the 1980 Water Quality Management Plan for the City and County of Honolulu (the "208 Plan"). These and other reports note that:

- The great majority of the homes and businesses in the Waialua-Hale'iwa area are served by cesspools.
- Approximately 40% of the cesspools in the Waialua-Hale'iwa area have failed and require pumping on a frequent basis.
- Even when working properly, cesspools remove only a small percentage of the pollutants contained in domestic sewage, with groundwater carrying the remainder into the ocean.
- There is a resulting potential for health problems as a result of the heavy recreational use of shoreline waters in this area.

The Supplemental Waialua-Hale'iwa Wastewater Facilities Plan (Hydro Resources International, 1994) and complimentary Environmental Impact Statement (pursuant to Chapter 343, Hawai'i Revised Status), identify steps that are required to solve the wastewater treatment and disposal problems taking into consideration the protection of public health, economic feasibility, water quality objectives, potential beneficial and adverse environmental effects, and other pertinent factors.

B. DESCRIPTION OF THE PROPOSED ACTION

The Supplemental Facility Plan recommends, as shown in Figure 1, a centralized subregional wastewater treatment system (collection and conveyance system, treatment plant, and effluent disposal by means of irrigation and rapid infiltration) for the urban core (Waialua, Hale'iwa, Kawailoa I) of the Waialua District. Two equally sized wastewater treatment plants (WWTPs) would be required. Each WWTP will handle a flow of 0.7 mgd and consist of the following treatment and disposal units: bar screens, rotating screens, oxidation ponds, constructed wetlands, coagulation/flocculation, slow sand filters, ultra-violet disinfection, and disposal of effluent by irrigation and rapid infiltration.

The proposed action involves construction of two 0.7 mgd capacity WWTPs, one west of the town of Waialua and the other east of Hale'iwa, each requiring approximately 35 acres (see Figure 1). The first proposed WWTP, near Waialua, is located on existing sugarcane land approximately 2,000 feet south of Farrington Highway; it is about 1/2 of a mile from the nearest residential parcel. An underground wastewater collection system would be installed allowing the plant to serve the Waialua urban core. The second WWTP, near Hale'iwa, would be located about 1/2 mile east of the boat basin, where Waialua Sugar presently leases land from Bishop Estates. Both WWTP sites are at an elevation of 130 feet above sea level.

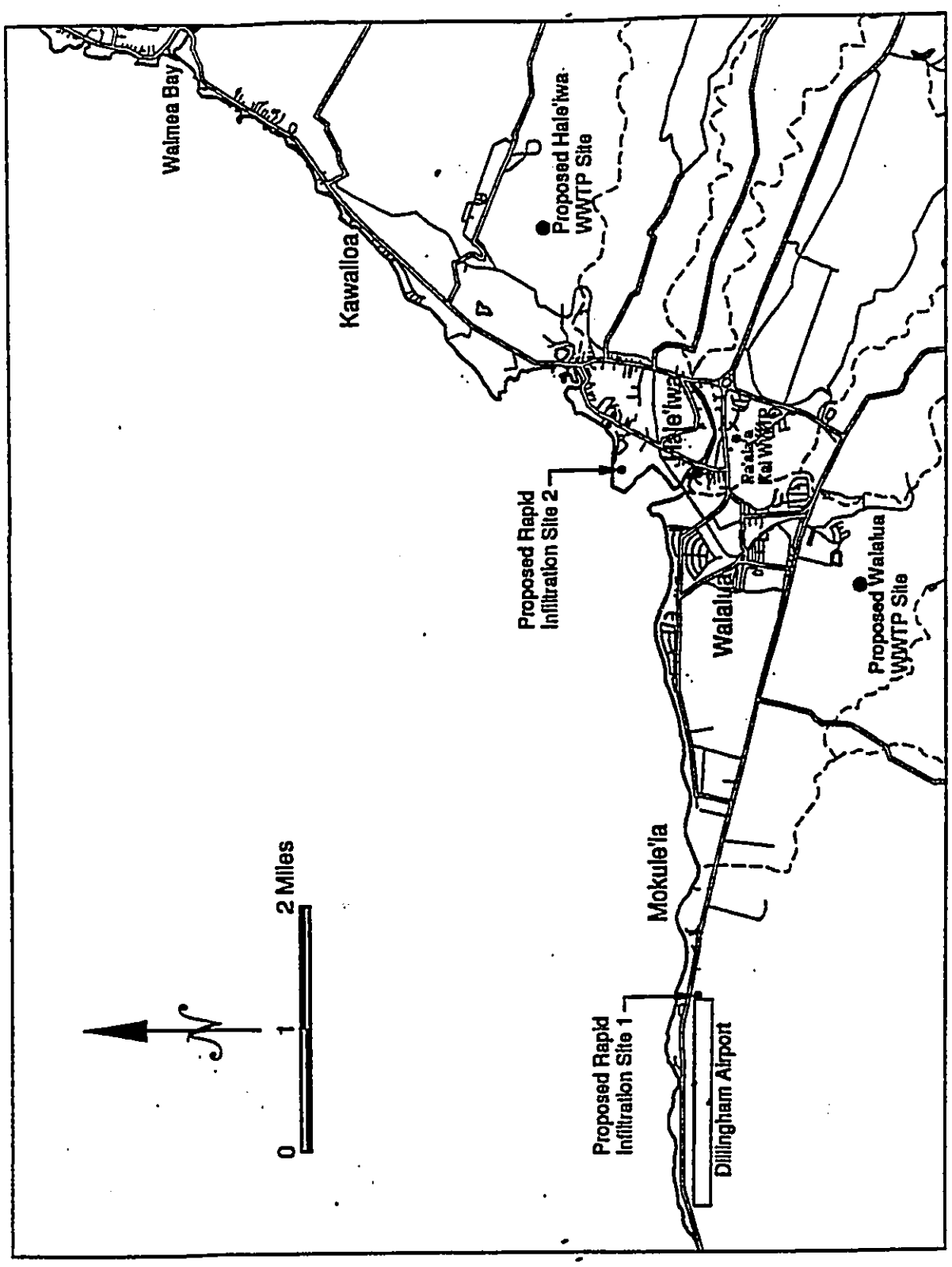

Figure 1 Proposed Location of Wastewater Collection, Treatment, and Disposal Facilities.

Another wastewater collection system, separate from Waialua's collection system, would be installed for the Hale'iwa urban core. A tertiary level of wastewater treatment would be provided by both WWTPs. The effluent would be disposed of by irrigation through reclaimed water lines and rapid infiltration. Each subregional system would have its own disposal system. Two reclaimed water lines will deliver reclaimed water to potential users, and each line will terminate in rapid infiltration disposal sites. At present between 20 to 80 acres of potential users have shown an interest in using reclaimed water for irrigation.

For the rural areas (Kawailoa II, Kawaihapai), the Supplemental Facility Plan recommends the optimal operation of existing systems alternative. Under this alternative, use of existing working systems continues, failing and new systems are replaced with other on-site systems as required by state law, and low flow indoor plumbing fixtures are installed in all dwelling units. In addition, garbage grinders would be removed from all dwelling units. At the end of the planning period (the year 2015), a re-evaluation should be conducted to determine the feasibility of expanding the service area of the plant to the lower density urban fringe areas. This evaluation is needed because of the state's goal of prohibiting the construction of new cesspools beyond the year 2000.

C. SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS

C.1 Beneficial Effects

Implementation of the recommended wastewater collection, treatment and disposal program would have three principal beneficial impacts:

(1) It would reduce the risk of potential public health problems to the public's exposure to raw or partially treated sewage from surfacing cesspool operations.

(2) It would reduce the volume of pollutants from domestic wastewater entering ground and surface waters in the study area, thereby improving coastal water quality.

(3) It would provide for a more significant and reliable wastewater treatment and disposal system for the more densely populated urban areas, while taking advantage of the economics of individual wastewater treatment systems in the less densely populated rural fringe areas.

(4) District construction expenditures would produce almost $29 million in construction worker income and an average of 806 construction industry jobs on O'ahu if spread over a hypothetical 10 year construction period. The total induced economic effects statewide would be about $65 million in personal income and more than 1,805 person-years of employment (a person-year is one person for one year).

C.2 Adverse Effects

C.2.1 Short-Term (Construction)

Most of the significant adverse construction impacts of the recommended alternative are associated with the collection system. This is because it involves extensive excavation along many of the area's roadways, whereas the WWTPs are situated on more isolated sites away from existing structures. These short-term construction impacts would include increased noise

levels, dust and other air pollutants, and traffic disruptions when motorists are routed around trenching operations, and when trenching occurs in roadways in front of residential units. Finally, property owners in the sewered area may also be required to pay an improvement district assessment, to arrange and pay for connecting existing structures to the wastewater collection lines, and backfilling their abandoned cesspools.

C.2.2 Long-Term (Operational Phase)

The recommended centralized subregional wastewater management systems would have relatively few adverse long-term impacts. Construction of the WWTPs would remove approximately 70 acres of prime agricultural land from production. Additional land would be required for the rapid infiltration disposal sites (2 acres), and the wastewater pump stations (1.5 acres), but this would involve little, if any, productive agricultural land. Approximately 164 acres of land is required for wastewater reclamation. If enough reclaimed wastewater subscribers cannot be found, the City may be required to purchase all or a portion of the required 164 acres for irrigation disposal. Owners of property in the sewered area would have to pay a monthly wastewater system user fee; this would be new only to those owners not currently paying a cesspool charge to the City. The recommended plan contains numerous design features intended to eliminate significant adverse noise, air quality, and other impacts sometimes associated with wastewater treatment plants.

D. PROPOSED MITIGATION MEASURES

Numerous considerations have been evaluated and incorporated into the recommended plan for the purpose of preventing or minimizing potential adverse impacts associated with wastewater treatment facilities. The following are among the more important steps that have been taken to avoid and/or reduce potential problems:

- The recommended wastewater treatment plant sites are located in agricultural fields well away from existing structures and urban-zoned land. The sites also are located where the normal wind trends would impact the least number of people. As a result, the impact of potential adverse noise or odor generated in the event of a system malfunction has been greatly reduced.

- The recommended facilities shall be designed to minimize its visual impact on the surrounding area. The plant layout and facilities have been selected to have the least visual impact. And where required, the facilities shall be screened from public views with landscaping and terra farming.

- Sites are free of rare/endangered species or other valuable flora or fauna, known archaeological/historical remains, and known flooding have been chosen for both WWTP sites.

- Odor prevention and control systems shall be incorporated in the WWTPs and the collection systems as needed.

- Odors from oxidation ponds are minimized with proper design. If odors occur surface aerators will be employed to meet oxygen requirements.

- Where possible, the wastewater pump stations have been sited outside flood hazard areas; where this is not feasible, plans call for flood proofing to the elevation of the 100-year flood.

- The proposed treatment train will produce an effluent which will be less than 5 mg/l BOD, 5 mg/l of suspended solids, and 5 mg/l of total inorganic nitrogen. The effluent will also have less than 1 coliform/100 ml, which meets the DOH, R-1 reclaimed water guidelines. Treated wastewater (reclaimed water) will be disposed of by irrigation. An irrigation management plan (required by DOH) will be prepared to insure that minimal impacts could occur on or off-site.

- Treated wastewater which cannot be disposed of by irrigation will be disposed of through rapid infiltration located makai of the BWS "No-Pass" line. The rapid infiltration sites will be located at the terminus of the two reclaimed effluent lines.

E. ALTERNATIVES CONSIDERED

A wide range of alternatives were formulated and evaluated during the wastewater facilities planning process. One of these, the "No-Action" alternative, assumes the area's residents and businesses will continue to dispose of their sewage through cesspools, private wastewater treatment plants, and other individual wastewater units. Other alternatives consisted of one WWTP, two WWTPs, and community-type centralized subregional WWTPs together with associated collection and disposal systems. The service areas, WWTP treatment processes utilized, and total treatment capacity of the various alternatives initially considered were comparable to that of the recommended alternative. Analyses conducted as part of the facility planning process indicated that the recommended alternatives for the urban and rural areas were superior to other alternatives with respect to minimizing the impacts on the environment.

F. UNRESOLVED ISSUES

Evaluation of effluent disposal alternatives indicates that irrigation of effluent is the most environmentally sound and least costly alternative. At this time one major land owner has indicated they would support the use of reclaimed wastewater for irrigation. Other major land owners have not indicated one way or the other. Historically, though, most of Wahiawa's effluent was used indirectly to irrigate sugar cane with no negative impact. Other potential users, City/County Parks, State Parks, State Transportation Department, and smaller agricultural holdings (5-20 acres) have shown an interest in the use of reclaimed water for irrigation. Approximately 20 to 80 acres of individual property owners have given written interest.

The justification for a land intensive wastewater management system is based upon the economic and environmental benefits of using approximately 236 acres of agricultural land for the treatment and disposal of generated wastewater in the project area. The benefits associated with the proposed wastewater management system is a highly treated wastewater effluent, high treatment reliability, reuse/storage potential of effluent, no ocean discharge, low capital cost, and low operation and maintenance costs.

G. COMPATIBILITY WITH LAND USE PLANS AND POLICIES

The wastewater facilities plan is in accordance with public land use policies and plans. It will help achieve the environmental quality objectives expressed in the State Plan, the City and County of Honolulu General Plan, the North Shore Development Plan, and other

applicable land use controls. It is designed to upgrade service to existing settlements; consequently, it will not stimulate growth beyond that provided for in these plans.

H. NECESSARY PERMITS AND APPROVALS

Implementation of the recommended plan will require the permits and approvals listed below. None of these have been applied for as yet, and permit applications will be submitted only at such time as a firm decision has been made to proceed with construction of the facilities. Further engineering and environmental analyses will be undertaken in the process of finalizing the design and preparing construction drawings as required.

Approving Agency or Body	Permit/Approval Needed
I. City and County	
Dept. of Land Utilization (Pre-design)	Special Mgmt Area Use Permit
Dept. of Land Utilization (Pre-design)	National Flood Insurance Program Conformance
Dept. of Land Utilization (Pre-design)	Shoreline Setback Variance
Dept. of Public Works	Grading Permit
Dept. of Public Works	Drainage Plan Approval
Board of Water Supply	Water Connection Approval
Board of Water Supply	Fire Hydrant Installation Plan Approval
Building Department	Building Permit
Dept. of General Planning (Pre-design)	Development Plan Public Facilities Map Designation
II. State	
Dept. of Health	Conditional Use Permit for Construction Activities
Dept. of Health (Pre-construction)	National Pollutant Discharge Elimination System
Dept. of Health (Pre-design)	Section 401 Water Quality Certification
Dept. of Land & Natural Res. (Pre-design)	Historic Sites Review
Dept. of Land & Natural Res. (Pre-design)	Conservation District Use Permit
Dept. of Land & Natural Res. (Pre-design)	Leasing

Dept. of Transportation	Permit to Perform Work Within State Highways
Dept. of Transportation	Permit for Work in Shore Waters of the State of Hawai'i
Dept. of Bus. & Econ. Devel. (Pre-design)	Hawai'i Coastal Zone Mgmt Program, Consistency Determination
State Surveyor, Land Court (Pre-design)	Approval for Subdivision of Land

III. Federal

United States Corps of Engr. (Pre-design)	Section 404 Permit - for stream crossings and wetlands
Federal Aviation Administration (Pre-design)	

IV. Utilities

Hawaiian Electric Company	Electrical Connection Approval
Hawaiian Telephone Company	Telephone Connection Approval
PRI Gas Co.	Gas Connection Approval
Cable TV Company	

Environmental Impact Statement
for the Supplemental Waialua-Hale'iwa Wastewater Facility Plan

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CHAPTER I

THE PROPOSED ACTION

1.1 NEED FOR THE PROPOSED ACTION

In 1972, the City and County of Honolulu published the ten-volume Water Quality program for O'ahu (WQPO). The program was designed to maintain and enhance water quality through a program of source controls and treatment of potentially harmful pollutants. In the same year the U.S. Congress approved major changes to the Federal Water Pollution Control Act (FWPCA), (Public Law; PL 92-500). Congress' goal was to eliminate the discharge of pollutants into the nation's waters, thereby restoring their chemical, physical, and biological quality and preserving them as a source of food and recreation. This goal closely matches those of the WQPO.

The FWPCA calls for the establishment of area-wide wastewater treatment management plans designed to insure adequate control of pollutant sources. The specific requirements for the development and contents of these plans are contained in Section 208 of the Act; hence, they have become known as "208 Plans". Published in October 1978 and amended in September, 1990, the 208 Plan for O'ahu is entitled Water Quality Management Plan for the City & County of Honolulu. It provides a framework for ongoing City and State water quality programs on O'ahu.

Chapter 10 of the 208 Plan addresses issues associated with municipal sewerage and household wastewater disposal systems. It notes that many parts of the island, including the Waialua-Hale'iwa area, lack municipal wastewater treatment facilities, relying instead on individual cesspools and other private systems. The 208 Plan lists the following broad categories of problems and potential problems associated with this reliance on individual disposal systems:

- Many of the systems have failed;
- Many produce seepage that pollutes coastal waters;
- There is an inefficient division of authority between the State and County, contributing to the use of cesspools in areas where they are inappropriate; and
- Cesspool pumping by government agencies involves a questionable subsidy to the owners of failed cesspools, eliminating the monetary incentive needed to induce owners to change to a more efficient system.

The city-operated Pa'ala'a Kai wastewater treatment plant (WWTP) is the only public wastewater treatment facility in the Waialua-Hale'iwa area. This system services only 307 single family units from the Pa'ala'a Kai housing development. The proposed action would require shutting down the Pa'ala'a Kai wastewater treatment plant. Most of the other homes and businesses in the area rely on cesspools; the 208 Plan notes that about 60% of these have failed and required pumping at least once. Each of the small apartment complexes located along the shoreline in Waialua and Mokule'ia is served by its own private wastewater treatment system (WWTS), many of which have performed poorly due to untrained operators and inadequate maintenance programs. The 208 Plan observes that cesspools remove only a small percentage of the pollutants contained in domestic sewage, and notes that the seaward movement of groundwater has the potential to carry most of the remainder of the pollutants into coastal waters, particularly when they are located near the shoreline. It also notes that, while adverse effects of cesspool seepage on water quality are not well documented, it is possible that there may have been a gradual and undetected impact on coastal waters because of cesspool use over many decades, especially where fringing reefs tend to restrict circulation in nearshore

waters. In view of the existing cesspool-related problems discussed in the 208 Plan and the increasing continuation of potential contamination from aging cesspools through the year 2000, the 208 Plan recommends that the Waialua-Hale'iwa area be sewered.

In response to the recommendations contained in the 208 Plan, the City & County of Honolulu applied for and received a grant from the U.S. Environmental Protection Agency (EPA) to prepare a "Facility Plan" for the Waialua District in accordance with the Federal Water Pollution Control Act of 1972 (PL 92-500) and Clean Water Amendments of 1977 (PL 95-217) and 1981 (PL 97-117). Facility plans are conducted to insure that solutions to perceived wastewater treatment problems take into consideration economic feasibility, water quality objectives, potential beneficial and adverse environmental effects, and other pertinent factors. The Environmental Impact Statement (EIS), in conjunction with the Facility Plan, evaluates alternatives and selects the appropriate solution for protecting the environment by minimizing/eliminating existing problems and is aimed to mitigate future environmental impacts.

In 1987, a wastewater treatment Facility Plan and EIS was prepared for the Waialua-Hale'iwa service area by Belt Collins and Associates (BCA). The City and County of Honolulu is now preparing a Supplemental Facility Plan to consider a treatment/disposal alternative (oxidation ponds/wetland/irrigation) which was not fully developed as a viable alternative in the 1987 Facility Plan and EIS. The Supplemental Waialua-Hale'iwa Facilities Plan and EIS is being prepared by Hydro Resources International (HRI).

1.2 PROPOSED ACTION

The proposed wastewater collection, treatment, and disposal system will serve the Waialua-Hale'iwa planning area with a decentralized collection and treatment system. The urban core of the planning area will be served by the two centralized subregional WWTPs. The rural area will utilize the optimal operation of existing systems up to the end of the planning period (the year 2015). The urban and rural areas of the Waialua-Hale'iwa study area are shown in Figure 1.1. The proposed action would require a change in the North Shore Septage Plan, which proposes a separate septage treatment system.

1.2.1 Rural Area

The proposed action for most of the rural areas of the Waialua-Hale'iwa planning area is the optimal operation of existing facilities alternative. This alternative would require a mandatory retrofit of all toilets that currently use greater than 1.6 gallons/flush and shower heads greater than 2 gpm. This would reduce the number of failing cesspools and would allow City and County pump trucks to better serve the rural area. This alternative proposes the continued use of existing wastewater systems. This recommendation is based upon the low population and density of the outlying rural areas. Due to the limited projected population increase through the year 2015, continued use of cesspools will have little or no detrimental effects on the environment and the potential for public health hazards appears minimal. The incorporation of a septage receiver station at the new WWTPs will provide a much more convenient and less expensive means of septage disposal than at the more distant City and County WWTPs, and further helps to justify the continued use of existing cesspools and new on-site wastewater treatment and disposal systems in the rural areas.

1.2.2 Urban Area

The potential environmental problems arising from either existing or future conditions, as mentioned in the "208 Plan" in the Waialua-Hale'iwa area, is most likely to occur in the

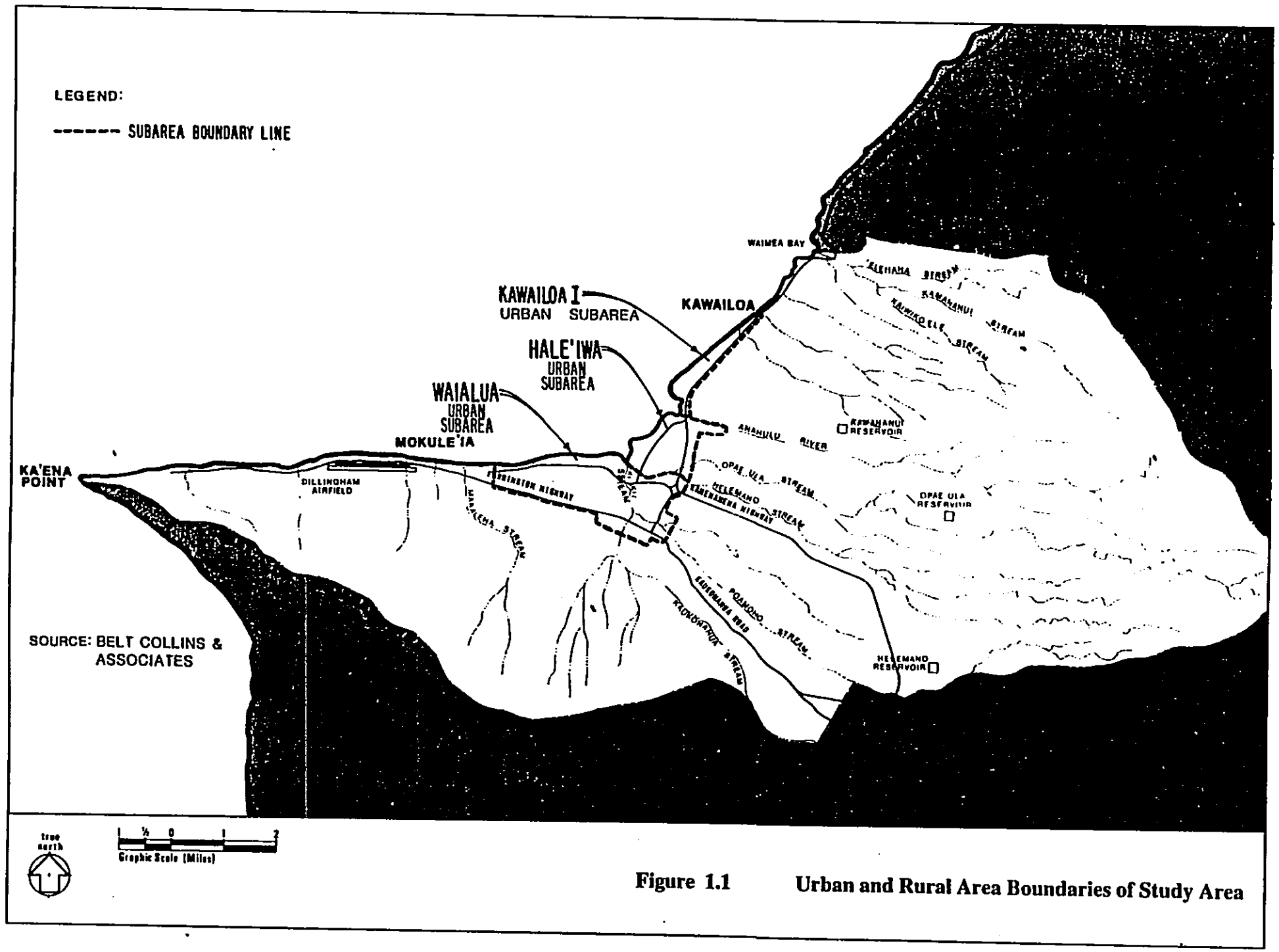


Figure 1.1 **Urban and Rural Area Boundaries of Study Area**

urban areas of the planning area. The proposed action involves the collection and conveyance of wastewater to two WWTPs, one located in Waialua and the other in Hale'iwa. The disinfected tertiary treated effluent will be disposed of by irrigation and/or infiltration.

Collection and Conveyance Systems

The recommended collection and conveyance system, consisting of gravity sewers, force mains, and wastewater pump stations for the urban areas are shown in Figures 1.2 and 1.3. The approximate pipe diameters of the force mains are also depicted.

WWTP Facility

One of the two proposed centralized subregional WWTPs is located in Waialua, within Waialua Sugar Company's cane field south of Farrington Highway; the other WWTP is located east of Hale'iwa, at a 130 foot elevation level, on land owned by Bishop Estates and leased to Waialua Sugar Company. Figures 1.4 and 1.5 show the proposed locations of the Waialua and Hale'iwa WWTP sites, respectively.

The proposed centralized subregional treatment trains for the two WWTPs are comprised of the following treatment and reclamation/disposal processes:

- Septage Receiver
- Bar Screens
- Rotary Screens
- Oxidation Ponds
- Constructed Wetlands
- Coagulation/Flocculation
- Slow Sand Filters/chemical addition
- Ultraviolet Disinfection
- Irrigation/Rapid Infiltration

A process flow sheet of the proposed WWTP facility is shown schematically on Figure 1.6, and a site plan for the proposed WWTP is shown in Figure 1.7. Each of the treatment plants will require approximately 35 acres of land which includes buffer and green areas.

Odor Control

Odor control at the proposed WWTPs will be achieved by covers over selected treatment units, and collection and treatment of the collected off-gases. Since the proposed treatment systems will produce a minimum of odor, it has been estimated that air flows will be less than 5,000 cubic feet per minute (cfm). Odors tend to concentrate at the headworks, or the point where the raw sewage enters the treatment system. The off-gases from the headworks will be treated through soil filters.

The wastewater pump station (WWPS) designs will include provisions for the inclusion of 35 to 55 gallon granular activated carbon (GAC) odor control units. An emergency ventilation unit will be provided for use during wet well maintenance periods.

Effluent Disposal

The tertiary effluent will flow by gravity to reclaimed water users along Kamehameha Highway and Hale'iwa Road and along Farrington Highway toward Dillingham Field. At the terminus of each of the reclaimed water lines, a rapid infiltration disposal field will dispose of unused reclaimed water (see Figure 1).

The effluent will meet the newly developed R-1 reclaimed guidelines i.e. oxidized, filtered, and disinfected wastewater. The effluent will have total coliform levels less than 1 coliform/100 ml after being disinfected with ultraviolet (UV) light. UV disinfection is known to be an effective agent for denaturing viruses and killing bacteria. The tertiary treated effluent will be disposed of by land application as reclaimed wastewater. Tertiary treatment is defined in this case as biochemical oxygen demand (BOD), suspended solids, and total inorganic nitrogen levels being less than 5 milligrams per liter (mg/l). The effluent will be irrigated at agronomic rates. The oxidation ponds and constructed wetlands afford approximately 45 days of storage above the normal operating level at the 0.7 MGD design flow. This storage will allow for the active management of the entire wastewater treatment and disposal system. Two delivery reclamation lines will be constructed to distribute reclaimed wastewater to potential users. One line will be routed along Kamehameha Highway and toward Hale'iwa Road. The other will be routed down Farrington Highway toward Dillingham Field. During portions of the rainy season irrigation, demand may be less than the wastewater production rate. When the system storage limit is reached, the excess effluent will be disposed of via rapid infiltration fields located at the terminus of the reclamation lines. The ponds and wetlands will be constructed with approximately four feet of free-board above the normal operating depth to accept rainfall during the non-irrigation period. There is sufficient storage above the normal operating depth to receive three simultaneous 100 year, 24 hour, rainfall events (14 inches) without the need to discharge effluent.

Two locations have been chosen for the proposed rapid infiltration disposal fields. For the Waialua WWTP, the proposed 1 acre infiltration site would be located east of Dillingham Airport and makai of the BWS "No-Pass" line. All potential areas for rapid infiltration disposal fields were chosen based on soil types and location to the BWS "No-Pass" line. Chosen soil types where JaC (Jaucus sand), Ms (Mokule'ia loam), and Mt (Mokule'ia clay loam). The U.S. Department of Agriculture has indicated that all of these soil types have rapid permeability and have no or slight limitations for adsorption fields. A more detailed description of these soil types can be found in Chapter III. The shaded areas, labeled JaC and Mt, shown in Figure 1.8 indicate soil types in the area most suitable for rapid infiltration sites for the Waialua WWTP. Potential rapid infiltration sites for the Hale'iwa WWTP have been chosen within the section of land southwest and northeast of Waialua Bay. Figure 1.9 shows soil types and locations that are most suitable for rapid infiltration fields.

Biosolids and Sludge Disposal

Over the past years there has been a trend to refer to the residual material generated from the treatment of wastewater as biosolids and not sludge. Biosolids can be defined as the predominately organic material produced as a result of the primary, secondary and advanced treatment of wastewater and where these solids can be beneficially recycled or reused. Domestic septage is also considered a biosolid. Biosolids are a valuable resource to use in improving marginal lands and as a supplement to fertilizers and soil conditioners.

There is no special biosolids handling requirements necessary when using oxidation ponds and wetlands as wastewater treatment processes. Biosolids will accumulate in the oxidation ponds and wetlands and further decompose leaving a layer of biosolids material in the sediment basin within the primary pond. A thinner 3 to 6 inch layer will gather in the

remainder of the pond system. History has shown that ponds can operate 25-40 years without need to remove this biosolids material. If necessary, ponds can be operated in parallel to allow for draining, drying, and removal of biosolids. Under normal conditions there is no need to retrieve biosolids from an oxidation pond. Biosolids, which are predominately detrital material, from the wetlands need to be removed every 8-12 years depending on production. These biosolids can then be land applied.

Solids from the bar screens and rotary screens will typically contain large amounts of inorganic material such as rags, sand, plastics, etc., and are not considered a biosolid but a sludge. This type of sludge cannot be stored within the oxidation pond, or land applied, and will have to be disposed of at a City's sanitary landfill site.

Septage Handling

A septage receiving station will provide the treatment plant with the capability of processing cesspool and septic tank pumpings. The receiving station flow will be rough screened prior to metering into the treatment plant headworks based upon a selected dilution ratio. A soil filter will be built to process the noxious gases associated with septage. The settleable solids will accumulate in the fermentation pit in the influent reach of the primary pond.

1.3 IMPLEMENTATION SCHEDULE

The three major steps involved with the implementation of this project are: (1) Preliminary Engineering Report (includes an irrigation management plan), (2) Step 2 - Plans and Specifications, and (3) Construction. The service area has been broken down into smaller improvement districts and are listed in order of priority - those areas that exhibit poorly-operating cesspools and/or that threaten to contaminate the groundwater or coastal waters being serviced in the earlier phases of construction. The tentative schedule of events to implement the proposed action is chronologically listed in Table 1.1.

Incremental installation of the collection and conveyance system has been planned to allow construction to progress as funds becomes available. This allows distribution of the cost of the system over a period of years.

The locations shown in this document for the collection system pump stations, treatment plants, and rapid infiltration systems are suggested sites. Final placement of these facilities will occur when the Preliminary Engineering Report is prepared. The location must not significantly impact historical, residential, or commercial establishments, and must not be subject to impacts from flooding. The Engineering Report will also consider aesthetic impacts of any above ground structures when preparing their structural and architectural design specificationa.

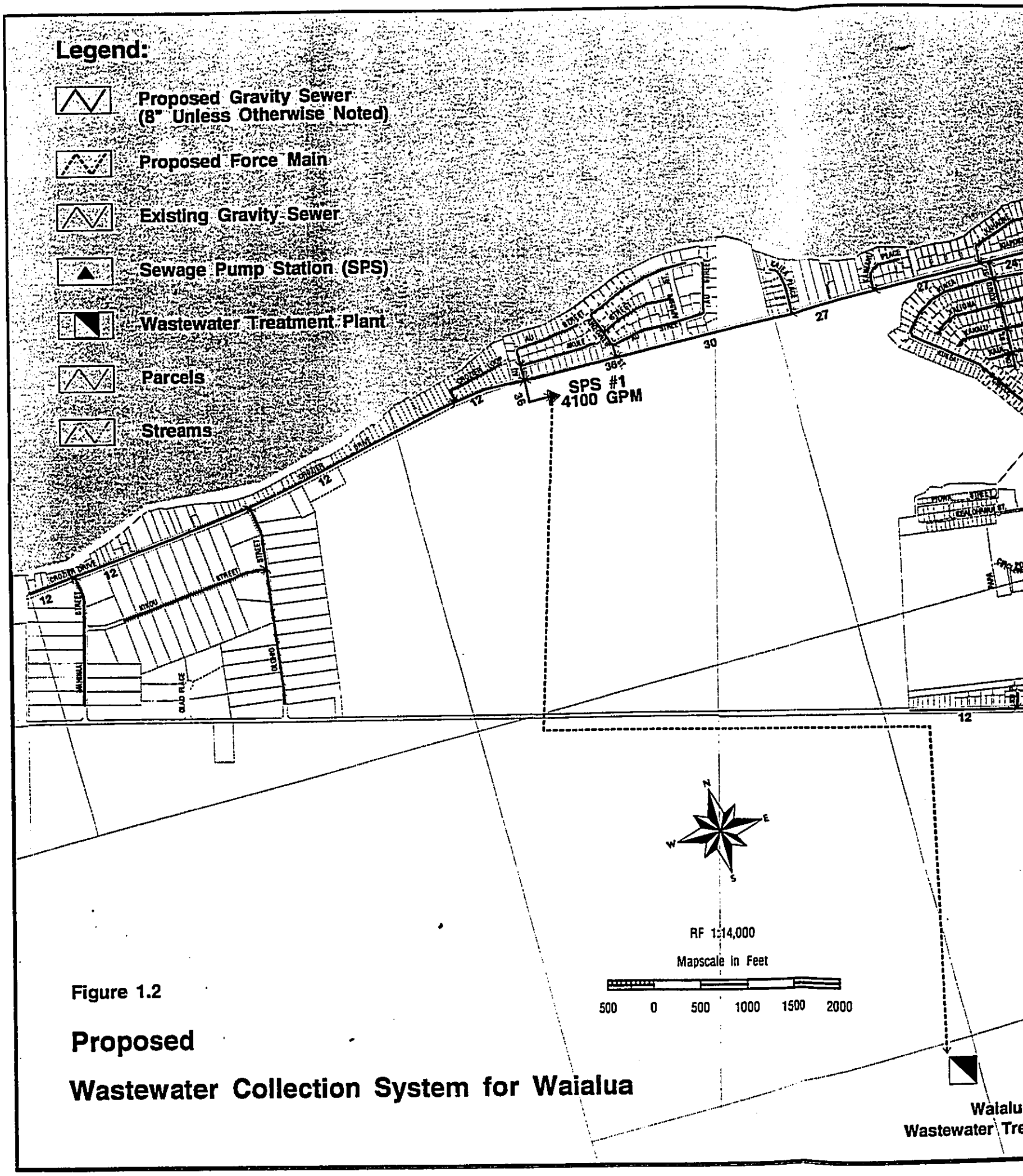


Figure 1.2

Proposed

Wastewater Collection System for Waialua

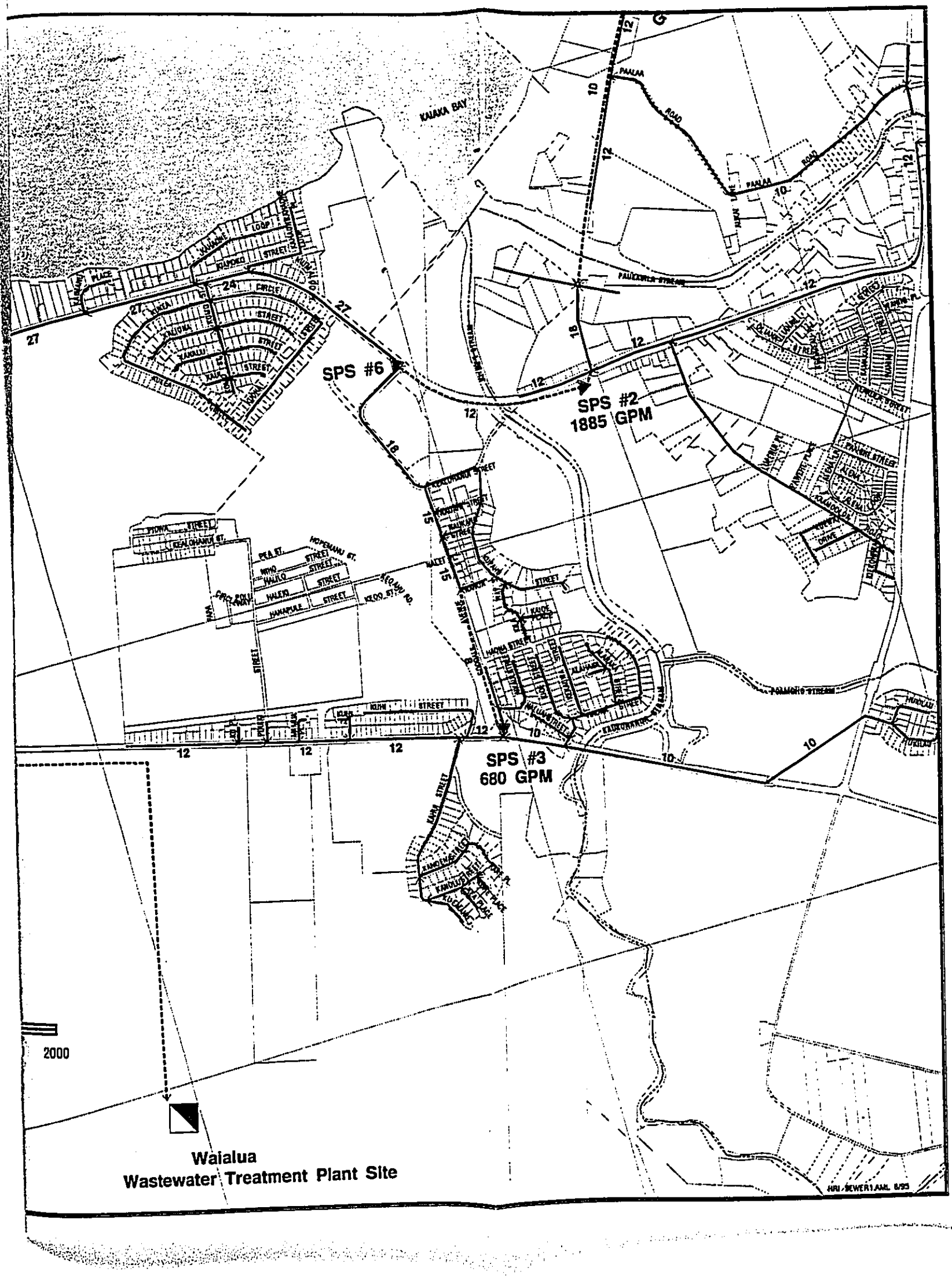
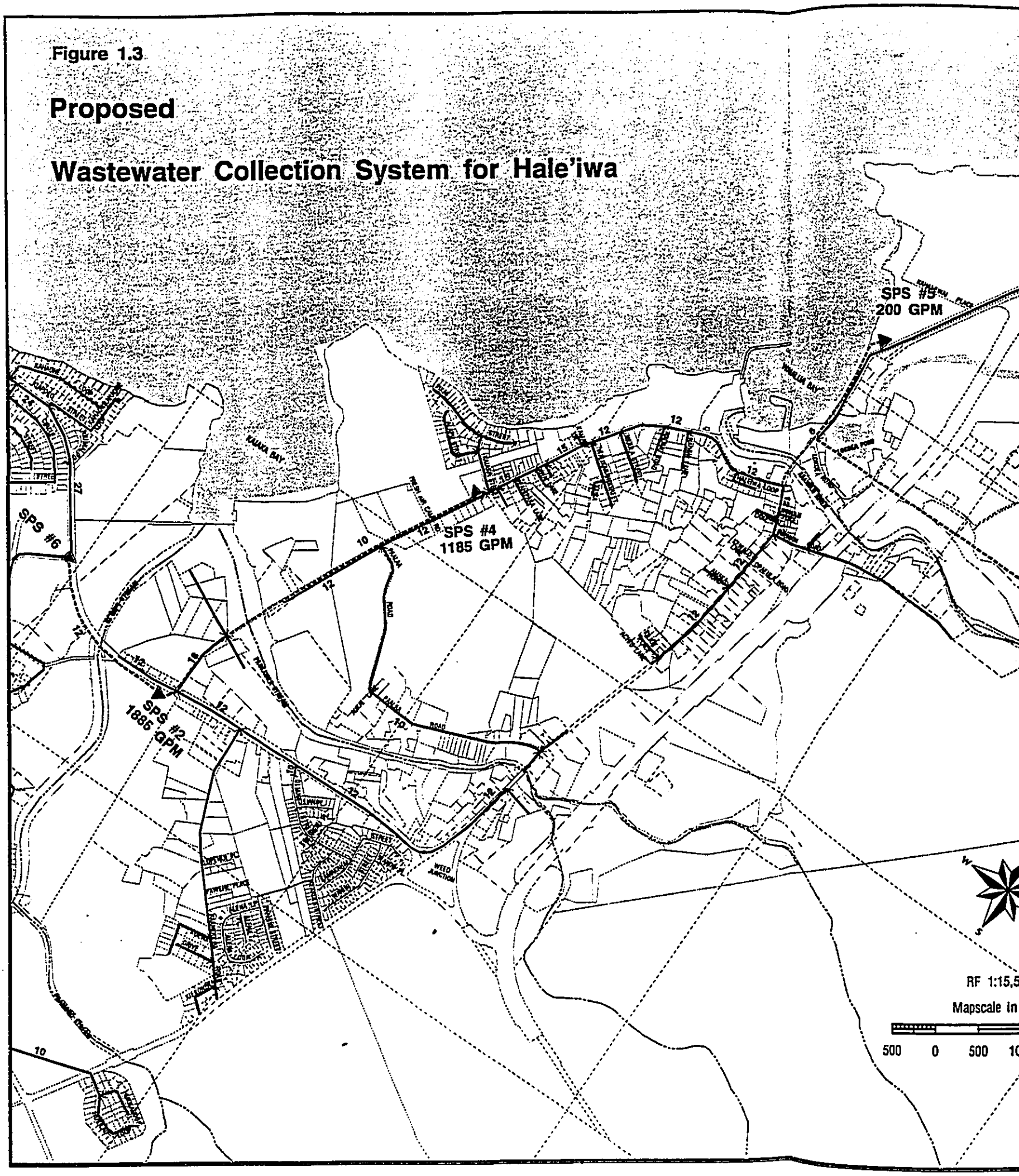
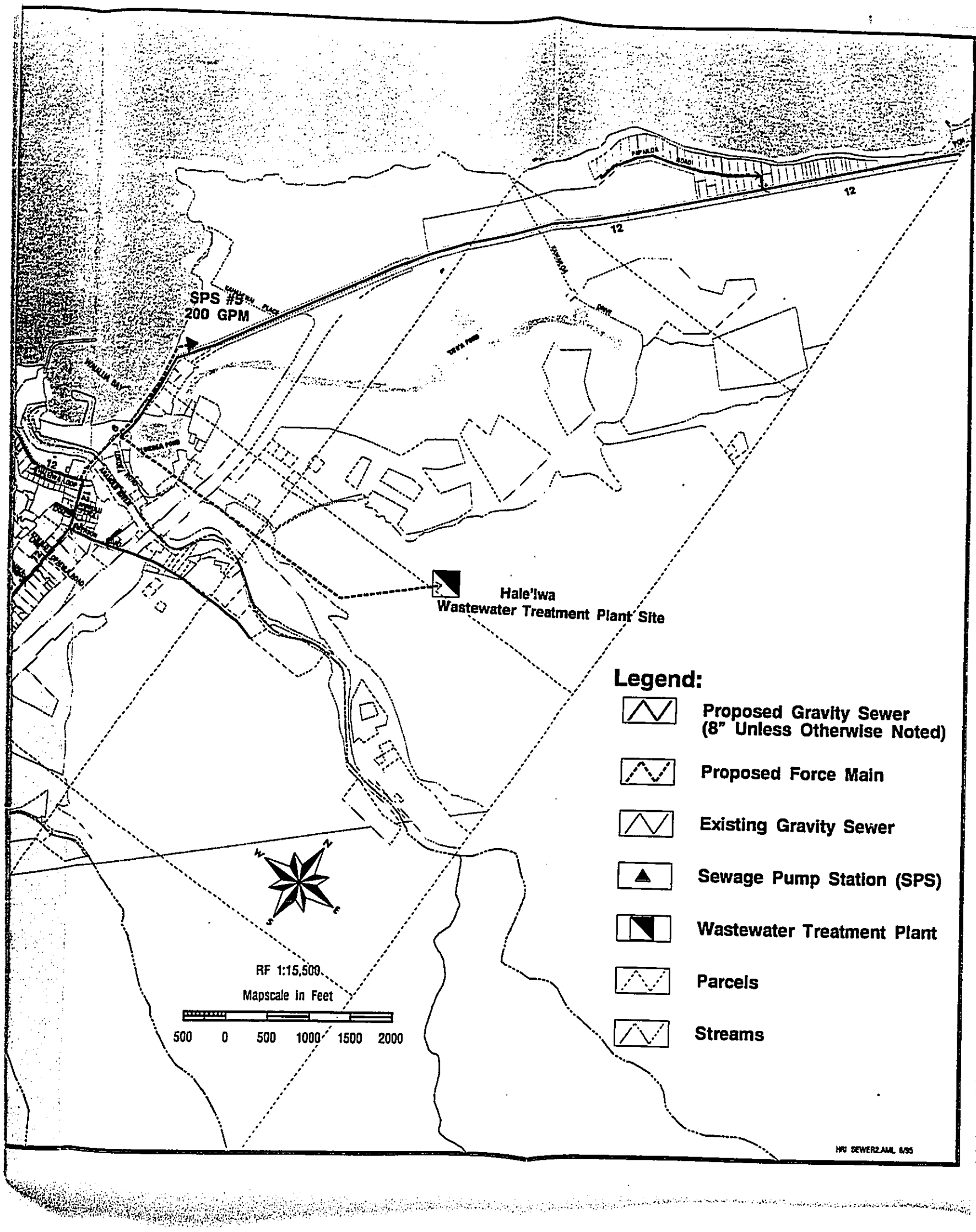

KAIAKA BAY
SPS #6
SPS #2
1885 GPM
SPS #3
680 GPM
2000
Waialua
Wastewater Treatment Plant Site

Figure 1.3

Proposed

Wastewater Collection System for Hale'iwa




SPS #5
200 GPM
Hale'iwa
Wastewater Treatment Plant Site
Legend:
Proposed Gravity Sewer
(8" Unless Otherwise Noted)
Proposed Force Main
Existing Gravity Sewer
Sewage Pump Station (SPS)
Wastewater Treatment Plant
Parcels
Streams
RF 1:15,500
Mapscale in Feet
500 0 500 1000 1500 2000
12
HRI SEWER2.AML 6/95

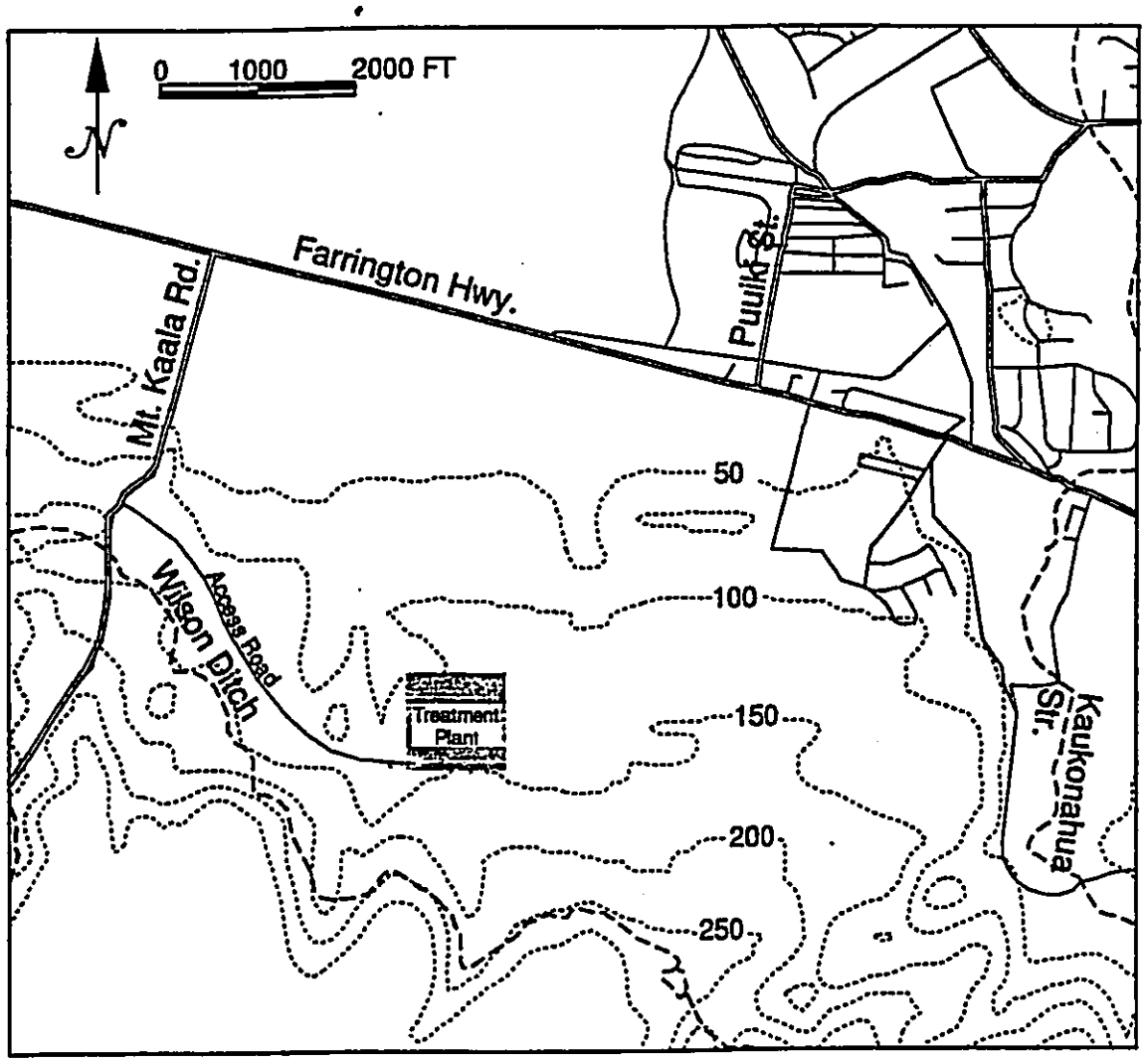


Figure 1.4 Proposed Location of the Waialua WWTP

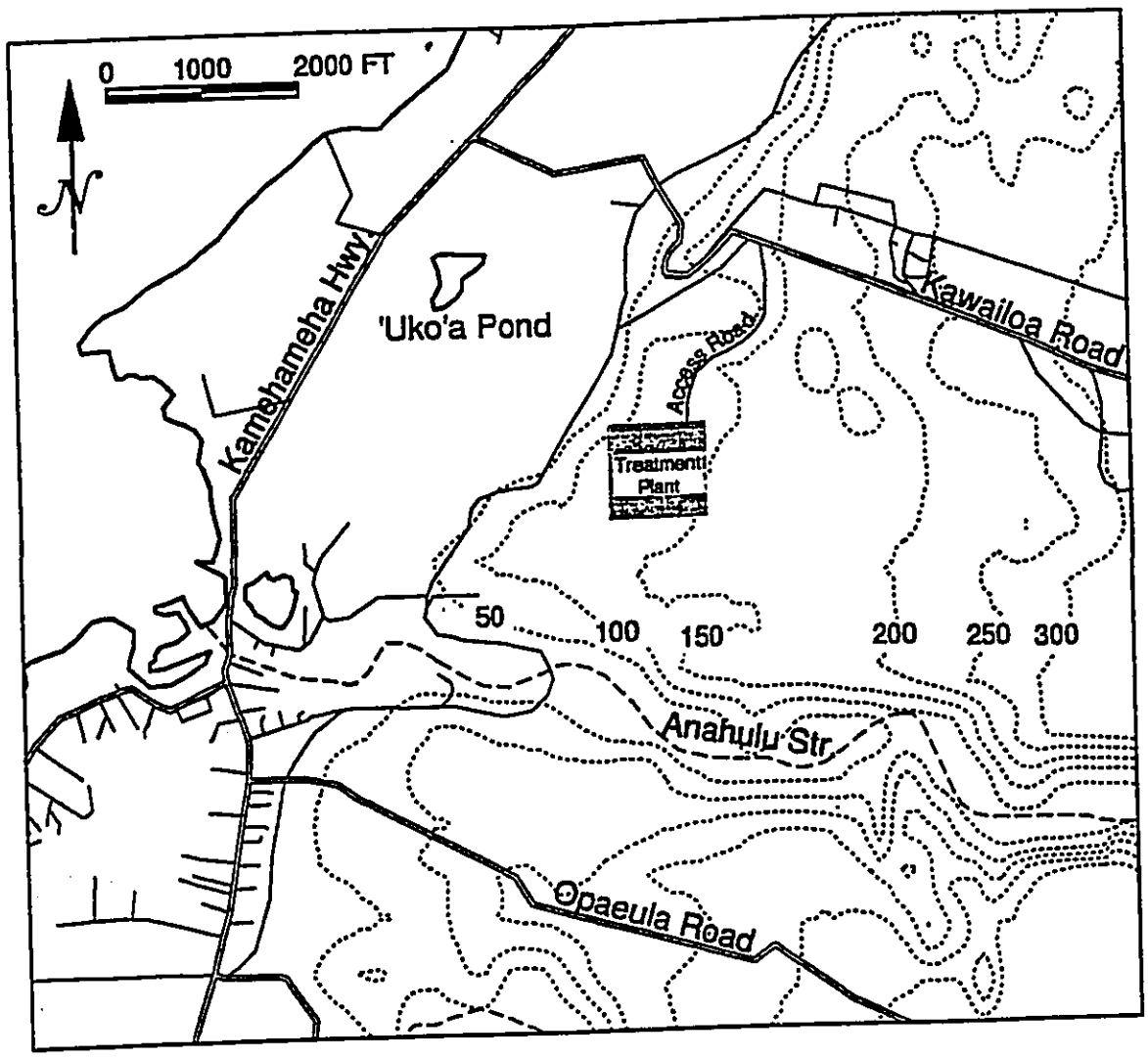


Figure 1.5 Proposed Location of the Hale'iwa WWTP

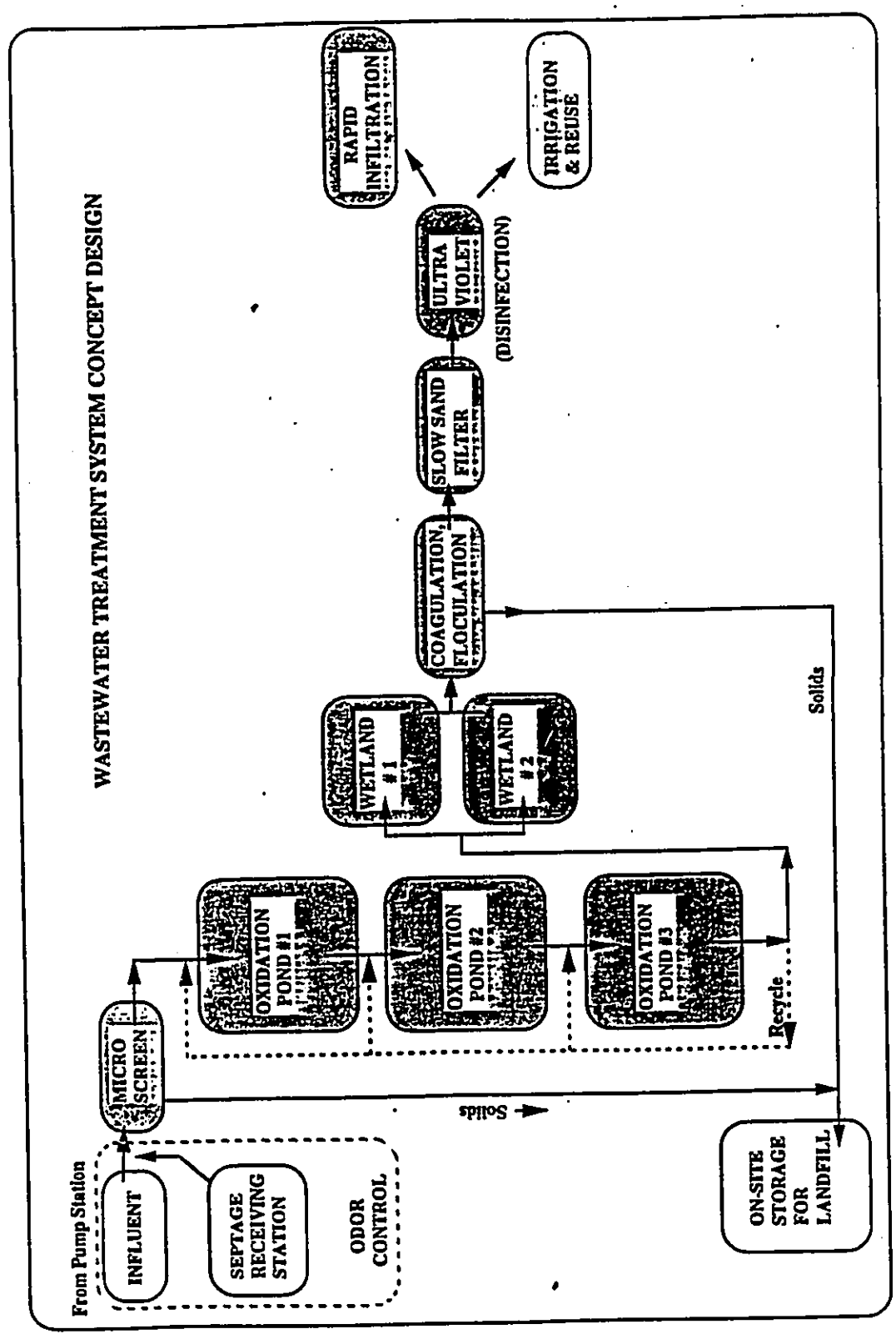


Figure 1.6 Typical Schematic Process Flow Diagram for the Proposed Waialua-Hale'iwa WWTP

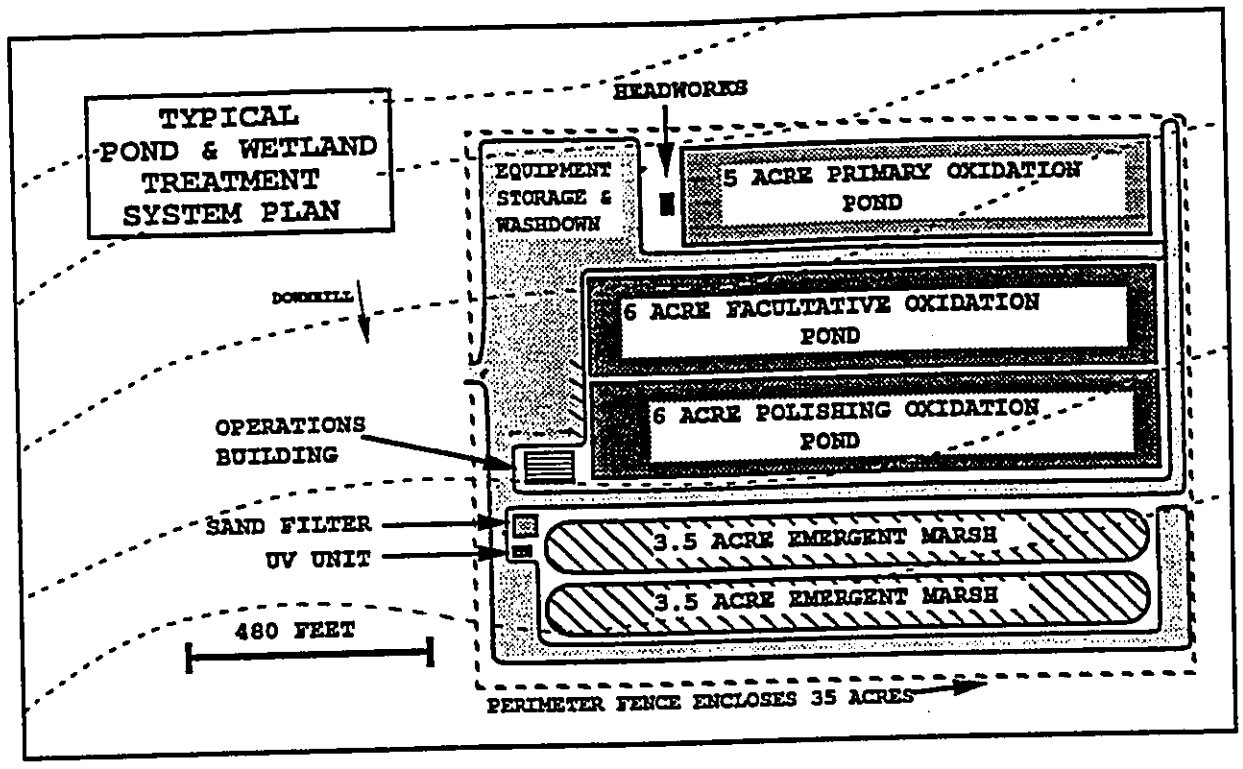


Figure 1.7 Proposed Site Plan for Each Waialua-Hale'iwa WWTP Facility

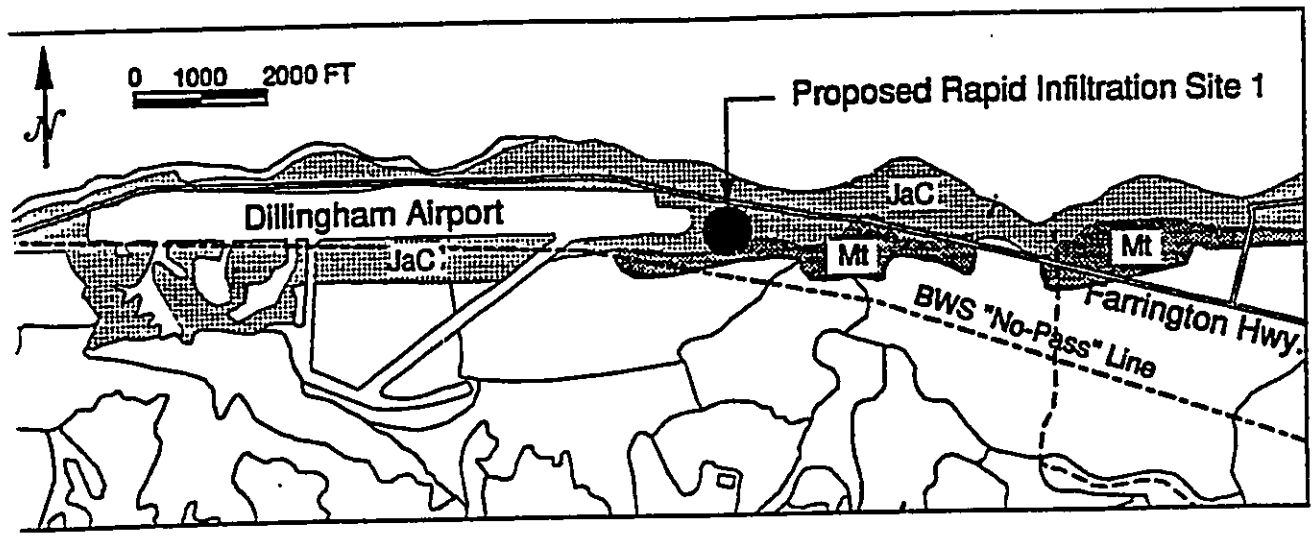


Figure 1.8 Proposed Location for Rapid Infiltration Disposal Field for Waialua WWTP

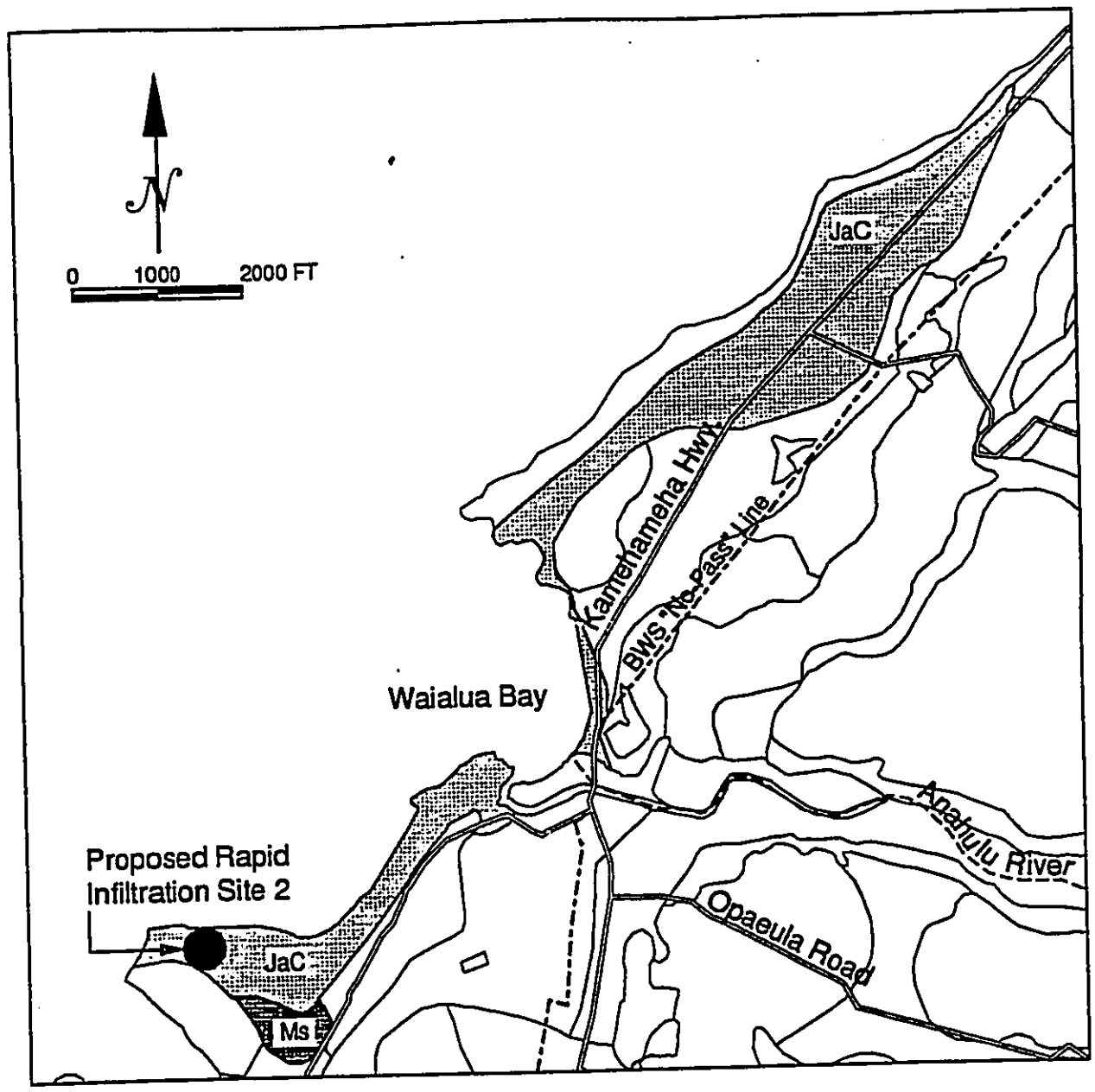


Figure 1.9 **Proposed Location for Rapid Infiltration Disposal Field for Hale'iwa WWTP**

Table 1.1 Implementation and funding priority list.

Priority	Item	Quantity	Costs[a] ($1000)	Construction Dates (FY)
I.	Plans & Specifications	–	N.A.	1997
II.	Construction	–	N.A.	1998
III.	Both WWTP sites land cost	72 ac	3,600	1998
	Irrigation land cost if purchased	164 ac	8,200	
	WWPS land cost if purchased	1.5 ac	75	
1	Waialua-Hale'iwa WWTPs	LS (2 sites)	8,970	1998
2	WWPS No. 1 and Force Main	LS	3,650	1998
3	WWPS No. 5 and Force Main	LS	3,650	1998
4	WWPS No. 6 and Force Main	LS	2,752	
5	WWPS No. 2 and Force Main	LS	2,496	1998
6	WWPS No. 4 and Force Main	LS	3,460	1998
7	WWPS No. 3 and Force Main	LS	1,977	1998
8	Waialua Interceptor Sewer	7,400 lf	3,992	1999
9	Goodale Avenue Trunk Sewer	1,700 lf	845	1999
10	Waialua Beach Rd. Trunk Sewer	7,900 lf	2,955	1999
11	Waialua-Hale'iwa Reclamation Lines and Disposal Systems	LS	4,273	1999
12	Waialua Sewers, Sec. 3, I.D.	9,200 lf	2,264	1999
13	Waialua Sewers, Sec. 4, I.D.	23,100 lf	5,797	1999
14	Hale'iwa Sewers, Sec. 1, I.D.	9,400 lf	2,065	2000
15	Hale'iwa Rd Trunk Sewer	7,450	2,731	2000
16	Pa'ala'a Rd Sewer, I.D.	4,100 lf	1,082	2000
17	Hale'iwa Sewers, Sec. 2, I.D.	11,100	2,428	2001
18	Kawailoa Trunk Sewer	8,800 lf	3,152	2002
19	Kawailoa Sewers, I.D.	3,500 lf	766	2002
20	Waialua Sewers, Sec. 1, I.D.	7,300 lf	1,607	2003
21	Waialua Sewers, Sec. 2, I.D.	12,750 lf	2,819	2003
22	Crozier Dr. Trunk Sewer	5,300 lf	1,897	2004
23	Mokule'ia Sewers, I.D.	6,500 lf	1,422	2005

[a]Implementation or Construction costs (construction includes 15% contingency).
Note: Construction steps shall be installed as funds become available.

CHAPTER II

DESCRIPTION OF ALTERNATIVES

2.1 INTRODUCTION

The purpose of this chapter is to further evaluate those wastewater management alternatives that were deemed to be most feasible and, based on this evaluation, select the best alternative for the study area. Factors that will be taken into consideration in this evaluation include: potential environmental impacts, reliability, energy requirements, implementability, and monetary costs.

Based on the evaluation presented in the Supplemental Facility Plan, it was determined that the "No-Action" and the optimal operation of existing systems options would be the most feasible wastewater management alternatives for the rural portions of the study area (Kawailoa II and Kawaihapai). In the urban areas, three wastewater management alternatives were retained for further evaluation: the "No-Action" alternative, the centralized sequencing batch reactor (SBR) with an ocean discharge alternative, and the two centralized subregional oxidation ponds/wetland/filter systems with irrigation and rapid infiltration for effluent disposal, as the final alternative.

All wastewater systems must perform four primary functions. First, wastewater must be collected from the point of generation (i.e., houses, businesses, and industries) and transported to a location for treatment and disposal. Second, wastewater must be treated, i.e., remove pollutants and other undesirable constituents, to a level such that it can be disposed of without creating health, environmental, or aesthetic problems. Third, it must dispose of the treated effluent to a receiving body of water in a safe and environmentally sound manner. Finally, they must provide for the safe disposal of the solid residuals of the treatment process (e.g., biosolids, sludge, chemicals, etc.).

2.2 URBAN AREAS

The urban portion of the study area mainly consists of the towns of Waialua and Hale'iwa, and also includes the Kawailoa I subarea (Figure 2.1). The urban portion of the study area is characterized by a relatively high population density (compared to the remaining portions of the study area).

2.2.1 "No-Action" Alternative

It is estimated that there are presently approximately 2,541 cesspools, 14 small private package WWTSs, and one municipally owned WWTP (the Pa'ala'a Kai WWTP) within the urban area. Under the "No-Action" alternative, these existing systems will remain in operation, and present problems currently being experienced with these systems (e.g., failure of the WWTSs and cesspools, and high O&M cost of the municipally owned WWTP) will continue to occur. With the increasing age of these facilities, it is expected that the number and frequency of present cesspool and private WWTP failures would also increase in the future, endangering public health and welfare.

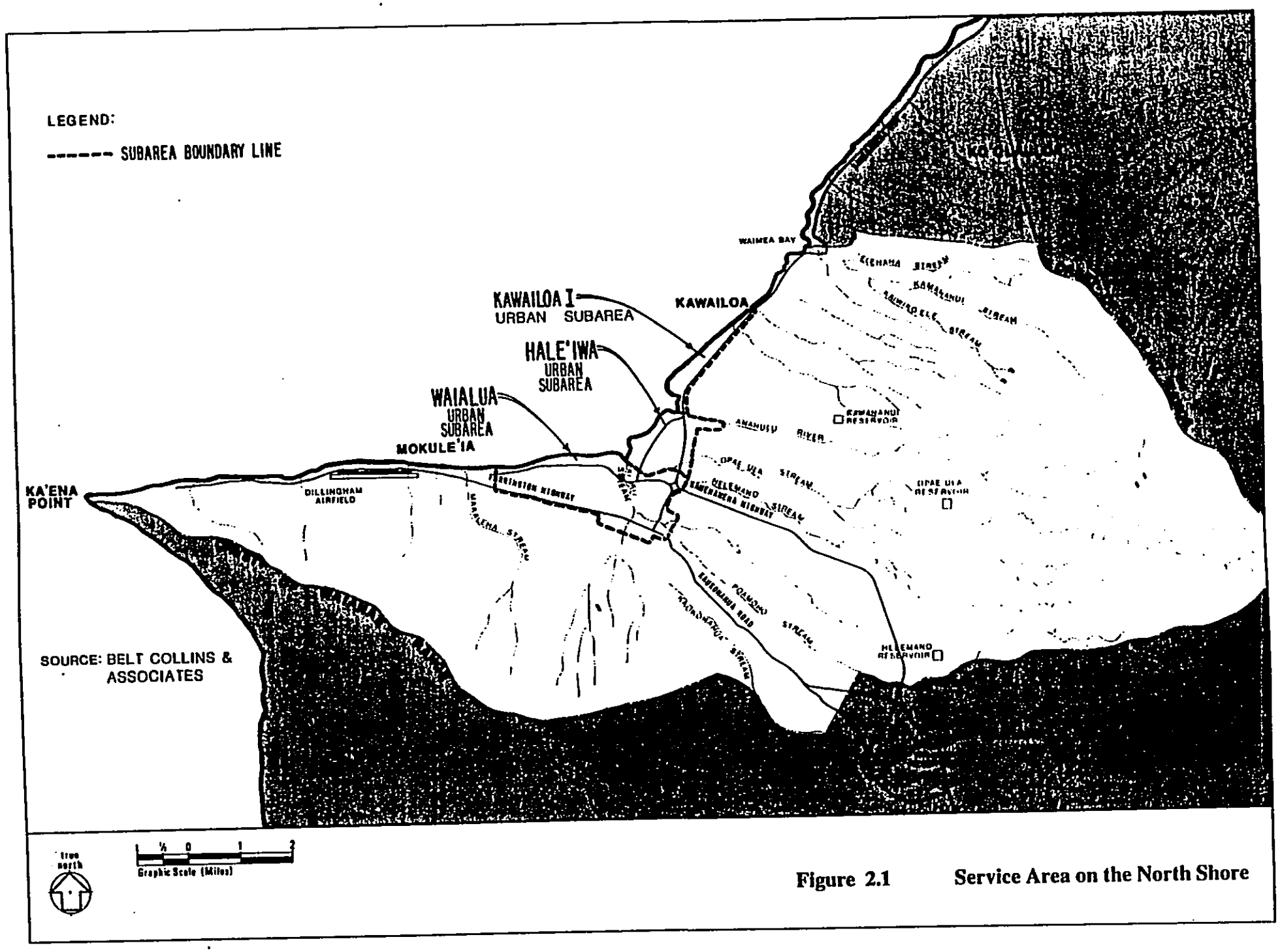


Figure 2.1 **Service Area on the North Shore**

2.2.1.1 Evaluation of the Environment

Development patterns in the urban area indicates that there are a number of existing cesspools located only a short distance from the shoreline. The proximity of these facilities to the shoreline is a potential source of contamination for the coastal and recreational waters of the area. In addition, the continued use of cesspools (especially those located above the BWS's "No-Pass" line) is also a potential source of contamination to the groundwater resources in the area. To-date the limited water quality sampling in the nearshore waters has not shown elevated levels of total coliform in the non-rainy season. However, increased coliform levels are found in the rainy season.

The 14 private WWTSs in this area will continue to pose a potential threat to the quality of coastal waters. The risk of contamination is even greater due to the location and high density of the developments served by these WWTSs. These developments are concentrated in a small area (approximately 25 acres), and in close proximity to the shoreline. Due to these factors, the potential negative impacts on both human recreational and natural marine life usage's outweigh the benefit of taking the "No-Action" alternative.

Another area of concern is the relatively low level of service support received at the existing private WWTSs. Without adequate service, the frequency of failures at these facilities and the corresponding risk to the public for the exposure to the wastewater are expected to increase. The installation of collection sewers and centralized treatment would greatly reduce this risk and has been proven to be more reliable than private WWTSs.

The "No-Action" alternative will also impact land usage in the urban area. Under the "No-Action" alternative, any vacant, residential-designated lot located above the BWS "No-Pass" line will have to remain undeveloped or require exotic on-site treatment since a cesspool permit will not be issued. In addition, the BWS will not allow subsurface disposal of effluent from any new WWTS located above the "No-Pass" line. Installation of a vault to hold the wastewater is no longer an acceptable wastewater management alternative. The "No-Action" alternative will continue to add poorly treated domestic sewage to the shallow groundwater during dry and wet conditions. During the wet weather season,
cesspools in the low lying areas contribute to surface water degradation.

Another area of concern is the relatively low level of service support received at the existing 14 private WWTSs.

2.2.1.2 Reliability

Cesspool pumping records indicate that there is a high cesspool failure rate in this area. In a recent study, it was estimated that approximately 1,331 failed cesspools exist in the Waialua-Hale'iwa service area (Parametrix, Inc., 1992). In Fiscal Year (FY) 1988-1989, Parametrix, Inc., determined that 3,377 cesspool pumpings occurred in the Waialua-Hale'iwa service area. It should be noted that 80 failed cesspools and 209 cesspool pumpings occurred in Waimea, which is outside of the study area. Based on a 2,000 gallon load per cesspool per pumping, Parametrix, Inc., further estimated that 578,000 gallons per month of septage was pumped from the service area for 1988-1989.

The high cesspool failure rate can be attributed to the age of the cesspools (since the capacity of cesspools decreases with age), the soil conditions surrounding the cesspool, and the groundwater level. Soils with moderately high to high permeability are favorable for cesspool installation. It is noted, however, that the soil in most of the urban area are of low to moderate permeability and clogs fairly rapidly when untreated sewage is applied. Cesspool clogging also may be accelerated by the large amount of grease used in local cooking. Grease

builds up on the cesspool walls and does not decompose rapidly. Over the past years, there has been an increasing number of cesspools requiring chemical treatment because of this situation. The cesspools along the shoreline are also subject to high groundwater levels. This tends to increase pumping requirements for these cesspools.

Collection sewers are much more reliable than cesspools or individual treatment units in terms of preventing failures. By preventing wastewaters from reaching the surface, direct contact between residents and wastewater can be avoided.

It has been noted that most of the existing 14 private WWTSs have experienced failures. These failures (of WWTS equipment and disposal systems) are mainly attributable to the lack of adequate maintenance. Due to the high maintenance cost, it is expected that these units will continue to receive an inadequate amount of routine maintenance. The increasing age of these facilities also contributes to the anticipated increase in private WWTS failures. The increasing cost of operating and maintaining these facilities (as they increase in age), along with the anticipated increased failure rate, reduces the reliability of the continued use of private WWTSs.

2.2.1.3 Energy Requirements

With the increasing age of the cesspools, the energy (e.g. labor, electrical and fuel) required to maintain these systems will also increase. Both the number of cesspools pumped and pumping frequencies are expected to increase. Presently septage is hauled to the leeward side of the island to a City/County WWTP. This haul represents an energy cost attributed to cesspool maintenance. The existing private WWTSs will also require more energy due to the increased age of the equipment and related loss in operational efficiency. New facilities may also be constructed in the future which will also increase energy consumption. Table 2.1 summarizes current and future energy use for the urban area under the "No-Action" alternative.

2.2.1.4 Implementability

No implementation is required for the "No-Action" alternative.

2.2.1.5 Monetary

The present worth cost of maintaining the 2,541 cesspools in the urban area, the 14 private WWTSs, the projected cost of new private treatment facilities, and the Pa'ala'a Kai WWTP is $8,083,000, $6,312,000, $1,111,000, and $4,935,000, respectively. The present worth analysis (for a period of 20 years at a discount rate of 7-3/8%) results in a total present worth value of $20,441,000 for the "No-Action" alternative.

2.2.1.6 Summary

Although the cost of the "No-Action" alternative is relatively low, other factors must be taken into consideration. Due to the high failure rate for existing cesspools and private treatment systems, this course of action cannot be considered the best alternative. Consideration must also be given to environmental consequences (with a high priority placed on public health), which are adversely affected by this alternative.

2.2.2 Centralized System Alternative

In a centralized system, untreated wastewater is collected and transported from each home to a centralized WWTP via a system of sewer lines and pump stations. From the WWTP, the treated wastewater is disposed of in a safe and environmentally sound manner.

Table 2.1 Order of magnitude estimate of energy use for wastewater collection, treatment, and disposal in the urban areas for the "No-Action" alternative (BCA' 1987 Facility Plan)

	Energy Use (MBtu/year) Year 1980	Year 2000
Cesspools	2,934	4,770
Pa'ala'a Kai WWTP	961	961
Private Systems	509	1,100
Rounded off Total	4,400	6,800

Two centralized systems are being considered for further evaluation within the urban area. The first system alternative is the recommended centralized system from the BCA 1987 Facility Plan. This system alternative consists of a collection system, a 1.4 mgd centralized WWTP, and disposal via an ocean outfall. The second system alternative is the recommended centralized subregional system from the HRI 1994 Supplementary Facility Plan. This alternative consists of a collection system, two 0.7 mgd centralized subregional WWTPs, and land disposal by irrigation and rapid infiltration. Table 2.2 is a summary of the two centralized system alternatives.

To better define the two centralized system alternatives, a brief summary of each alternative is in order. Following is a brief summary of the two centralized systems.

Belt Collins & Associates 1987 Facility Plan and Environmental Impact Statement

The BCA 1987 Facility Plan and EIS evaluated various collection systems, wastewater treatment processes and effluent disposal methods for the Waialua-Hale'iwa area.

Three types of collection systems were considered which included gravity systems, low pressure collection systems, and vacuum collection systems. It was determined that for the Waialua-Hale'iwa area, low pressure and vacuum systems involve higher construction, operation, and maintenance costs than gravity systems without offering significant offsetting benefits. Consequently, the recommended wastewater collection network consisted of a gravity system, and wastewater pump stations where required.

Numerous wastewater unit operations and processes were considered for the Waialua-Hale'iwa area. Based on an analysis of the volume and type of sewage generated in the study area, and considering the intent to dispose of treated effluent initially through exfiltration wells and ultimately through an ocean outfall, the BCA Facility Plan recommended the following treatment train:

- Bar Screens
- Aerated Grit Chamber
- Rotary Fine Screens
- Pre-Aeration Basin
- Sequential Batch Reactor (SBR) (computer controlled operation)
- Rapid Sand Filters
- Chlorination
- Ocean Discharge

This treatment train was utilized for all alternatives involving a centralized WWTP in the BCA 1987 EIS.

Five effluent disposal options were developed and evaluated for the SBR treatment system: ocean outfall, injection/exfiltration wells, irrigation reuse/land application, stream discharge, and infiltration/percolation ponds. BCA determined that an ocean outfall would provide the most reliable long-term disposal for the Waialua-Hale'iwa area. Due to the need for a supplemental EIS (to determine the impacts specifically related to the construction and operation of the ocean outfall) and additional detailed oceanographic studies, BCA further recommended that exfiltration wells be constructed and temporarily used until the ocean outfall is completed.

Table 2.2 Summary of treatment and disposal system options.

Collection System Alternative	Treatment Plant Option	Treatment Plant Location	Effluent Disposal	Number of Pump Stations
IA	4	Mokule'ia	Ocean Discharge	5
II	13*	Subregional (Waialua & Hale'iwa)	Irrigation & Rapid Infiltration	6

* Option developed in the HRI Supplemental Facility Plan.

The sludge handling system recommended by BCA would include gravity thickening, a two-stage anaerobic digestion process, and polymer conditioning prior to dewatering by a belt filter press. The dewatered sludge would then be disposed of at a City/County landfill site.

The recommended odor control management plan was to control odors with a combination of up-stream controls and foul-gas scrubbing at the WWTP. Chlorine injection at the headworks also is recommended. It was further recommended that the specific odor control management practice should be developed based on actual site data; therefore, the odor control system recommended is conservative and tentative.

The BCA 1987 Facility Plan and EIS further evaluated centralized wastewater systems based on three specific WWTP locations. Alternatives IA ands IB consisted of a 1.4 mgd WWTP facility located in Mokule'ia or Kawailoa, respectively. Alternative II was the consideration of employing two subregional WWTP facilities; a 0.4 mgd WWTP in Kawailoa and a 1.0 mgd WWTP in Mokule'ia, each located at the same sites as alternatives IA and IB. It was determined that alternative IA, a 1.4 mgd WWTP located in Mokule'ia, with an ocean outfall would provide the best possible solution from among the alternatives considered. Figures 2.2 and 2.3 show this alternative.

Hydro Resources International (HRI) 1994 Supplemental Facility Plan

HRI is preparing a Supplemental Facility Plan to the BCA 1987 Facility Plan for the City and County of Honolulu. The Supplemental Facility Plan is considering a treatment/disposal alternative (oxidation ponds/wetland filtration/irrigation) which was not fully developed as a viable alternative in the original Facility Plan. Reconsideration of land based treatment alternatives was to some extent justified by new information on constructed wetland

technology and due to potential legal intervention and cost and time of implementation. Irrigation of highly treated effluent became a disposal alternative to reevaluate because of the relative ease and speed of implementation and relative low cost.

The Supplemental Facility Plan proposed a centralized subregional alternative. The centralized subregional alternative consists of two 0.7 mgd WWTPs - one located at Waialua and the other at Hale'iwa. Each WWTP will receive wastewater from a wastewater collection system similar in layout to the gravity system recommended in the BCA 1987 Facility Plan. However, the collection system will be split to provide equal 0.7 mgd flows to each centralized subregional WWTP.

Each of the two centralized subregional WWTPs will consist of the same wastewater unit operations and processes. Figures 2.4 and 2.5 show the two centralized subregional alternatives. The proposed treatment train consists of the following units.

- Septage Receiver
- Bar Screens
- Rotary Screens
- Oxidation Ponds
- Constructed Wetlands
- Coagulation/Flocculation
- Slow Sand Filters
- Ultraviolet Disinfection
- Irrigation/Rapid Infiltration

The Supplemental Facility Plan further recommended that the highly treated effluent be reused for irrigation. The treated effluent would gravity flow through wastewater reclamation lines located along Farrington Highway and Kamehameha Highway to users. It is estimated that approximately 82 acres of irrigation land would be required for each centralized subregional WWTP. A single 164 acre site will be required for the total flow from the two WWTPS. Combinations of 5 to 20 acre parcels can be used if located in a region of close proximity to the reclamation line.

At the terminus of each of the reclaimed water lines a 1 acre rapid infiltration disposal field will dispose of the unused reclaimed water. The proposed locations for the two rapid infiltration disposal fields are in areas with adequate soils for infiltration and makai of the BWS "No-Pass" line. All rapid infiltration sites have soils that the U.S. Department of Agriculture have indicated are highly permeable and have no or slight limitations for infiltration fields. For the Waialua WWTP the proposed infiltration area is east of Dillingham Airport, and for the Hale'iwa WWTP the proposed areas are south and northeast of Waialua Bay.

Rotary screens solids will produce about 1 ft^3 of wet solids per day from both plants. These solids will be landfilled. There is no special biosolids handling requirements necessary when using oxidation ponds. Sewage solids and algal solids will accumulate and further degrade in the primary pond resulting in a minimal accumulation of peat like material over the life of the system (30-40 years). Vegetative solids from the wetlands will need to be removed every 8-12 years. This organic material can be land applied.

Odor control will be achieved by covers over selected treatment units, and collection and treatment of off-gases. Odors will tend to concentrate at the headworks, or the point where the raw sewage enters the treatment system. If the off-gases become a nuisance they will be treated through soil filters.

2.2.2.1 Evaluation of the Environment

Characteristic to both of the centralized system alternatives is the requirement for land, not only for the treatment plant, but also for each wastewater pump station (WWPS). The WWPSs will require approximately 10,000 square feet each, while the treatment plants will require approximately 10 to 70 acres, depending on the centralized system alternative selected. Although presently vacant or unused lands would be used when convenient, prime agricultural land must be utilized when dictated by the location of the facility, as in the case of the Waialua and Hale'iwa WWTP sites.

The WWTP site for the SBR/ocean discharge alternative would be located in Mokule'ia; whereas, the two WWTP sites for the oxidation ponds/wetland/irrigation alternative would be in Waialua and Hale'iwa. All potential WWTP sites are located on land presently used by the Waialua Sugar Company, which is either owned by Castle and Cooke or leased from Bishop Estates. This land is presently used for the cultivation of sugarcane.

The SBR/ocean discharge option requires approximately 10 acres for the treatment facility. The oxidation ponds/wetland/irrigation option would require approximately two 35 acre sites for each WWTP, 82 acres for irrigation reclamation for each WWTP (164 acres total), and two 1 acre rapid infiltration disposal fields for each WWTP. The total area required for the two oxidation ponds/wetland/irrigation alternative is approximately 236 acres.

The EIS process and possible litigations associated with the construction of an ocean outfall could be both costly in terms of dollars and time. Potential nearshore water quality impacts are possible. Abnormal operations during periods of high rainfall and/or plant upset conditions could allow for poorly treated effluent to be discharged.

The exact location of the acreage required for irrigation is undetermined at this time. It is estimated that approximately 82 acres of irrigation land would be required for each WWTP system. Waialua Sugar Company's sugar land would be required for these options if only one site afforded all the capacity. Combinations of small parcels (5-20 acres) of land could also be used if located in a region of close proximity to the reclamation water line.

Public land (County and State parks), in close proximity to the proposed reclamation line are shown in Table 2.3. These sites would be potential users of the reclaimed wastewater. There is approximately 175 acres of parks in the study area.

Other portions of the system requiring land are the wastewater pump stations (WWPSs). Approximately 10,000 square feet of land will be required for each WWPS. The WWPSs are scattered throughout the urban area. Land parcels will have to be acquired in order to accommodate them.

One impact which cannot be overlooked is the installation of the network of gravity sewer lines and force mains and the reclamation line for the centralized subregional alternative. In most cases, these lines will be placed under existing paved roadways, and this will create interference with traffic and possible hazard while the trenching and pipe laying is being done. Restoration work done in these sections should result in a roadway equal to or better than the existing condition. Some degeneration of portions of the roadway is foreseen after trenching is completed.

The structures required for the WWPSs and the WWTP should have a negative visual impact on the community. Attempts will be made to mitigate the visual impact of these facilities. All of the sites are located Makua of population centers.

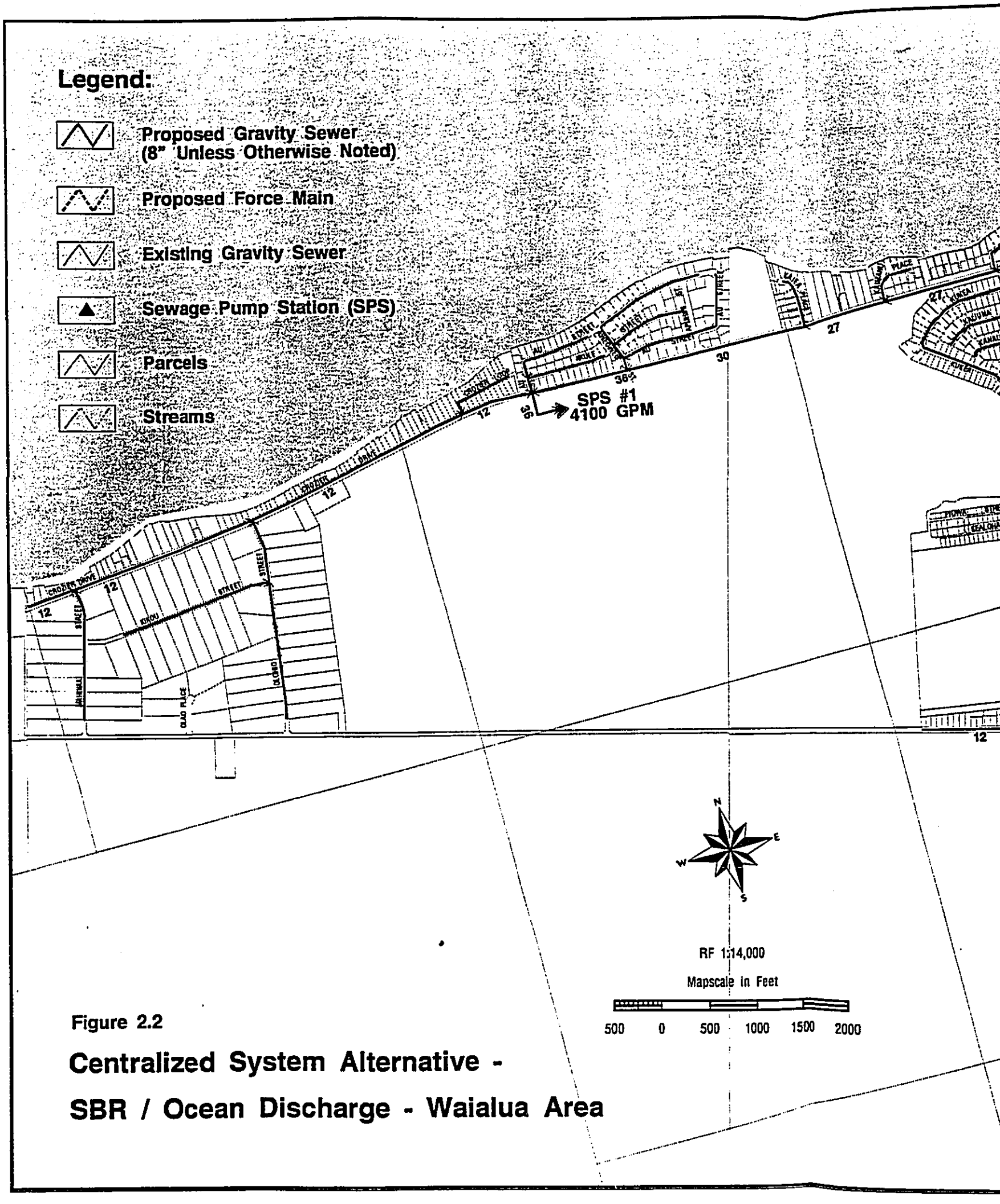


Figure 2.2

Centralized System Alternative -

SBR / Ocean Discharge - Waialua Area

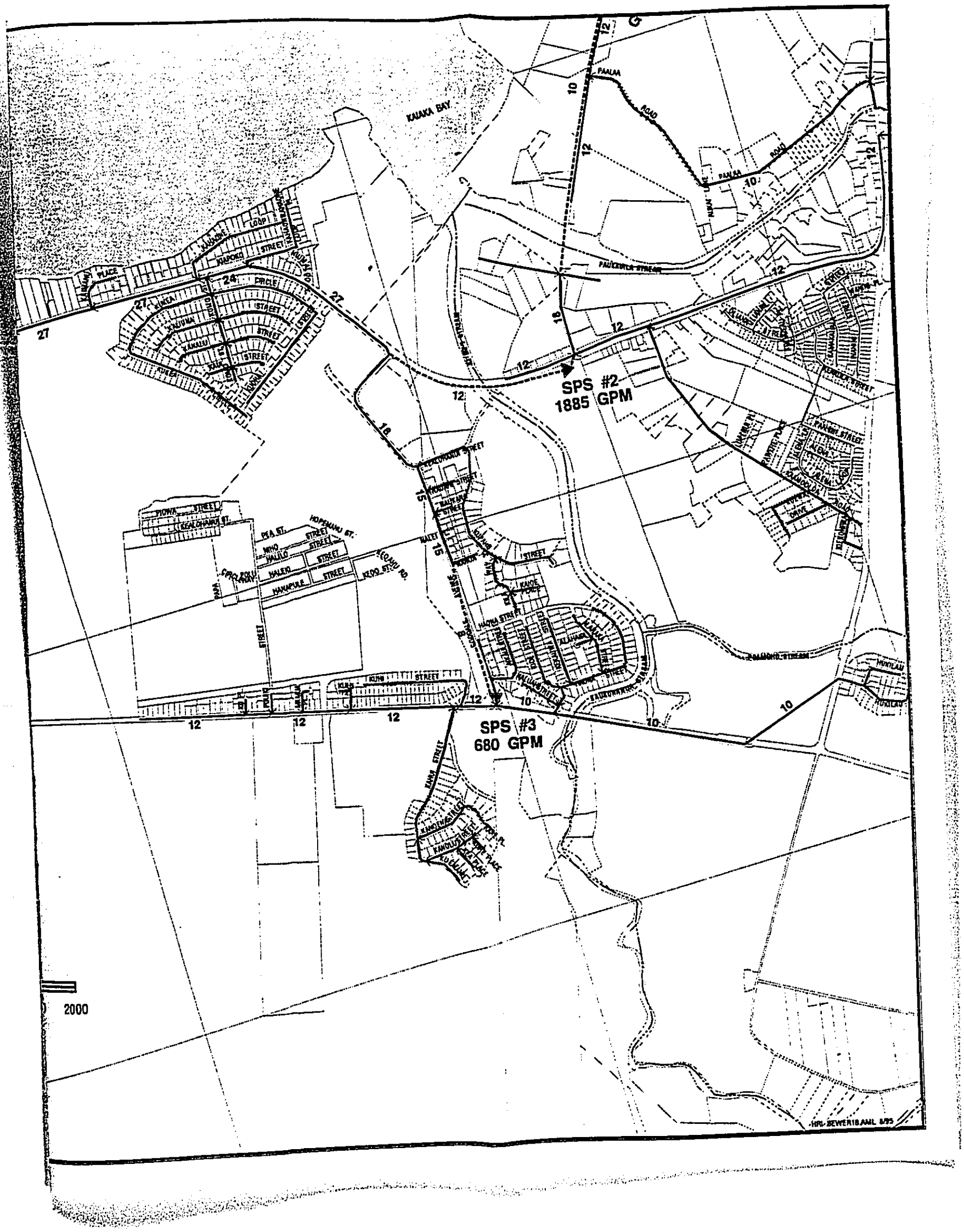
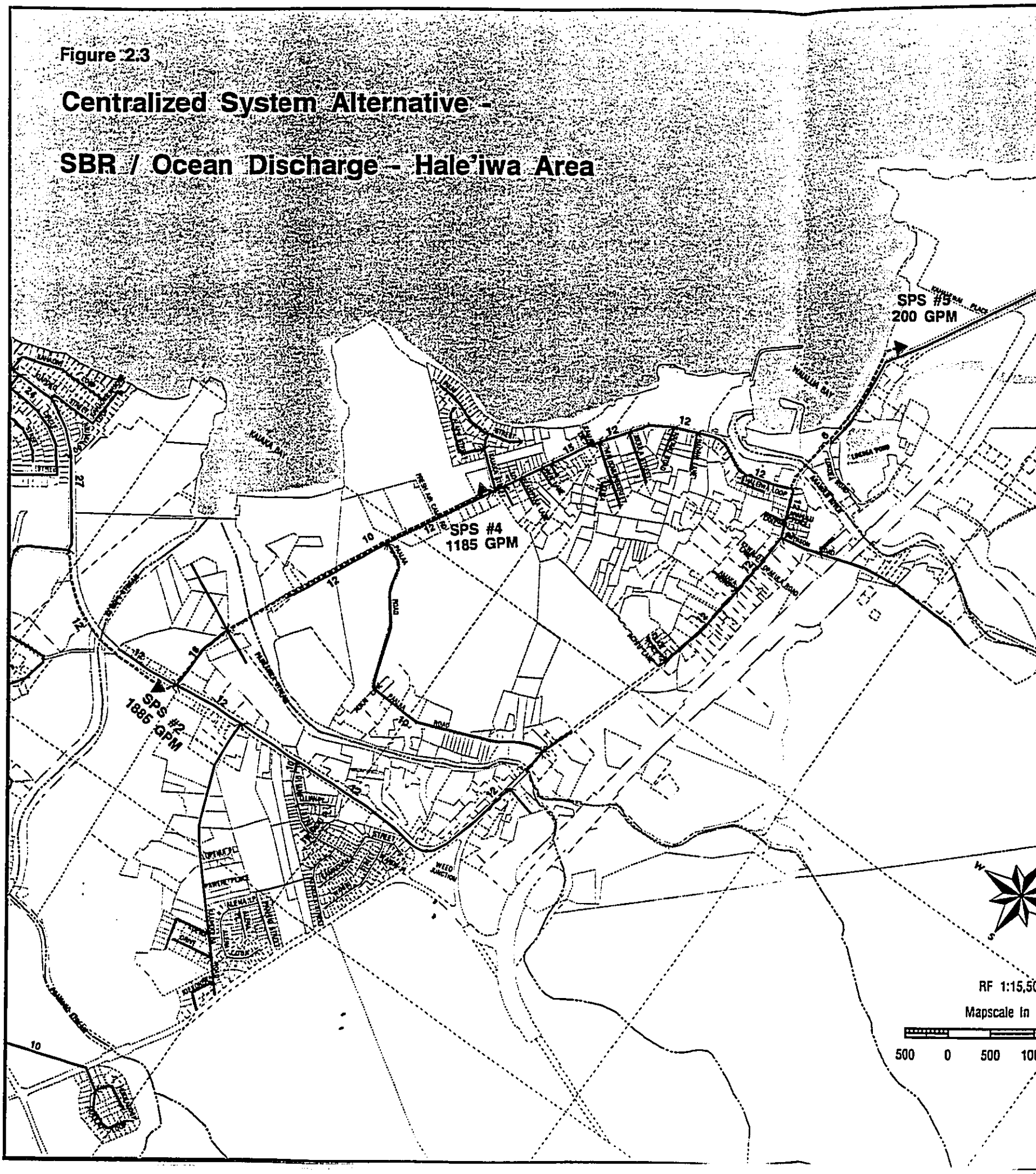
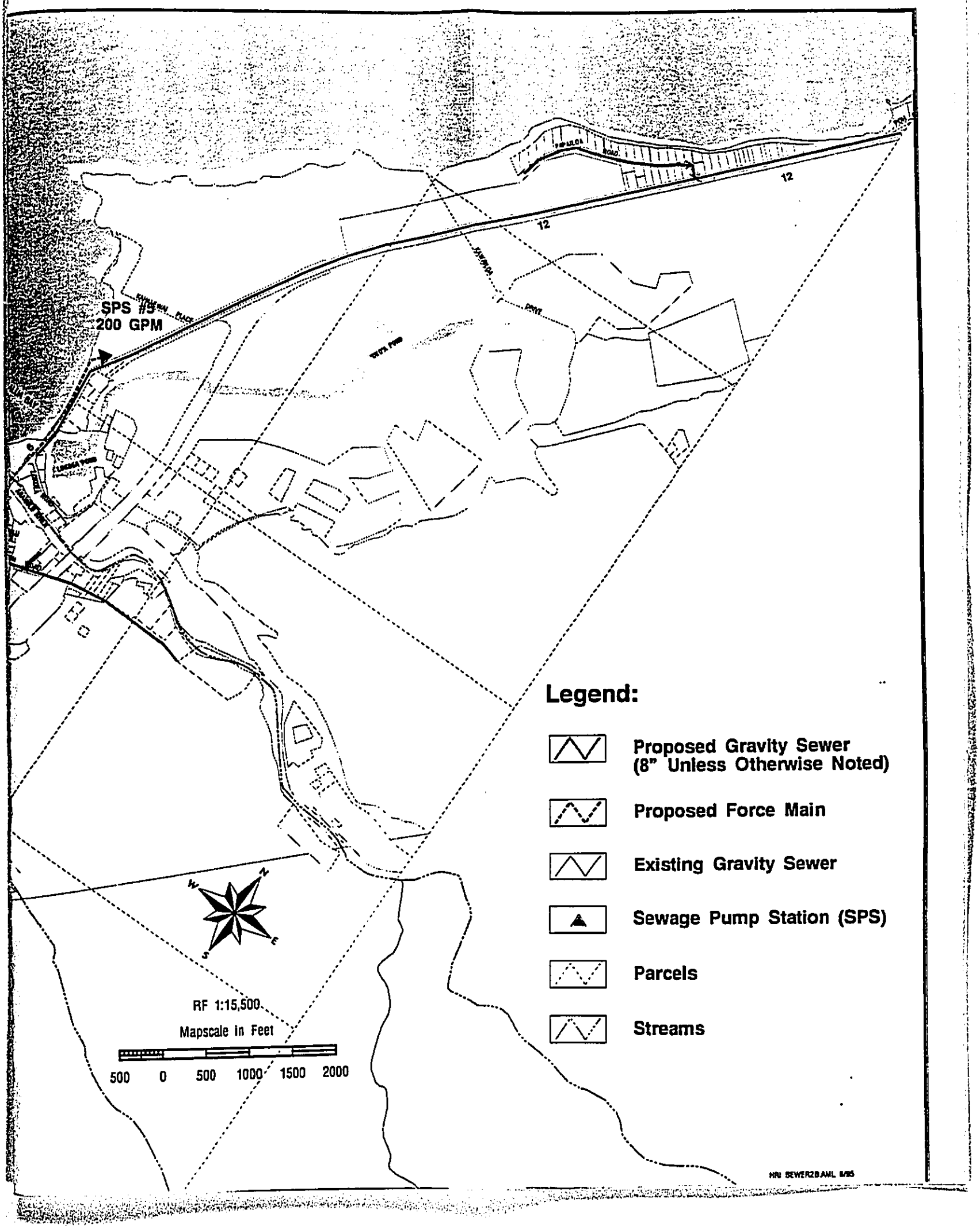

KAIAKA BAY
PAHUA ROAD
PAUKAUILA STREAM
SPS #2
1885 GPM
SPS #3
680 GPM
2000
12
10
16
18
24
27

Figure 2.3

Centralized System Alternative -

SBR / Ocean Discharge - Hale'iwa Area




SPS #9
200 GPM
12
12
RF 1:15,500
Mapscale in Feet
500 0 500 1000 1500 2000
Legend:
Proposed Gravity Sewer
(8" Unless Otherwise Noted)
Proposed Force Main
Existing Gravity Sewer
Sewage Pump Station (SPS)
Parcels
Streams

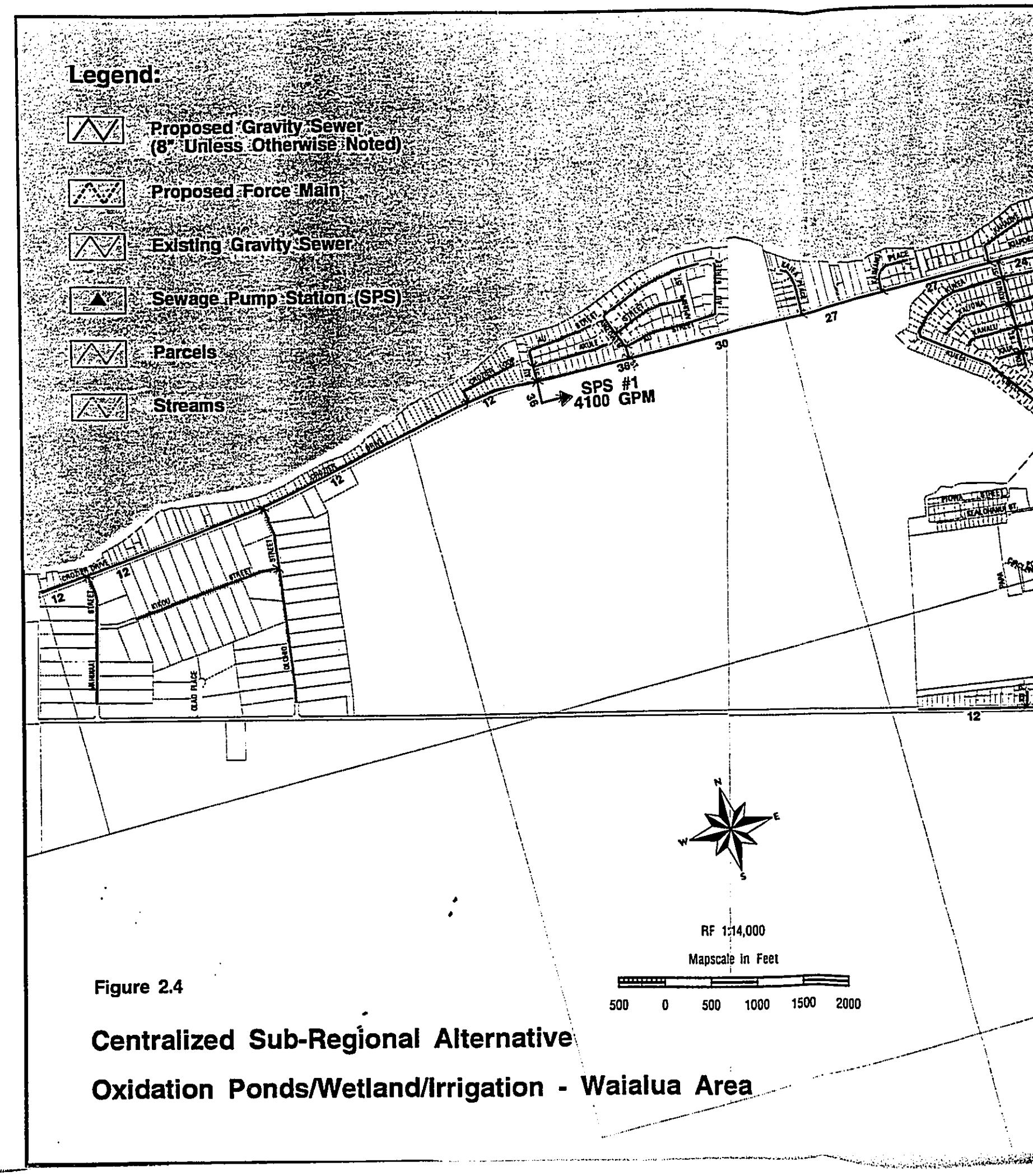


Figure 2.4

Centralized Sub-Regional Alternative

Oxidation Ponds/Wetland/Irrigation - Waialua Area

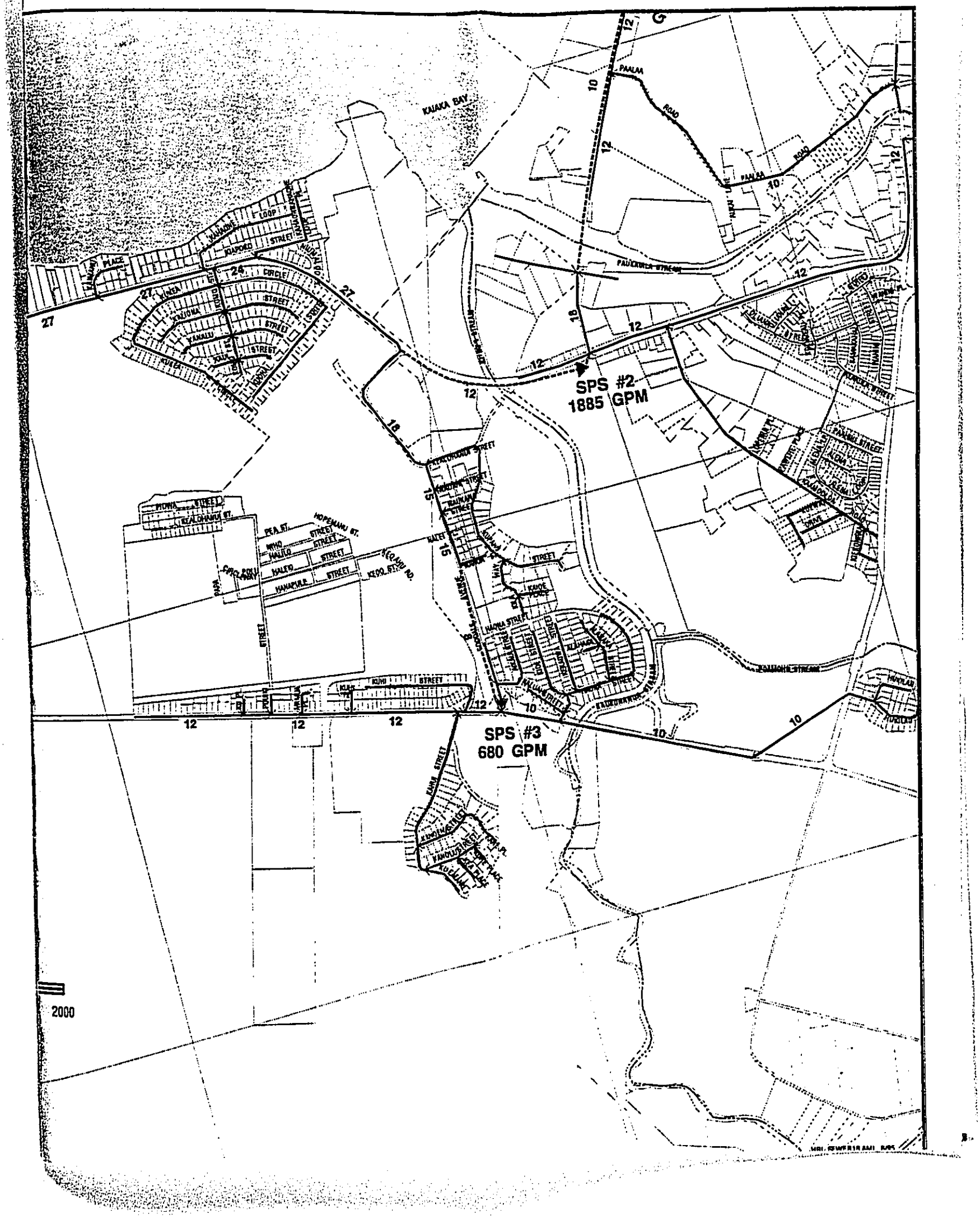
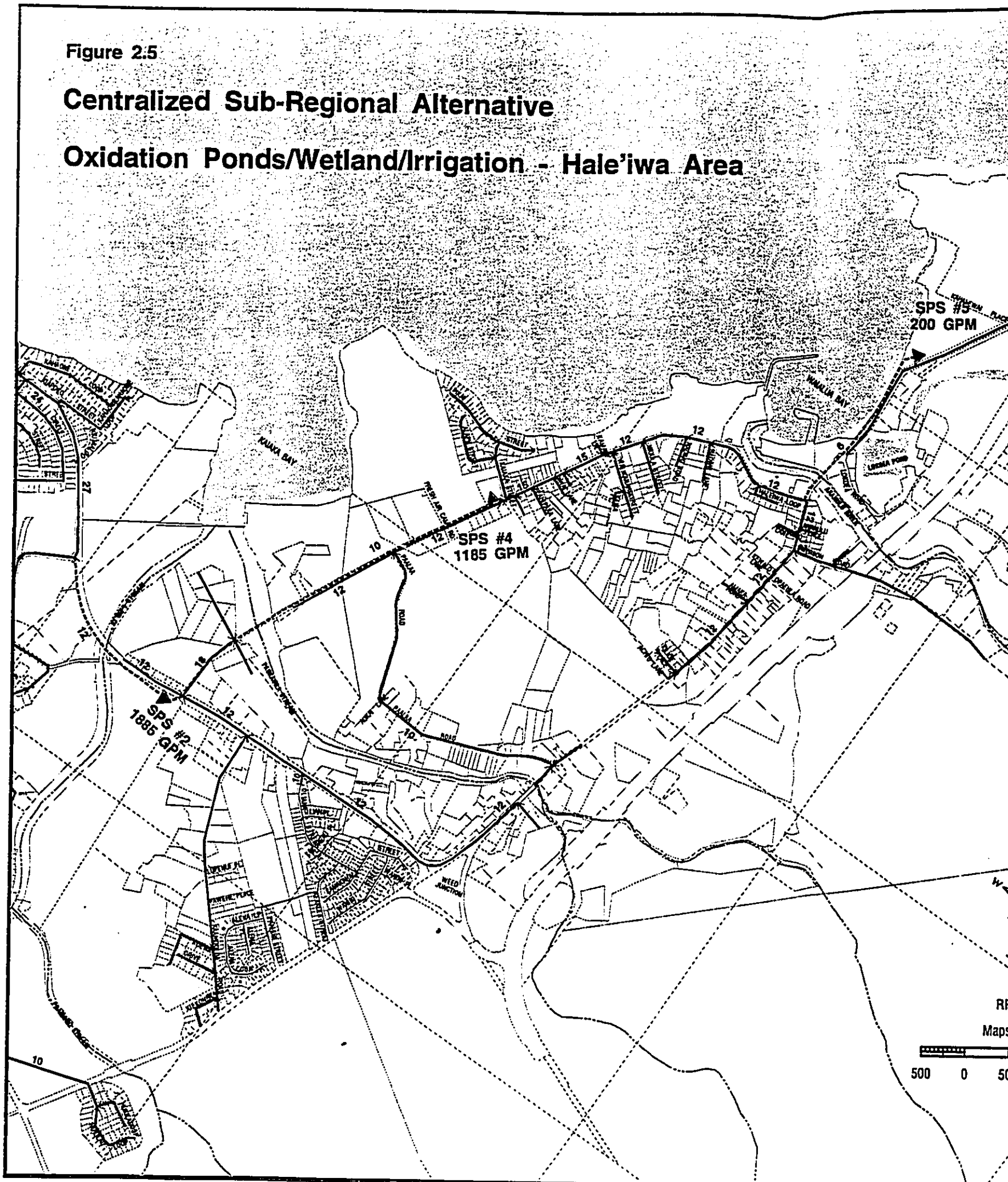
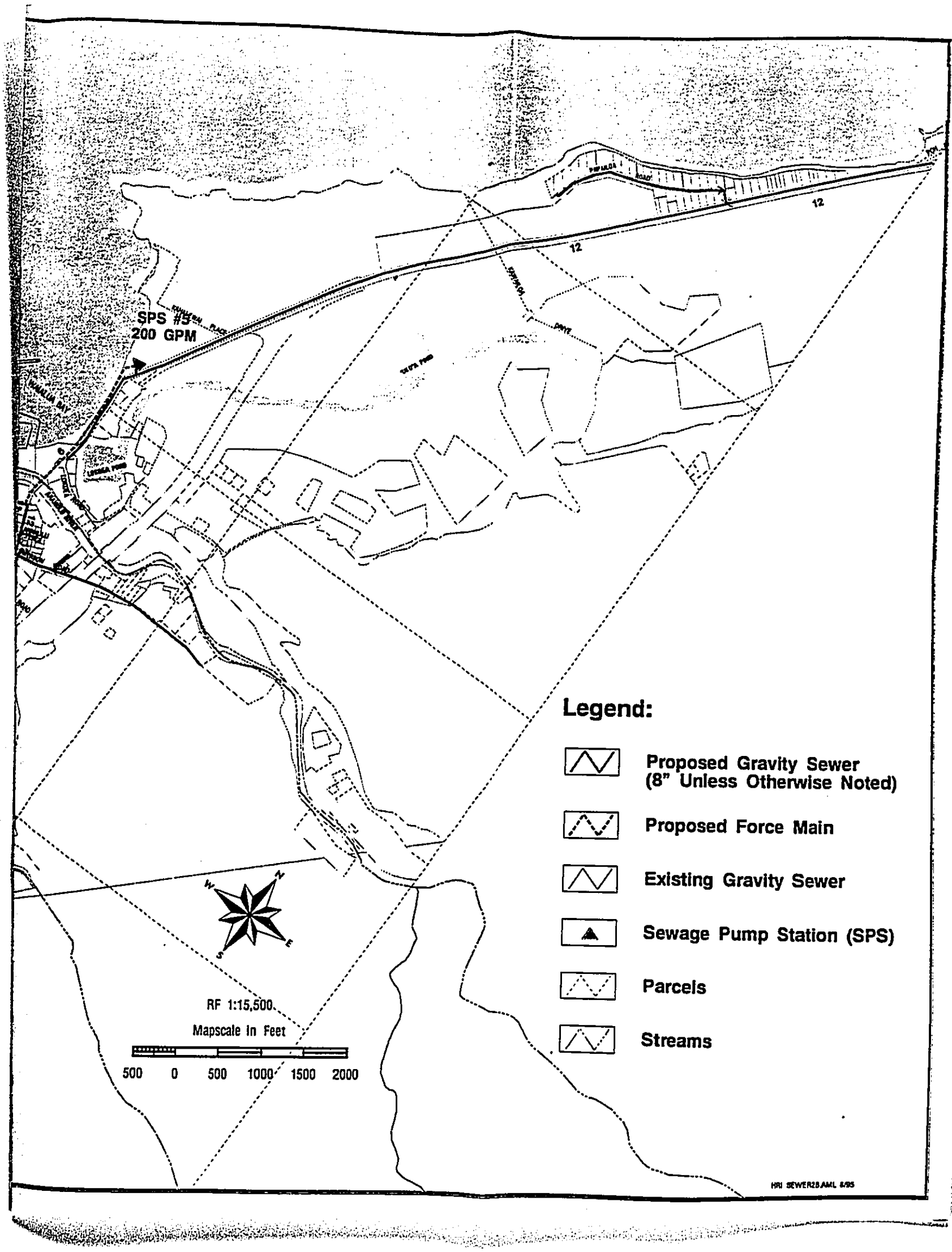

KUAKA BAY
PAALAA ROAD
SPS #2
1885 GPM
SPS #3
680 GPM
2000

Figure 2.5

Centralized Sub-Regional Alternative

Oxidation Ponds/Wetland/Irrigation - Hale'iwa Area




SPS #5
200 GPM
12
12
PAPAKOA ROAD
PAPAKOA DRIVE
PAPAKOA PLACE
MAMALA BAY
LOKOMA PLACE
LOKOMA PLACE
Legend:
Proposed Gravity Sewer
(8" Unless Otherwise Noted)
Proposed Force Main
Existing Gravity Sewer
Sewage Pump Station (SPS)
Parcels
Streams
N
W
E
S
RF 1:15,500
Mapscale in Feet
500 0 500 1000 1500 2000
HRI SEWER2B.AML 8/95

One major complaint often leveled against treatment facilities deals with odors. Despite measures taken to subdue odors, odor problems may occur, therefore the proximity to local surroundings is a prime consideration. Proposed treatment plant sites are surrounded by sugarcane fields and there are no homes downwind of the prevailing northeast wind. The nearest homes is approximately a third of a mile away or more for all of the locations. The potential of an odor problem does not appear great, however, odor control systems will be provided if necessary.

The WWPSs, on the other hand, will be located nearer to homes and the potential for odor complaints here are far greater. To minimize odors that may be produced and emanated from the WWPSs, the design of the pump stations will include space for future odor control, such as the installation of 55-gallon drum granular activated carbon (GAC) units.

Table 2.3 County and State Parks - North Shore O'ahu

	Acres	Irrigated	Notes
COUNTY			
Mokule'ia BP	13	Y	
Makaleha BP	27	N	New acquisition, undeveloped
Aweoweo BP	1 approx.	N	
Kamananui NP	0.7	Y	
Waialua DP	13	Y	
Hale'iwa Ali'i BP	19	Y	
Hale'iwa BP	15 approx.	Y	
Hale'iwa RP	3	N	Undeveloped
STATE			
Kaika Bay SRA	25 approx.	Y	
Dillingham Field	60 approx.	N	Aeronautic Division

BP - Beach Park
NP - Neighborhood Park
RP - Regional Park
DP - District Park
SRA - State Recreation Area

Note: Irrigation is done about every three days, more frequently at the larger parks.

2.2.2.2 Reliability

The two centralized system alternatives consists of three main components - collection, treatment, and disposal. The collection system for all options under consideration are very similar. The system will be designed to accommodate wastewater flows generated by the area's population from the present to the year 2015.

The SBR treatment alternative can produce a high quality effluent when all design conditions are met and all electrical and computer systems are operative. If any of the influent conditions change or a control system fails, a possibility exists that the effluent standards will

not be met. The oxidation ponds/wetland/filter system has the ability to absorb wide variations in influent conditions while still meeting effluent standards. This capability of an oxidation ponds/wetland/filter system is not a function of operator skills, power availability, or equipment status.

The reliability of the treatment segment of the two treatment options is different. Each option will be designed to handle the flows generated by its designated service area. However, because of the anticipated population growth, construction will be phased and additional facilities will be added as the wastewater flows increase. The quality of the treated effluent will conform to all current and applicable standards and regulations.

Two effluent disposal options were considered for the proposed centralized system alternatives. The SBR option will discharge effluent to the ocean via an ocean discharge. The oxidation pond/wetland option will discharge effluent to irrigation when practicable and to rapid infiltration when irrigation of the effluent is not possible.

One of the major advantages of an oxidation ponds/wetland/irrigation system is the capability of the system to store wastewater for extended periods of time with no discharge. It is this reliability factor of storage which allows for no discharge during rainy periods and no discharge if downstream treatment processes need to be taken out of service. Oxidation pond/wetland effectiveness is a function of organic loading, inlet/outlet configuration, depth, and orientation.

The limiting factor in the location of the effluent rapid infiltration sites is the Board of Water Supply (BWS) "No-Pass" line and the Federal Underground Injection Control (UIC) line. The BWS, City and County of Honolulu, with the intent of protection the quality of underground water resources, has promulgated rules and regulations on wastewater disposal facilities (City and County of Honolulu, Board of Water Supply, 1980). These regulations require review by the BWS for proposed wastewater disposal facilities which include cesspools, septic tank systems, household aerobic treatment units, disposal wells, stabilization ponds, and sewage treatment plants. Under the (UIC) program, the State of Hawai'i has established Chapter 23 of Title 11, Administrative Rules to regulate underground disposal of wastes. The intent of these regulations is to protect the quality of the state's underground drinking water sources from pollution by subsurface disposal of fluids. Established within these regulations are specified conditions governing the location, construction and operation of injection wells.

With regard to these regulations, the BWS has established a "No-Pass line. In areas between this "No-Pass" line and the shoreline, all types of disposal systems (assuming suitable treatment) are acceptable to the BWS. Wastewater disposal mauki of the "No-pass" line is subject to careful review to ensure that no threat to potable groundwater supplies occurs. Currently, projects identified by the State Department of Health as posing no significant risk to groundwater resources are acceptable to the BWS. The DOH has established an UIC-Line for each island in Hawai'i. In the Waialua-Hale'iwa planning area, the UIC line roughly coincides with the BWS "No-Pass" line. Injection wells of wastewater effluent mauki of the UIC line is prohibited.

All proposed WWTP sites are located above the BWS "No-Pass" line and the UIC line; consequently, they are subject to BWS and UIC limitations. The proposed rapid infiltration sites are located makai of the lines, and are acceptable to BWS.

Effluent irrigation of sugarcane and other crops is a viable and convenient means of disposal. The furrow method of irrigation poses no particular problem, however with drip irrigation, the clogging of the irrigation lines is a potential problem. The effluent quality from

the oxidation ponds/wetland system will be of consistently higher quality than produced by a SBR system. The effluent quality from the oxidation ponds/wetland/filter system will be less than 5 mg/l BOD and SS, respectively and the turbidity of the effluent will be less than 2 NTU prior to irrigation use. Drip irrigation standards for BOD and SS is set at 5 mg/l for both parameters.

2.2.2.3 Energy

Energy requirements for the centralized system alternatives varies between the two options. In general, energy demand is directly proportional to the size of the flow and indirectly proportional to the treatment contact period (the period of time the wastewater is treated at the WWTP). The greater the contact period the less energy required when considering passive treatment systems. High rate biological treatment processes require significant amount of energy to mix, aerate, and pump the wastewater in the process, although there are other influencing factors. The number of pump stations required will also affect energy consumption. Table 2.4 shows the estimated energy use for the two systems being considered. The centralized subregional system would require approximately 25% of the energy required for a SBR treatment system.

Table 2.4 Order of magnitude estimate of energy use for wastewater collection, treatment, and disposal in the urban areas for in the urban areas for the centralized and centralized sub-regional *system* alternative.[a]

	Energy Use (MBtu/year) Year 2000	Year 2010
Centralized	5,160	6,250
Centralized Sub-regional	864	1,728

[a]Based upon assumption found in Table 2.3 page 7-14 of the Belt Collins & Associates, 1987 Facility Plan.

Due to economy of scale, treatment facilities capable of handling larger flows generally require less energy (per gallon treated) than those capable of treating smaller flows (given that the facilities being compared consist of similar unit processes). Based on this general finding, two smaller facilities (with a combined treatment capacity equivalent to a single large plant) would consume more energy than the larger plant if they were energy intense systems. Oxidation pond/wetland treatment systems use little to no energy for treatment. This more than compensates for the higher energy needed to pump the effluent to two sites versus one site in the SBR alternative.

The energy requirements for pumping wastewater up to the WWTPs differ between both centralized options. Both of the WWTPs in the centralized subregional alternative are approximately 50 feet higher in elevation than the centralized alternative option. Consequently, the centralized regional alternative will require less energy to pump wastewater up to the WWTP than will the centralized subregional alternative.

The energy requirements for the various disposal options also differ. Essentially, the effluent options that only require rapid infiltration will not require additional energy input since gravity flow will be used. The ocean disposal options , on the other hand, may require energy to pump the effluent into the disposal system. The amount of energy required will depend upon the location of the connection point to the respective disposal system. The irrigation disposal system would not require energy if disposal sites were down gradient from the WWTPs. The

two sites for the proposed centralized subregional system would afford adequate head to insure 25-40 psi at the point of delivery along Kamehameha Highway and Farrington Highway.

2.2.2.4 Implementability

The ability to implement a central collection and treatment alternative depends primarily on the ability to obtain adequate funds to construct these facilities. The funding is the responsibility of the grantee (City) and the individual home owners. Current sources of funds includes state revolving loan funds seeded by the EPA, and City and County of Honolulu funds.

A portion of the City's share may be assisted by wastewater improvement district assessments. Since an improvement district requires an ordinance, public hearings are conducted to solicit public comments. The remaining portion of the cost would be required from the City's general fund.

The implementation period for the entire project is estimated to be 10 years. The phasing of the collection, treatment, and disposal aspects of the project for the various service areas would consider health risks as the primary criteria. Hale'iwa represents the area with the greatest cesspool failure rate in the closest proximity to water contact activities. Waialua would be a second phase for collection/treatment/disposal.

2.2.2.5 Monetary

The total cost or net worth of each of the two alternatives is summarized in Table 2.5. The SBR system with ocean discharge was selected in the BCA 1987 Facility Plan as the preferred alternative even though the ocean outfall option is the most costly disposal alternative. Comparing the oxidation ponds/wetlands/filters to the SBR option shows a distinct economic advantage for the pond/wetland system with reclamation/reuse as a disposal means. The pond/wetland/filter treatment alternative would cost approximately $13.1 million less to construct (46% less), and the irrigation reuse and disposal system would cost $20.4 million less to construct (60%)less) compared to an ocean outfall, even if the 164 acres of irrigation land needs to be purchased.

2.2.2.6 Expandability

The expansion capability of the oxidation ponds/wetland/irrigation alternative is a major advantage of this system over the SBR/ocean discharge system. This expandability would not require any increase in land, only an internal increase in treatment capacity.

The Facility Plan and EIS can only deal with increases in flow due to known development plans and projected growth rates. The history of O'ahu development suggests that major development plans might be submitted to the City/County in the design period. The centralized subregional alternative would be able to be expanded to treat the wastewater flow of approximately 50,000 people which is three times the design flow in the Facility Plan. This expandability would require minimal additional land purchases. All of the increased treatment capability will be handled by increasing treatment equipment within the existing area. For example oxidation ponds can be converted to less land intensive systems such as oxidation ditches. The residual internal land will be converted to constructed wetlands. The only increase in land requirements would be necessary to dispose of treated effluent through irrigation. For example, it would take 275 acres of land to irrigate at the 50,000 people equivalent flow condition. In all probability any development would bring with it the opportunity for irrigation.

The North Shore of O'ahu has been targeted for many development plans. The added cost for expansion to meet any future flows greater than those projected in this Facility Plan will be significantly less with the centralized subregional alternative.

2.2.2.7 Summary

Both alternatives provided wastewater treatment to approximately two-thirds of the entire urbanized portion of the study area. In the remaining portion of the urban area, existing conditions are not improved. With the increasing age of these facilities, the number of failures would also be expected to increase - creating potential public health hazards and potential sources of coastal, surface and groundwater contamination. The number of facilities and the scattered locations would be expected to greatly increase the total maintenance hours required for the service area.

2.3 RURAL AREAS

The rural areas have been defined as those areas within the planning district which are outside the Waialua-Hale'iwa urban core. The primary factor which distinguishes the rural from the urban areas is the population density. Because of the similarity of the rural subareas (Kawaihapai and Kawailoa II), it is possible to evaluate the rural segment as a single unit and the alternative selected will be employed throughout the entire rural area.

Table 2.5 Estimated breakdown of *1995 total capital cost* for both centralized system alternatives

Item	Ox ponds/wetland/ irrigation $	SBR/ocean discharge $
WWTP Construction Cost	$20,000,000	$ 29,462,160
Effluent Disposal Costs Irrigation land purchased	$ 4,269,200 $12,300,000	$ 35,274,720
Collection System	$72,180,000	$ 69,703,920
Total	$108,749,200	$134,440,800
Total (Irrigation land not Purchased)	$96,449,200	

2.3.1 "No-Action" Alternative

The "No-Action" alternative in the rural areas is based on the continued use of the existing cesspools, plus the addition of septic tank/adsorption fields for new houses.. As with the "No-Action" alternative for the urban area, problems with cesspools will continue to exist, including the high amount of maintenance required to pump cesspools.

2.3.1.1 Evaluation of the Environment

These areas are presently experiencing some problems with their existing cesspools. As with the urban area, the cesspools are prone to failure and require occasional pumping. Continued use of the cesspools near the shoreline may lead to public health hazards and contaminate the coastal waters. However, because of the low density of development in the coastal areas (approximately 4 per acre), the sources of potential pollution are not concentrated

in one area, thus greatly reducing the potential risk to the environment.) Therefore, the "No-Action" alternative does not pose a major threat to the environment.

2.3.1.2 Reliability

Due to the increasing age of the existing cesspools in these areas, the reliability of these cesspools may be of some concern. Of the estimated 541 cesspools presently in use in the rural area, approximately 30 have required pumping in excess of four times per year during a five year period, while an additional 88 have been pumped at least once during the same period. Furthermore, 18 lots receive yearly chemical treatment. Table 2.6 shows a breakdown of cesspool counts for the Waialua-Hale'iwa area.

2.3.1.3 Energy Requirements

The energy requirements for this alternative consists of the continued and possible increased need for cesspool pumping, in addition to the transportation to the treatment facility and the treatment of the collected sewage. Energy will also be expended if any unit requires replacement.

Table 2.6 Cesspool Counts for the Waialua-Hale'iwa Area (1989)

Subarea	Number of Cesspools
Urban	
Waialua	1,806
Hale'iwa	633
Kawailoa I	102
Rural	
Kawailoa I	339
Kawaihapai	202
Non-Residential	70

2.3.1.4 Implementability

There is no implementation required in the "No-Action" alternative.

2.3.1.5 Monetary

A present worth analysis of the "No-Action" alternative, accounting for the current cesspool failure rate and an expected increased failure rate over the next 20 years, results in a total present worth for the rural areas of $906,000 (for a period of 20 years at a discount rate of 7-3/8%). This is the least costly alternative.

2.3.1.6 Summary

The "No-Action" alternative is a viable alternative. This alternative requires the smallest capital outlay and almost no change in the status quo, although other circumstances may override these two factors. The fact remains that the majority of the existing cesspools are old, and as such, are subject to increasing failure rates. A number of the existing units have required treatment and conditions are not expected to improve. The "No-Action" alternative

precludes any significant development to occur in the service area. Development plans which require sewage treatment capacity would be precluded from implementation.

2.3.2 Optimal Operation of Existing Systems Alternative

This alternative is a simple modification of the "No-Action" alternative. Under this alternative, use of the existing working systems continues, failing and new systems are replaced with other on-site systems as required by state law, and low flow indoor plumbing fixtures are installed in all dwelling units. In addition, garbage grinders would be removed from all dwelling units.

2.3.2.1 Environment

Similar environmental impacts as the "No-Action" alternative exist, but are somewhat reduced due to the decreased organic and hydraulic load to the cesspools.

2.3.2.2 Reliability

Similar to the "No-Action" alternative, but somewhat increased due to the decreased organic and hydraulic load to the cesspools.

2.3.2.3 Energy Requirements

Similar to the "No-Action" alternative, but somewhat reduced due to lower rate of cesspool pumping.

2.3.2.4 Implementability

Implementation of the low-flow indoor plumbing fixture restrictions can be easily accomplished in a short time. A large number of cities in California have implemented similar conversion programs on a much larger scale than the 541 existing housing units considered here in a three year period. Perhaps the easiest implementation plan is to require households to convert over a fixed time period (say two years) with a "rebate" being given when conversion is complete. The household would "repay" the rebate by a charge imposed on the water bill. The water bill "charge" would be calculated so that reductions in water service due to the water saving devices would be used to repay the rebate. After a period of about 8 years, the rebate should be paid off, and the household would see their water bill decrease due to the lower water use.

2.3.2.5 Monetary

The present worth cost of this alternative is the same as the "No-Action" alternative.

2.3.2.6 Summary

The addition of low flow indoor plumbing fixtures in all rural housing units represents a no-cost method of improving the reliability of the current on-site treatment systems.

2.4 SELECTED SYSTEMS

From the discussions contained in the preceding sections of this chapter, the following wastewater management options were retained for further evaluation:

a. Urbanized Area:
   1. "No-Action"
   2. Centralized system with ocean discharge
   3. Centralized subregional oxidation ponds/wetland/filter with disposal by irrigation and rapid infiltration.

b. Rural Area:
   1. "No-Action"
   2. Optimal operation of existing systems

2.4.1 Comparison of Urban Alternatives

The general purpose of this study is to recommend the wastewater management scheme that would best protect the welfare of the public and the water quality in the area, as well as to comply with applicable water quality regulations. The three urban area wastewater management alternatives were initially evaluated on the basis of environmental impacts, reliability, implementability, energy requirements and monetary cost. The results of this initial evaluation are summarized in Table 2.7. In this table, each alternative is rated with respect to these factors in terms of having a strongly beneficial or strongly negative impact are evaluated. Based on this evaluation, it was determined that taking the least cost "No-Action" alternative in the urban area would not be beneficial to the area primarily due to the negative environmental impacts it would create and the low reliability of the system.

Table 2.7 Selection of alternatives for the urban and rural areas.

Alternative	Environment	Reliability	Implement-ability	Energy	Monetary Cost	Recomm. Alternative
Urban Area						
No Action	-3	-1	0	-1	-1	
Centralized SBR/Ocean	-1	+2	+2	-3	-3	
Centralized Ponds/Wet. Reuse	+1	+3	+1	+3	+2	*
Rural Areas						
No Action	-1	-1	0	-1	-1	
Optimal operation of existing systems	0	0	-1	0	-1	*

* Recommended Alternative

The two remaining options were evaluated in more detail. In addition to being evaluated in terms of the factors mentioned previously, the centralized WWTP and the centralized subregional WWTPs, are now evaluated in terms of other factors which include land requirements, inconvenience created, visual impacts of the WWTPs and WWPSs, potential public health risks, potential future water quality degradation, and present worth cost per person serviced. The results of this evaluation is summarized on Table 2.8. In this table, a two point ranking system is utilized (with 1 being the best ranking).

Table 2.8 Comparison of urban area wastewater management alternatives. (Ranking of 2 or 1 with 1 being the best)

Description	Centralized WWTP SBR/ Ocean Discharge Alternative	Centralized Subregional WWTP Ox Ponds/Wetlands/ Irrigation Alternative
1. Land Requirements	1	2
2. Inconvenience	1.5	1.5
3. Visual Impacts		
a. WWTP	2	1
b. WWPS	1.5	1.5
4. Public Health Risk	2	1
5. Water Quality Degradation	2	1
6. Reliability	2	1
7. Implementability	1	2
8. Energy Requirements		
a. WWTP	2	1
b. WWPS	1	2
9. Present Worth Cost Per Person Serviced	2	1
10. Expandability	2	1
11. Reclamation	2	1
TOTAL	22	17

2.4.2 Comparison of Rural Alternatives

The two rural area wastewater management alternatives were also evaluated in terms of environmental impacts, reliability, implementability, energy requirements and monetary cost (see Table 2.7). Based on this evaluation, the optimal operation of existing systems alternative was selected. This alternative is no more costly than the "No-Action" alternative, is fairly easy to implement, and improves the reliability of the existing systems.

2.5 CONCLUSIONS

Based on the evaluation presented in the preceding section, it was determined that the centralized subregional system with individual wastewater treatment sites in Waialua and Hale'iwa, and ultimate disposal by irrigation, would be the most beneficial alternative. The irrigation sites would be developed over the phasing of the project with interested small parcel landowners. Approximately four miles of reclamation delivery line is proposed for each of two treatment facilities. This cost is included in the cost estimates in Table 2.5. The cost of purchasing disposal land, if that is the most viable approach, is also included in Table 2.5. If irrigation land is purchased, the Table 2.5 cost estimates include a delivery system 4 miles from each of the treatment sites for irrigation purposes on City and County purchased property. A reclaimed water line will be built to deliver reclaimed water to potential users. Two rapid infiltration disposal fields will be constructed at the terminus of the reclaimed water lines. This rapid infiltration site will serve as a secondary disposal means. A City and County of Honolulu ordinance requires use of reclaimed water when available for use in non-potable areas on the island.

To summarize the results of this chapter the following conclusions were drawn:

1. The Waialua-Hale'iwa planning area should be divided into two subareas: urban core and rural.

2. Wastewater management proposed for the urban core is two centralized subregional WWTPs with one WWTP near Waialua and one WWTP near Hale'iwa.

3. The centralized subregional WWTPs consist of two 0.7 MGD plants.

4. Wastewater management proposed for the rural areas is the optimal operation of existing systems alternative.

5. The centralized subregional wastewater system collects and conveys wastewater via gravity sewers (force mains and pump stations are required).

6. The two centralized subregional WWTPs would produce an effluent quality equivalent to tertiary treatment standards.

7. The treatment train for the two centralized subregional WWTPs employs screening, oxidation ponds, constructed wetlands, coagulation/flocculation, slow sand filters, and ultra-violet disinfection.

8. The two centralized subregional WWTPs employs raw effluent discharge below the water surface of the oxidation pond for odor control, and soil mantle treatment for odor control at the septage handling facility and headworks if required.

9. Effluent disposal will be accomplished by irrigation and rapid infiltration basin.

CHAPTER III

DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

3.1.1 Planning Area Description

The planning area, as shown in Figure 3.1, is based on the Waialua-Hale'iwa sewerage district established in the Water Quality Program for O'ahu (WQPO) and the Water Quality Management Plan for the City and County of Honolulu (208 Plan). The Waialua-Hale'iwa sewerage district boundaries shown on page III-2 of the WQPO and page 10-21 of the 208 Plan are essentially the boundaries of the Waialua District, which comprises census tracts (CT) 99 and 100. Natural features define three of the four boundaries of the planning area -- the northern edge is bounded by the Pacific Ocean, the western and eastern edges are demarcated by the crests of the Waianae and Ko'olau ranges, respectively, and the southern boundary follows an irregular course from the top of Mount Ka'ala across the central plateau north of Schofield Barracks to the crest of the Ko'olaus. The natural boundaries can also be seen in Figure 3.1. Most of the approximately 115 square miles (mi^2) of the planning area are in agricultural uses.

The populated areas are along the 16-mile coastline, with most of the population in the towns of Waialua and Hale'iwa. Almost all of the homes in the planning area are served by cesspools. The Pa'ala'a Kai subdivision and a few apartment and commercial complexes have their own wastewater treatment and disposal systems. The physical and socio-economic conditions of the planning area are described in the following sections.

3.1.2 Organizational Context

The Department of Wastewater Management and the City and County of Honolulu is responsible for the planning, design, construction, operation and maintenance of most publicly owned wastewater treatment works on the island. The Department of Wastewater Management is organized as shown in Figure 3.2. A sewer service charge was adopted by the City Council of the City and County of Honolulu and implemented on January 1, 1977. Revenue from sewer service charges is being used for operating and maintaining the wastewater treatment works and to finance a portion of the City's annual debt service expenses for capital improvements to the system.

3.2 PHYSICAL CONDITIONS

3.2.1 Physiography/Geology

The island of O'ahu consists of two parallel mountain ranges, the Waianae on the west and the Ko'olau on the east, joined by a central plateau. Each of the "ranges" is the remnant of a large shield volcano. The central plateau was formed when lava's from the Ko'olau Volcano, the younger of the two, banked against the already-eroded flank of the Waianae Volcano. At 4,025 feet above sea level, the Waianae Range's Mount Ka'ala is the highest point in the District (and on the island); the highest elevation on the Ko'olau side of the Waialua District is 2,673 feet.

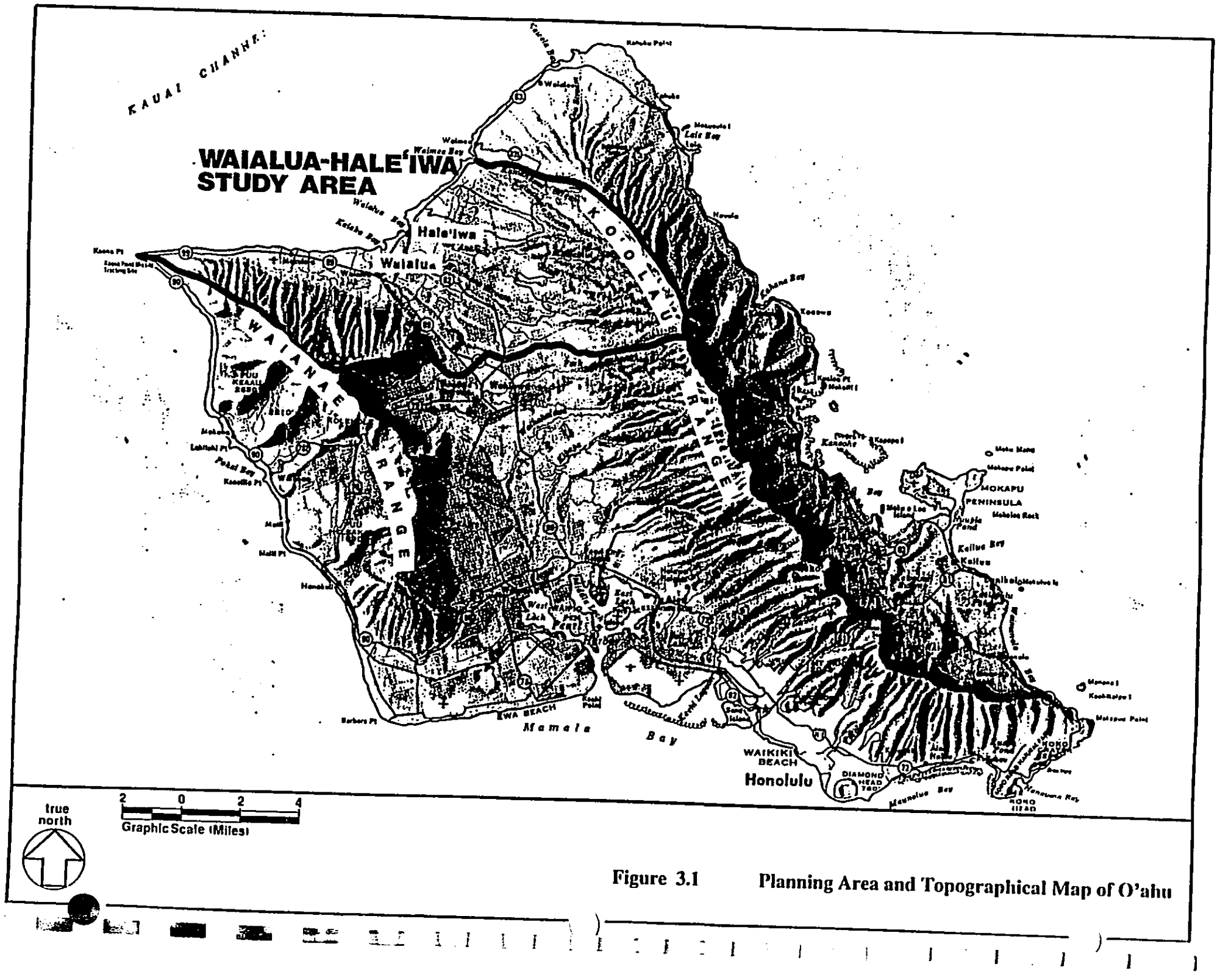


Figure 3.1 **Planning Area and Topographical Map of O'ahu**

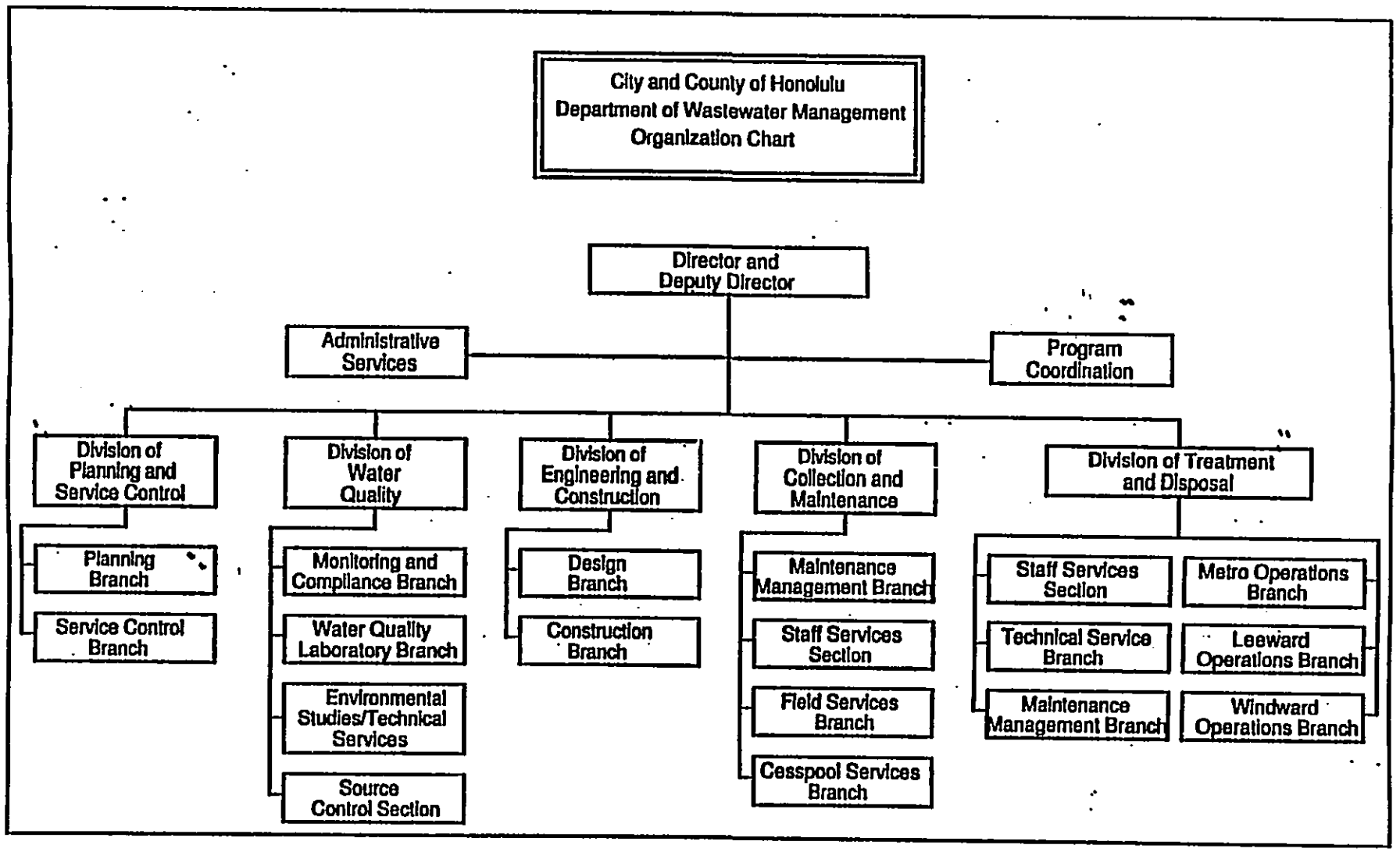


Figure 3.2 Organization Chart Department of Wastewater Management

The district is composed of three different geologic units. They are, in order of decreasing age, (i) basaltic lavas and dikes of the Waianae Volcanic Series, (ii) similar lavas and dikes of the Ko'olau Volcanic Series, and (iii) alluvium and marine sediments of sand and coral. West of Kaukonahua Gulch the upland areas consist of rocks from the Waianae Volcano; east of the gulch they are from the Ko'olau Volcano. Nearly vertical, relatively impermeable dikes have intruded through both the Ko'olau and Waianae lavas in several rift zones extending for one to two miles on either side of their crests. A hydrologic discontinuity between the Wahiawa and Waialua Districts indicates some change in geologic structure across the Schofield Plateau. However, the nature of this discontinuity is not fully understood.

A distinct topographic break at the 200-foot elevation level inland of Waialua marks the boundary between the exposed Waianae lavas and a coastal plain composed of calcareous and terrigenous sediments laid down over the downsloping Waianae lavas. The width of the Waialua-Mokule'ia coastal plain varies from nothing at Ka'ena Point to two miles at Waialua. Its thickness at the coastline is equally variable, ranging from zero at its western end to over 400 feet at Waialua. A similar, but generally narrower and much thinner, layer of mostly alluvial material is present on the Kawailoa coastal plain northeast of Hale'iwa area as shown in Figure 3.3. The towns of Waialua and Hale'iwa have both developed on these relatively flat coastal plains.

The proposed oxidation ponds and wetlands are located over the freshwater aquifer at elevations of 80 to 120 feet above sea level. For this reason these two unit processes will be lined with a Geotextile membrane on top of compacted natural clay. The liner will reduce the potential for direct seepage into the freshwater aquifer below.

All of Waialua seaward of Farrington Highway is less than 50 feet above sea level; everything north of the Waialua Sugar Mill is less than 20 feet in elevation. The wide flood plain and marshes adjacent to Ki'iki'i Stream are less than 15 feet above sea level and thus physically separate the two towns. The town of Hale'iwa itself is further divided into two distinct parts by the flood plain and marshes of Paukauila Stream. The old town center and residences lie mostly north of Paukauila Stream below the 20-foot contour. Newer development, especially the 307-unit Pa'ala'a Kai subdivision, lies on gently sloping ground south of both the stream and Waialua Beach Road at elevations from 15 to 50 feet above sea level.

O'ahu is relatively free of serious earthquakes, although tremors originating in major fault systems near the island of Hawai'i are felt here periodically. The Moloka'i and Maui fracture zones are other potential sources of tectonic activity, but they are relatively inactive. The island of O'ahu is designated as Zone 2a, the next to lowest rating on the scale used to rank earthquake hazards and establish structural design requirements for buildings.

3.2.2 Hydrology

A number of streams flow into the Pacific Ocean between Ka'ena Point and the Sunset Beach Area, as can be seen in Figure 3.4. The discharges of the larger streams are gauged continuously, several of the smaller streams have crest-stage gauges that record only high flow events. Table 3.1 lists historic average and peak discharge flows for various streams. Kamananui stream is the major tributary to the Waimea River and is the source of water for Waimea Falls Park, a tourist attraction. The Anahulu River flows into Hale'iwa Boat Harbor and the adjacent Waialua Bay. Paukauila Stream is formed by the confluence of Helemano and Opae'ula Streams, it joins Ki'iki'i Stream to form a small estuary at Kaiaka Bay. The main stem of Ki'iki'i Stream is formed by two tributaries, Poamoho and Kaukonahua Streams. The North and South Forks of Kaukonahua Stream converge at Wahiawa Reservoir ("Lake Wilson") at an elevation of 900 feet.

The total watershed area of all gauged streams in the region is 106.57 mi^2. All streams are diverted for agricultural use. Because most stream water is used for agriculture, even the larger streams cannot be considered perennial in modern times. Kaukonahua and Anahulu streams, because of their larger watersheds are probably less likely to go dry than the other north shore streams. Even Kamananui and Helemano Streams are dry in the vicinity of USGS gauges during periods of prolonged dry weather. Some of the smaller streams such as Kaunala, Makaleha and Paumalu Streams flow infrequently at all elevations.

Table 3.1 Historic stream ,discharge flows for various streams.

Station Number	Period of Record	Name of Station	Altitude (ft)	Drainage Area (sq. mi.)	Average Discharge (cfs)	Peak Discharge (cfs)	Date	Minimum Discharge (cfs)
16-2000	1913-1953; 1960-1990	N. Fork Kaukonahua Stream Above Right Branch	1150	1.38	16.5	5640	10/28/81	0.12
16-2080	1957-1990	S. Fork Kaukonahua Stream at East Pump Reservoir	860	4.04	21.9	5460	4/15/63	0
16-2105	1963; 1968-1990	Kaukonahua Stream at Waialua	22	38.7	n/a	13400	4/19/74	n/a
16-2112	1969-1990	Poamoho Stream at Waialua	24	10.9	n/a	7340	4/19/74	n/a
16-2113	1958-1963; 1966-1990	Makaleha Stream at Waialua	180	4.15	n/a	3640	11/13/66	n/a
16-3178	1973-1990	Kaunala Gulch near Sunset	n/a	1.98	n/a	250	3/18/80	n/a
16-3180	1968-1990	Paumalu Gulch at Sunset	n/a	2.59	n/a	980	4/19/74	n/a
16-3250	1963-1990	Kamananui Stream near Pupukea Military Road	590	3.13	10.6	3390	12/30/75	0
16-3300	1958-1990	Kamananui Stream at Maunawai	20	12.36	18.5	8540	3/18/80	0
16-3310	1968-1990	Waimea Gulch near Sunset	n/a	2.23	n/a	2030	3/18/80	n/a
16-3400	1958-1990	Anahulu River near Hale'iwa	70	13.5	n/a	15900	4/19/74	n/a
16-3430	1968-1982	Helemano Stream at Hale'iwa	2	14.2	10.8	18200	4/19/74	n/a
16-3450	1957-1990	Opaeula Stream near Wahiawa	1120	2.98	13.9	5540	7/17/74	0
16-3500	1956-1990	Opaeula Stream near Hale'iwa	20	5.96	n/a	7600	4/19/74	n/a

3.2.2.1 Flooding

Historically, most storm flooding in the Waialua-Hale'iwa area has resulted from the widespread rains that accompany the movement of large-scale frontal systems during the winter (November through April). Floods are also produced by intense local thunderstorms which may occur during any season, but tend not to affect all of the streams at the same time. The primary cause of flooding is channel overbanking during periods of high streamflow. However, some localized areas, especially between Kamehameha Highway and Hale'iwa Road, flood during periods of intense local rainfall because the level terrain prevents adequate drainage. Peak discharges from major flood events of record in the area are also summarized

in Table 3.1. The worst floods occurred in 1932 and 1974. The latter caused damage of nearly $1,000,000 and claimed three lives.

In addition to storm flooding, coastal areas are also subject to inundation by tsunamis and large waves generated by North Pacific storms. Since record-keeping began in the early nineteenth century, approximately 40 tsunamis have struck the Hawaiian Islands. According to the U.S. Army Corps of Engineers (November 1970:5), the tsunami of March 9, 1957 had the severest effect on the coastline of the Waialua-Hale'iwa area. Waves generated by that tsunami ran up to the 13-foot elevation level in the coastal area from Waialua to Kaiaka Bays and carried water inland over one-half mile in places. Like most of those which have caused significant damage on this stretch of coast-line, the 1957 tsunami originated from an earthquake in the North Pacific.

The North Shore of O'ahu is famous among surfers for its large winter waves. Usually the waves cause no property damage. Occasionally, however, an unusual weather situation north of the island produces sustained high winds over a large stretch of ocean which generates exceptionally powerful waves. Two such storms in early December of 1969, produced breaking waves estimated at 30 to 35 feet off the Waialua shoreline. These waves damaged shoreline structures, boats, and recreational facilities; they also carried debris several hundred feet inland. While storm waves increase the frequency with which areas along and immediately adjacent to the shoreline are inundated, they are less of a threat than tsunamis.

The U.S. Army Corps of Engineers (November 1970; February 1978) has estimated peak flood flows for the Waialua-Hale'iwa area using a regional flood frequency approach that relates expected stream discharge to drainage area size. The Federal Insurance Administration flood estimates were used in preparing the official flood boundary maps. Figures 3.5, 3.6 and 3.7 show the flood boundaries for the Mokule'ia, Waialua and Hale'iwa areas, respectively.

3.2.2.2 Groundwater

Most of the groundwater in the Waialua District is contained in permeable volcanic rocks. A U.S. Geological Survey study by Rosenau, et al. (1971) identified six major groundwater compartments. They are: high level dike water impounded in the upper reaches of the Ko'olau and Waianae Mountain Ranges, mid-level water beneath the Schofield plateau, and basal water in the Mokule'ia, Waialua-Hale'iwa, and Kawailoa areas, respectively. The subdivision is very similar to that put forward by the Honolulu Board of Water Supply (March 1963:36-37) and by Dale (January 1978:11-19). The approximate boundaries of these different groundwater compartments are shown in Figure 3.8.

Dale (January 1978) estimated that total pumping from the various compartments of the Waialua basal water body is about 36 mgd. In 1980, about 2.2 mgd of this was used for domestic purposes; the remainder was used for irrigation. About 1.7 mgd of the water used for domestic purposes was drawn from the Honolulu Board of Water Supply's Waialua well field at elevation 200 feet along Kamehameha Highway; most of the rest was pumped from a private well in Mokule'ia that belongs to Mokule'ia Ranch. In addition, the Waialua Sugar Company provides domestic water to its plantation homes via their three wells.

The Board of Water Supply has completed and is presently utilizing the 1.0 mgd capacity Hale'iwa wells located about one mile northeast of its existing Waialua wells. Preliminary approval had also been given for another 1.0 mgd well that could serve a new subdivision on Mokule'ia Ranch lands. Over the long-term, the Board of Water Supply has targeted the Waialua basal lens for considerable additional development.

However, the Groundwater Control Area program, regulated by the State Department of Land & Natural Resources (DLNR), identifies three control areas in the region of study. The three control areas, along with their sustainable and allocated yields are indicated in Table 3.2. All future groundwater withdrawals from the Control Areas must be approved by the Department of Land and Natural Resources in accordance with the Groundwater Control Area regulations. The vast majority of this water is used for sugarcane irrigation.

Table 3.2 Groundwater yield control areas located in study area.

Control Area	Yield (in mgd) Sustainable	Groundwater Allocated
Waialua Control Area	60.0	53.6
Mokule'ia Control Area	20.0	7.8
Kawailoa Control Area	10.0	6.0

3.2.2.3 Existing Water Quality

(a) Streams

Stream water quality is poorly documented in the north shore region. The USGS has collected some water quality records at stream gauging stations in the past, however, data were obtained only once or twice per year, and in some years not at all. Water quality data for the streams in the Waialua-Hale'iwa planning area are limited to the records maintained by the USGS. Presently, the only streams in the planning area which the USGS monitors for water quality are Helemano Stream and Opae'ula Stream. The monitoring station for Helemano Stream (station no. 16-3430) is located in the lower reach of the stream near Hale'iwa, while the main station for Opae'ula Stream (station no. 16-3450) is located far upstream. A second station on Opae'ula Stream near Hale'iwa (station no. 16-3500) was also monitored for wate· years 1971-1973. Monitoring station locations are shown on Figure 3.4. Selected USGS water quality data for the streams is summarized in Table 3.3. In general, the figures shown are based on only one or two samples per year. Hence comparisons of reported water quality with the State standards must be made with caution.

Water quality standards for streams in the state of Hawai'i are contained in Title 11, Chapter 54 of Administrative Rules, State of Hawai'i [Section 11-51-05(c)(2)]. Data from the sampling stations near Hale'iwa indicate that Helemano and Opae'ula Streams exceed the State standards for specific conductance and nitrite and nitrate nitrogen (for both wet and dry periods). Turbidity levels at all three monitoring stations show a wide variation in relation to the existing standards. The USGS data only reports orthophosphorus and not total phosphorus. Consequently, total phosphorus levels may still exceed the present wet-weather standard.

The data for Opae'ula Stream near Wahiawa indicates that it generally satisfies the standards for specific conductance and nitrite and nitrate nitrogen at this location. Turbidity levels are exceeded only on occasion. Orthophosphorus levels there appear to be lower than the levels in the downstream sections near Hale'iwa.

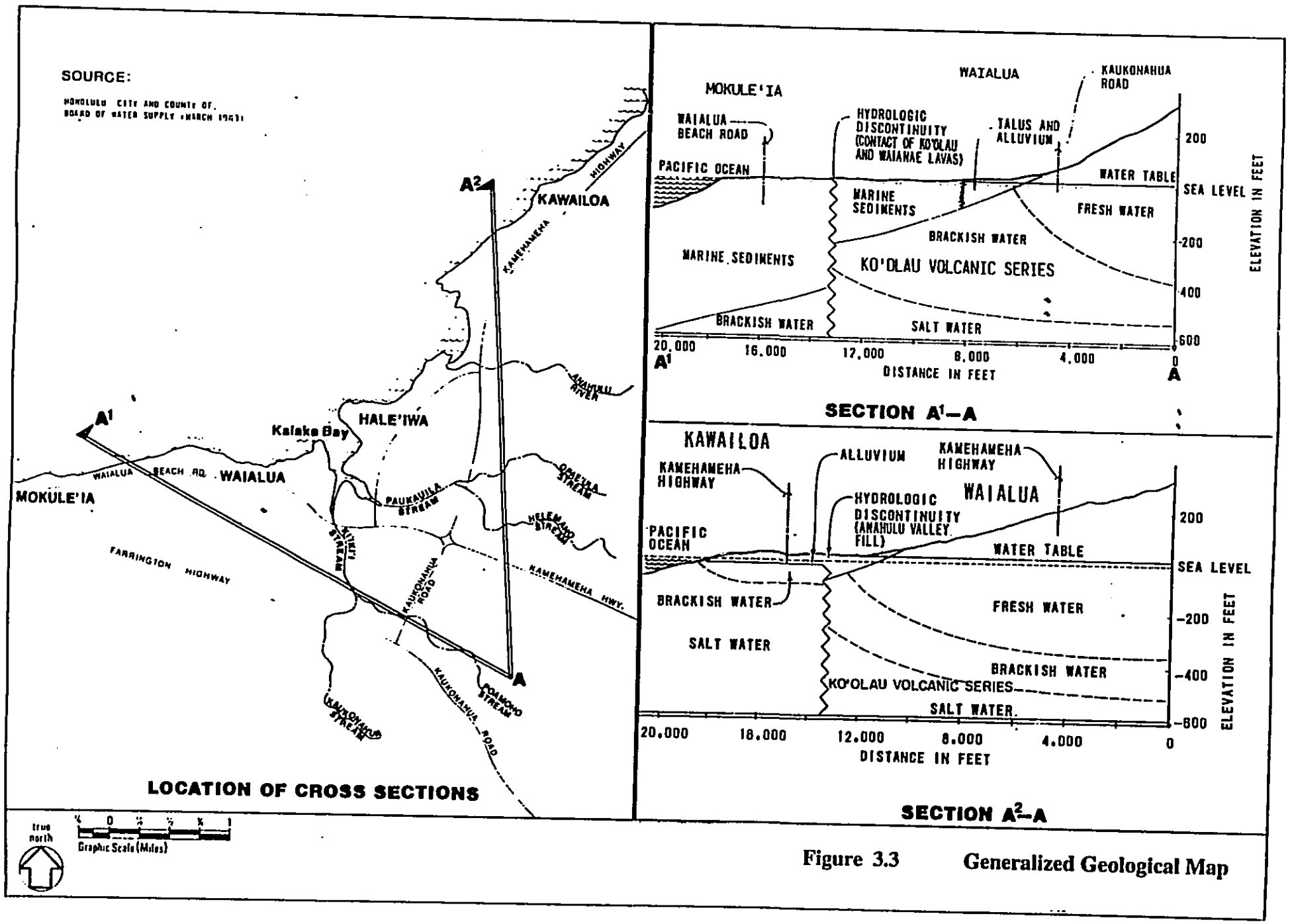


Figure 3.3 **Generalized Geological Map**

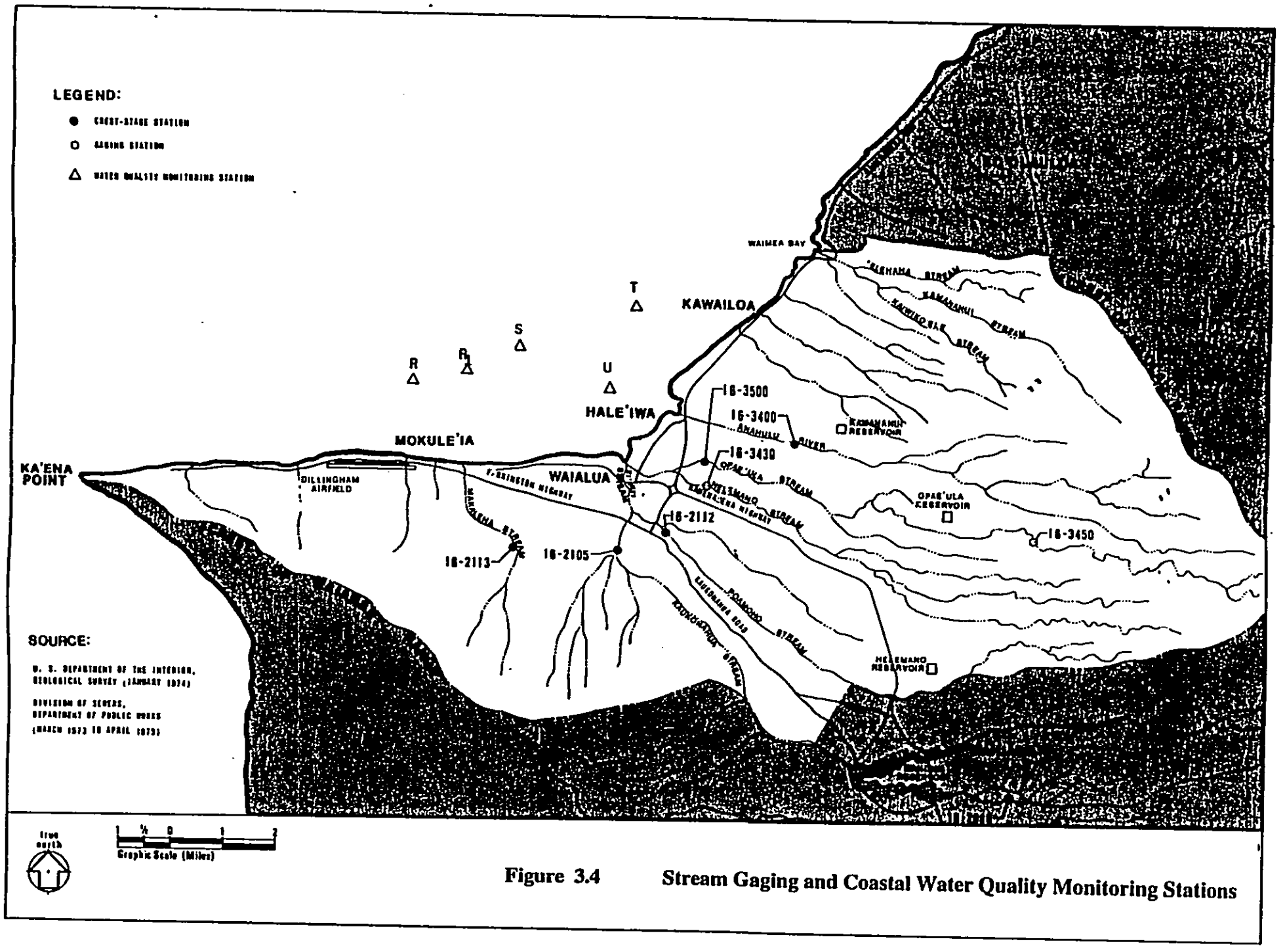


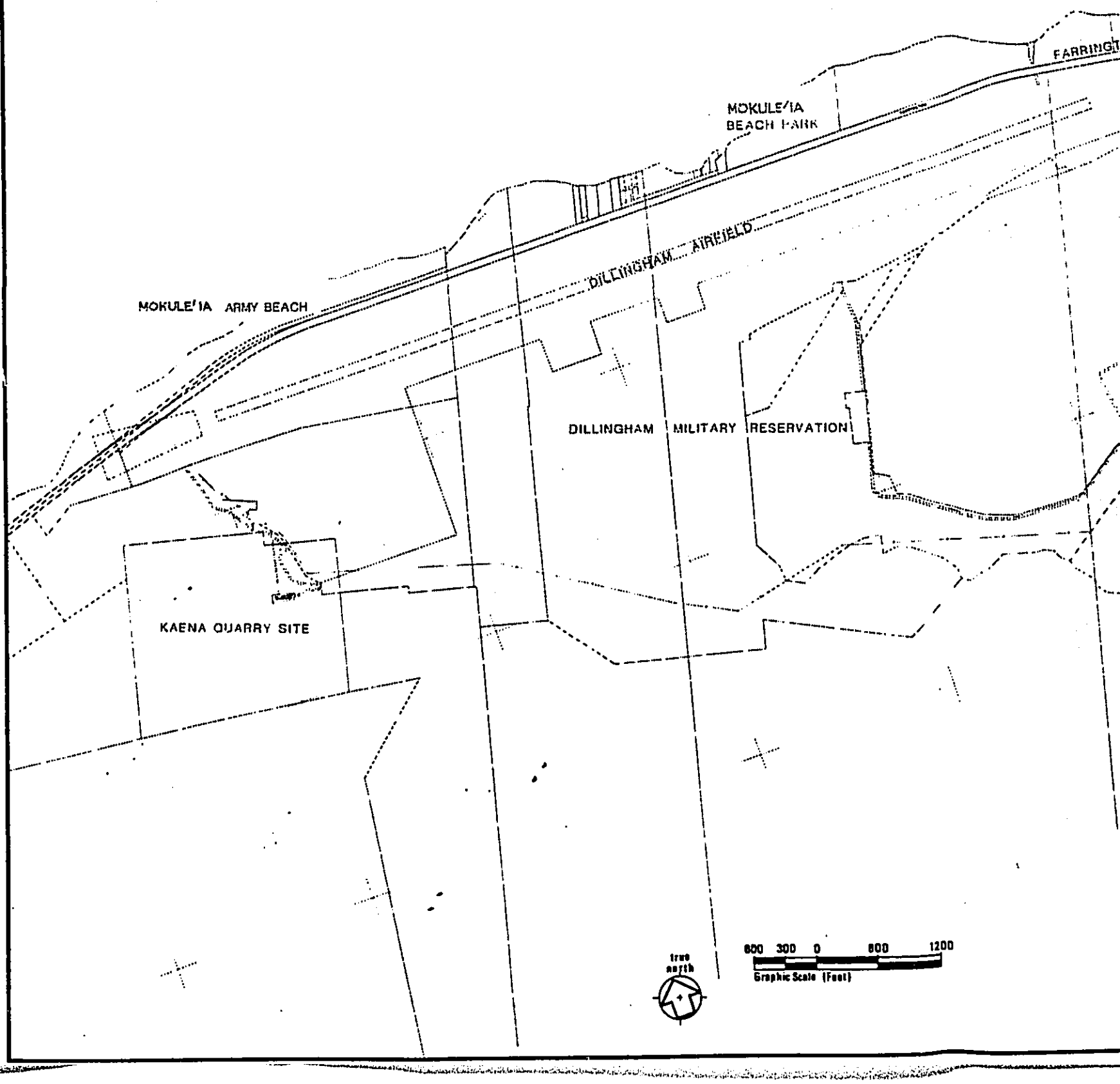
Figure 3.4 **Stream Gaging and Coastal Water Quality Monitoring Stations**

SOURCE:

R.M. TOWILL CORP. FLOOD MAP, PREPARED FOR FEMA (AUGUST 1986).

LEGEND:

- AREAS OF 100 YEAR FLOOD
- FLOODWAY
- AREAS BETWEEN LIMIT OF 100-YEAR FLOOD AND 500-YEAR FLOOD
- AREAS OF MINIMAL FLOODING



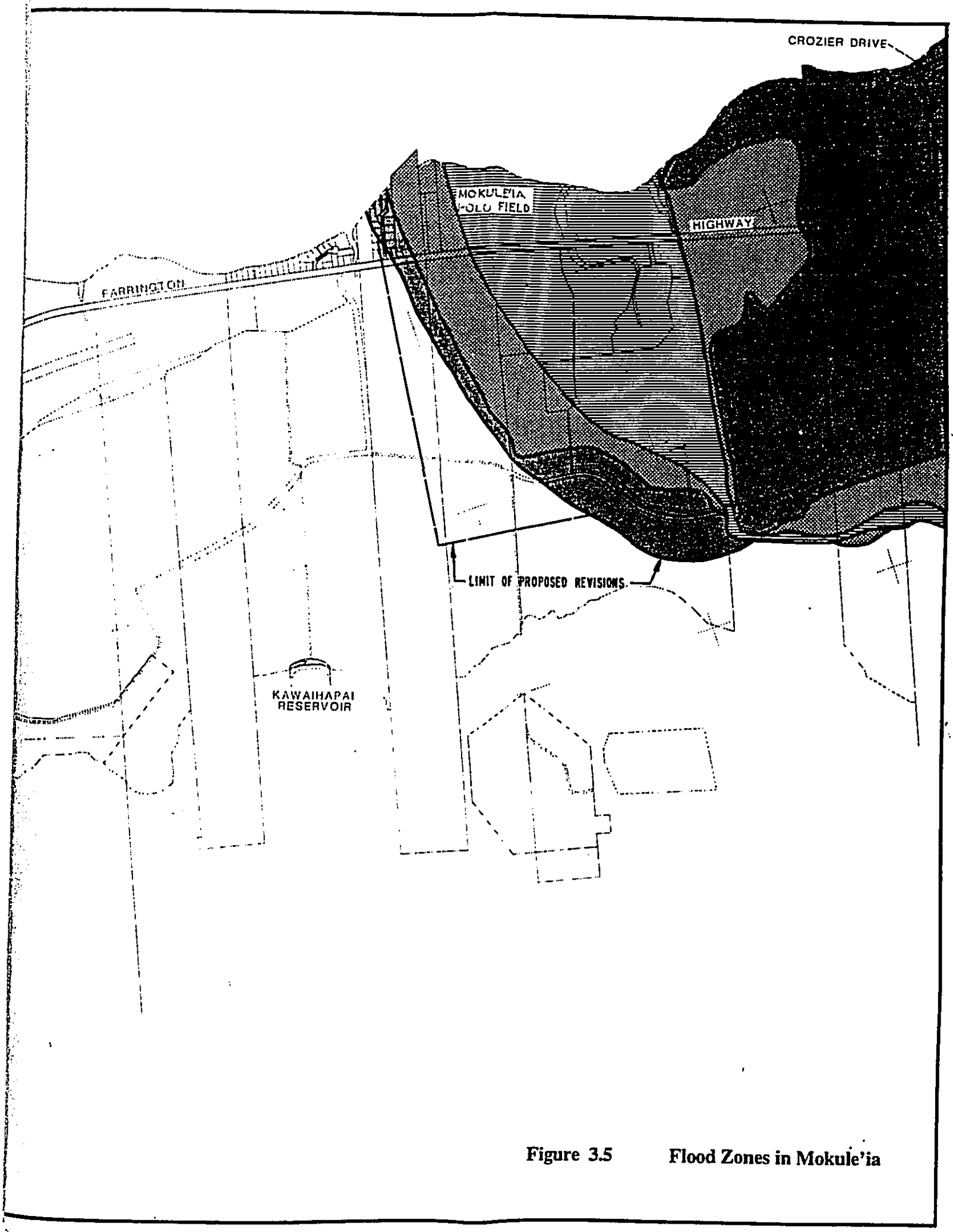


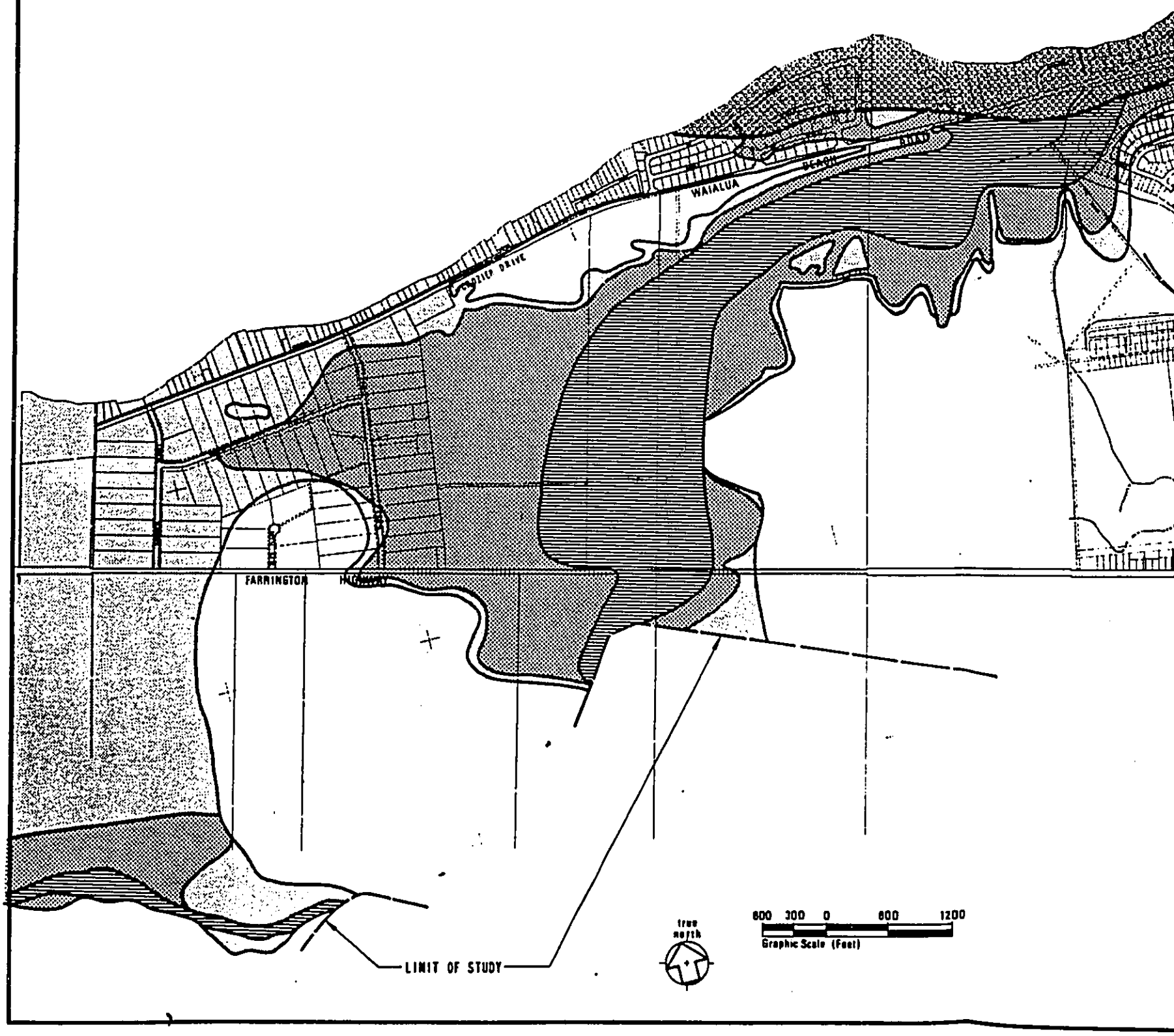
Figure 3.5 **Flood Zones in Mokule'ia**

SOURCE:

1. U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, FEDERAL INSURANCE ADMINISTRATION (SEPTEMBER 3, 1980) FIRM-FLOOD INSURANCE RATE MAP (#150001-0020A & #150001-0040A) AND FLOODWAY-FLOOD BOUNDARY AND FLOODWAY MAP
2. R.M. TOWILL CORP. FLOOD MAP, PREPARED FOR FEMA, AUGUST 1986.

LEGEND:

- AREAS OF 100 YEAR FLOOD
- FLOODWAY
- AREAS BETWEEN LIMIT OF 100-YEAR FLOOD AND 500-YEAR FLOOD
- AREAS OF 100-YEAR COASTAL FLOOD WITH VELOCITY (WAVE ACTION)
- AREAS OF MINIMAL FLOODING



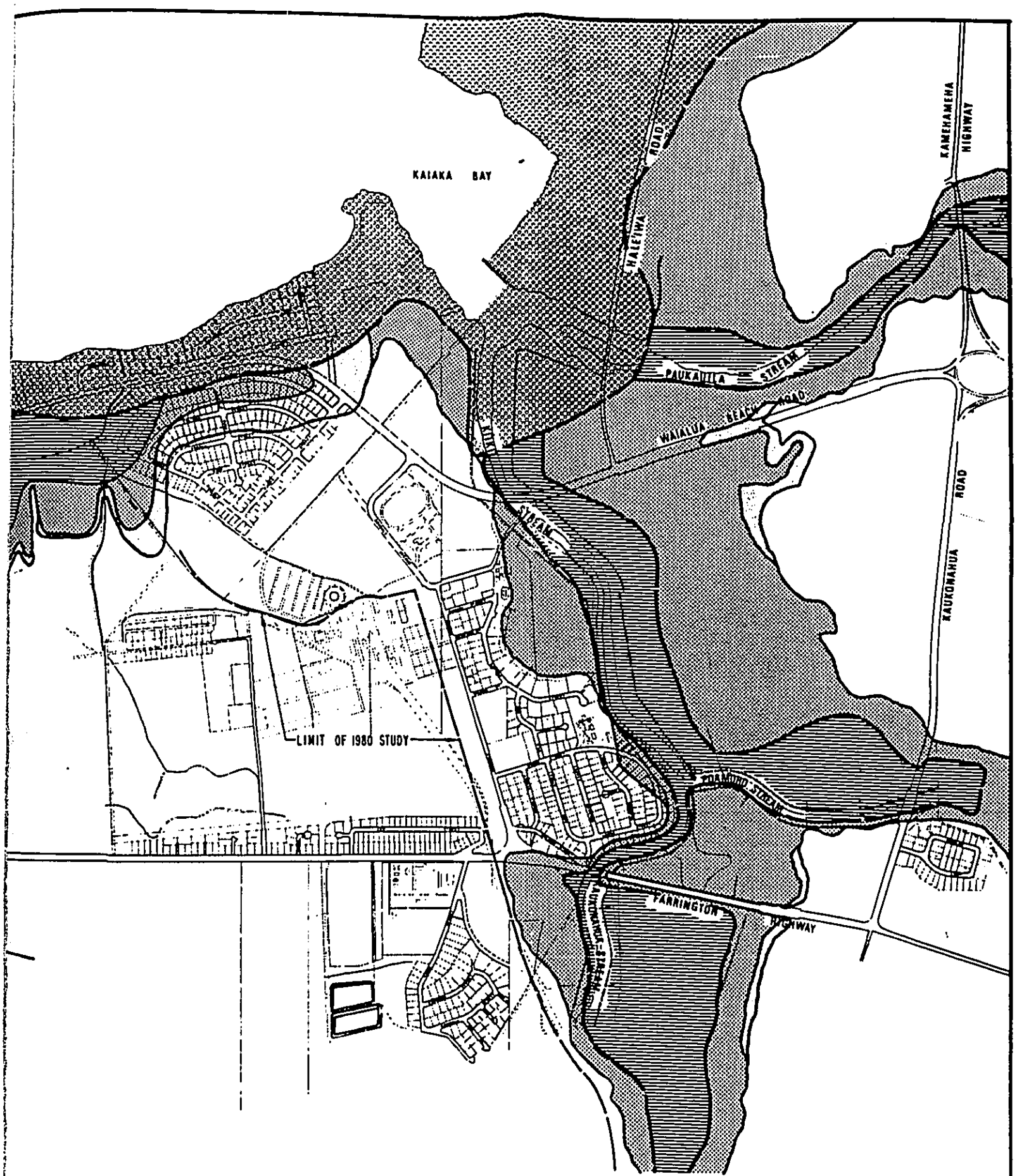


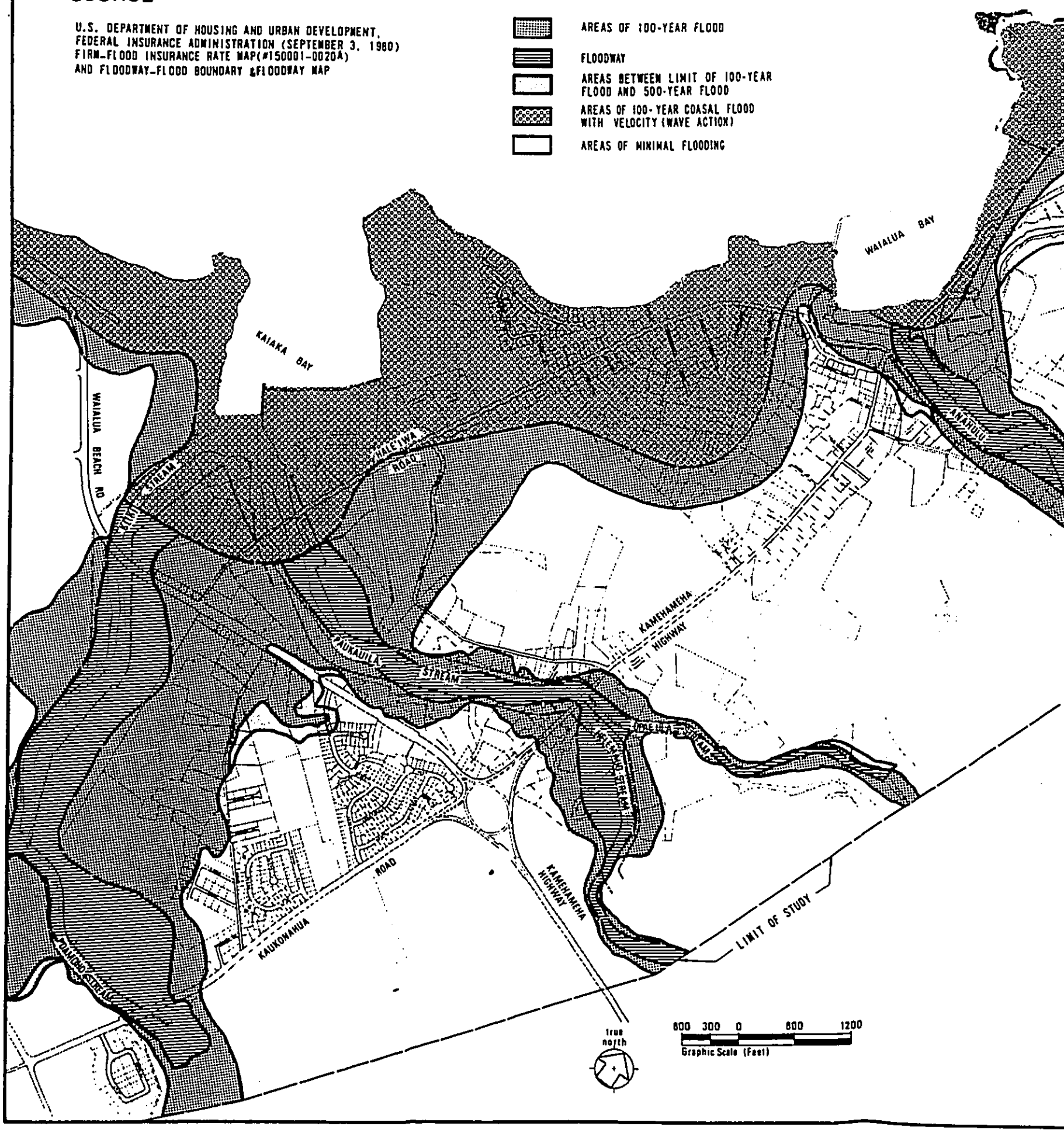
Figure 3.6 **Flood Zone in the Waialua Area**

SOURCE:

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT,
FEDERAL INSURANCE ADMINISTRATION (SEPTEMBER 3, 1980)
FIRM-FLOOD INSURANCE RATE MAP(#150001-0020A)
AND FLOODWAY-FLOOD BOUNDARY &FLOODWAY MAP

LEGEND:

- AREAS OF 100-YEAR FLOOD
- FLOODWAY
- AREAS BETWEEN LIMIT OF 100-YEAR FLOOD AND 500-YEAR FLOOD
- AREAS OF 100-YEAR COASAL FLOOD WITH VELOCITY (WAVE ACTION)
- AREAS OF MINIMAL FLOODING



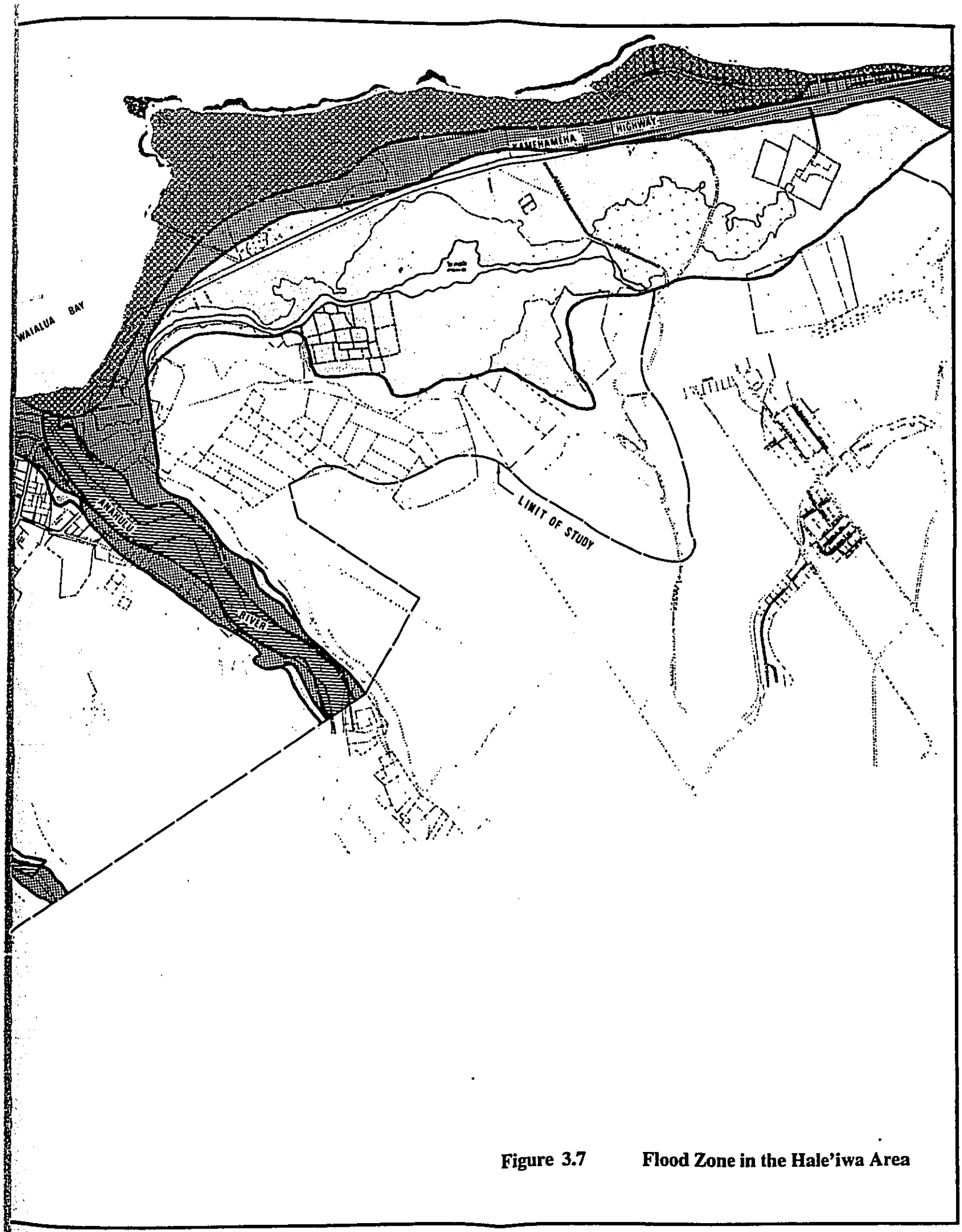


Figure 3.7 **Flood Zone in the Hale'iwa Area**

Table 3.4 New stream data for the Hale'iwa-Waialua area (HRI).

Stream	Site	Conductivity (micromhos) or Salinity(ppt)	Turbidity (NTU)	Non filterable Residue (mg/l)	Bio-chemical Oxygen Demand (mg/l)	Ammonia (mgN/l)	Nitrite and Nitrate (mgN/l)	Total Phos-Phos. (mgP/l)	Fecal Coliform (col/100ml)
State Water Quality Standard		300.00	2.00				0.3	0.3	
Anahulu	An1	14ppt	2.85	7.50	<2.00	0.030	0.337	0.067	490.00
Helemano	He1	13ppt	5.00	16.20	3.47	0.128	1.900	0.119	450.00
Kauko-nahua	Ka1	1500.00	4.62	5.40	<2.00	0.316	3.170	0.134	1800.00
	Ka2	490.00	19.20	33.50	3.08	0.020	0.008	0.085	n/a
	Ka3	126.00	4.05	2.20	<2.00	0.011	0.314	0.053	25.00
	Ka4	188.00	13.90	8.70	2.29	n/a	n/a	n/a	310.00
Kiikii	Ki1	23ppt	3.95	20.80	<2.00	0.004	0.318	0.074	33.00
	Ki2	18ppt	5.87	15.80	<2.00	0.115	0.542	0.102	100.00
Paukauila	Pa1	14ppt	3.81	14.60	2.97	0.153	0.004	0.129	42.00
	Pa2	16ppt	5.84	12.80	6.79	0.100	0.040	0.132	2900.00

A comparison of water quality data from the HRI sampling and USGS sampling indicate that nutrient levels can vary substantially within a watershed and that in general stream water quality improves farther up the stream course. Non-point sources are the primary cause of water quality degradation in the region. All of the watersheds in the area have been substantially altered for agricultural purposes. Diversions, impoundments, reduced stream-flows, siltation from cultivation and military land use practices, and nutrient loading from fertilizers and other agricultural chemicals have been factors in the reduction of stream water quality.

(b) Groundwater

O'ahu has a relatively permeable rock base which is saturated with water. This groundwater consists of a lens-shaped body of freshwater, which, because of its lower density "floats" on the denser saline water contained in surrounding rock. The exact location of the three-dimensional boundary between fresh and salt water is a function of the amount of freshwater recharge at the surface and the relative permeability of the rock units that are involved. Because of this, perhaps the single most basic measurement of groundwater quality is the chloride level. The greater the amount of outward moving freshwater and the more impermeable the caprock along the ocean, the lower the chloride concentrations are along the coast; lower the fresh-water recharge rates and/or higher permeability lead to more salt water intrusion.

Groundwater quality data have been collected and analyzed by First West Engineers, Inc., as part of that firm's work for the State DOH's Underground Injection Control regulations and the results are presented in Table 3.5. From this data, a 2,500 milligram per liter (mg/l) isochlor (line of equal concentration of chloride) was drawn. As shown in Figure 3.9, the 2,500 mg/l isochlor is at the coastline towards the western end of the study area, whereas at its eastern end it generally follows Kamehameha Highway; in the central portion of the region it swings farther inland.

Table 3.5 Groundwater quality data (First West Engineers, Inc., 1990).

Source	Fiscal Year Ending June 30, 1990 pH	Alkalinity	Parts per million Hardness	Chloride
Waialua-Kahuku District				
Kahuku Wells (4057-15)	7.92	62	55	36
(4057-16)	7.82	62	58	34
Waialee Well I (4101-07)	8.07	58	66	58
Waialee Well II (4101-08)	8.12	54	54	33
Hale'iwa Wells (3405-03)	7.56	74	60	48
(3405-04)	7.79	72	60	42
Waialua Wells (3405-01)	7.38	72	52	70
(3405-02	7.72	72	55	56

The UIC regulations adopted by the State DOH establish a line mauka of which domestic and industrial wastewater injection wells are not allowed. This line generally follows the 2,500 mg/l isochlor, but it has been drawn along recognizable boundaries for administrative clarity.

Of necessity, First West Engineer's estimate of the location of the 2,500 mg/l isochlor was based on water quality samples taken from many different wells. Each well draws from different depths and, hence, from different locations within the basal lens. Because of this, and differences in other parameters, such as quantity of water pumped, chloride levels in wells are not often directly comparable, and considerable professional judgment and interpretation were involved in delineation of the 2,500 mg/l isochlor. Thus, not all experts agree with the location shown. For example, the U.S. Dept. of the Interior, Geological Survey, Water Resources Division (March 31, 1982) has noted that Laniakea Springs in Kawailoa has a chloride concentration of 500 mg/l even though it is at the shoreline.

(c) Coastal Waters

The Marine Environment

Several broad classifications of open water and bottom types exist offshore the project area (roughly from Ka'ena Pt. to Waimea Bay). The most specific of these classifications are from the DOH Title 11, Chapter 54. In this scheme, all marine waters are designated as being either embayments, open coastal, or oceanic waters. Water quality criteria and an accompanying level of appropriate protection are specified for each designation. These designations are either Class AA or Class A. Class AA waters are the most highly protected and are to be managed so that the wilderness character of these areas be protected "... with an absolute minimum of pollution or alteration of water quality from any human caused source". Class A waters are primarily managed for recreational and aesthetic purposes though other uses are permitted so long as they are compatible with propagation of wildlife and recreation. Further, "such waters shall not act as receiving waters for any discharge that has not received the best degree of treatment or control as possible".

Bottom subtypes are; sand beaches, lava rock shoreline and solution benches, marine pools and protected coves, artificial basins, reef flats and reef communities, and soft bottom communities. These marine bottom ecosystems are likewise given two levels of

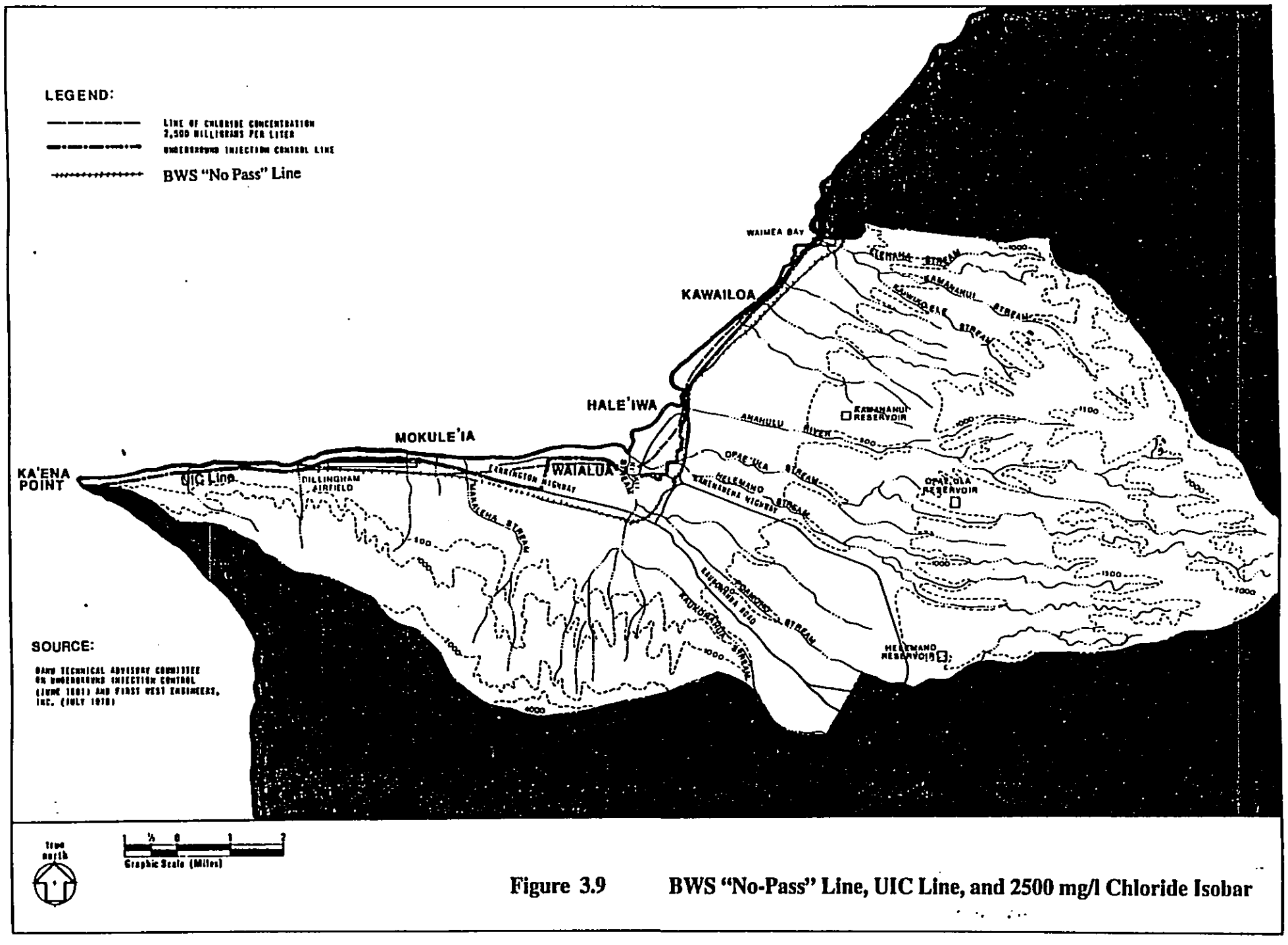


Figure 3.9 BWS "No-Pass" Line, UIC Line, and 2500 mg/l Chloride Isobar

protection, Class I and Class II. Class I bottom marine ecosystems are most highly protected and are to be managed in their natural state "... with an absolute minimum of pollution from any human-induced source". Class II marine bottom types are to be managed for the propagation of marine life and for recreation. Additionally, "Any action that may permanently or completely modify, alter, consume or degrade marine bottoms ..." requires written approval of the Director of Health.

Additional classifications are mandated by the Federal Water Pollution Control Act [Section 303(e) - Basin Planning] as reported in the 208 Plan. These regulations identify two marine water types in the region; Water Quality Limited Segments and Effluent Limitation Segments. Water Quality Limited Segments are those coastal areas that are identified by DOH that generally do not meet water quality standards and will likely not meet applicable standards even after effluent limitations on point source discharges are in place. Effluent Limitation Segments are the coastal areas where water quality standards are generally being met or where applicable standards will likely be met after effluent standards are in place.

Under the state classification scheme, all waters seaward of the 100 fathom line are designated oceanic waters and are considered Class A waters. The ocean area inside the 100 fathom line from the tip of Ka'ena point to a distance of 3.5 miles on both the southeast (Makua) and northeast (Mokule'ia) directions are designated Class AA open coastal waters, as is the reach from Kaiaka Pt. to Pua'ena Pt. (outside of Kaiaka Bay). All other coastal areas in the project area are Class A. Kaiaka Bay and Hale'iwa Boat Harbor are considered Class A embayments and Waialua Bay (exclusive of the boat harbor) is considered a Class AA embayment.

Bottom communities associated with Ka'ena Pt. Natural Area Reserve and Sharks Cove (Pupukea) Marine Life Conservation District are Class I bottom areas. These areas are lava rock shore line and solution benches. Waimea Bay is designated as a Class I wave exposed reef community. The Mokule'ia region has both solution bench and marine pool areas designated as Class II. Waialua Bay, Hale'iwa Boat Harbor, and Kaiaka Bay are Class II bottom areas.

The City and County 208 Plan identifies the waters within Waialua and Kaiaka Bays as a Water Quality Limited Segment. This reach (designated Hydrographic Area VI), was determined to be a medium use area amenable to water quality improvements. The watershed area draining into of Kaiaka Bay encompasses approximately 80 mi^2. Dale (1976) estimated an infusion of freshwater of 7.05 mgd via caprock leakage from the aquifer. Waialua Bay receives surface water from the Anahulu River which has a watershed of about 16 mi^2. An inflow of about 4.79 mgd of freshwater flows through the caprock and into the bay. The remainder of the coastal areas, to the southeast towards Ka'ena Pt. and to the northwest towards Kawela Bay, are designated Effluent Limitation Areas in the 208 Plan.

Marine Water Quality

Historical water quality data collected by DOH from Kaiaka Bay, Kawela Bay and Hale'iwa Beach Park (Waialua Bay) are presented in Table 3.6. Mean concentrations for many of the water standards are exceeded. Nutrient concentrations (measures of nitrogen and phosphorus), and measures of water clarity (suspended solids and turbidity) suggest that water quality conditions are being degraded from land-derived sources. A one-day survey of water quality parameters in Kaiaka and Waialua Bays, conducted by the Department of Public Works (DPW), gives similar results to the DOH data. Table 3.7 lists the water quality data collected in the DPW survey.

Table 3.6 Water quality data for Kaiaka Bay, Kawela Bay and Haleiwa Beach Park (DOH).

Site	Year	N	Temp	pH	DO (mg/l-O)	Nitrite & Nitrate (mg/l-N)	Ammonia (mg/l-N)	Total Kjeldahl (mg/l-N)	Ortho-P (mg/l-P)	Total-P (mg/l-P)	NTU Turbid.	Susp. Solids	Salinity
Standard Water Quality Standards (Embayment)			1° C from ambient	Between 7.6 - 8.6	Not less than 75% of saturation	0.005	0.0035	0.15	0.007	0.02	0.4	15.0	–
Kaiaka Bay	1987	4	24.3	8.1	6.5	0.02	0.15	0.22	n/a	0.01	n/a	39.1	33.2
	1988	4	24.9	8.2	6.4	0.03	0.05	0.23	n/a	0.02	n/a	15.2	31.6
	1989	4	24.4	8.1	7.2	0.01	0.06	0.17	n/a	0.02	n/a	24.6	24.4
	1990	6	24.6	8.2	6.6	0.02	0.06	0.17	n/a	0.01	n/a	35.2	32.1
Kawela Bay	1987	4	23.8	8.1	6.5	0.01	0.11	0.12	n/a	0.01	n/a	29.7	32.0
	1988	5	24.6	8.2	6.5	0.02	0.05	0.18	n/a	0.02	n/a	17.1	31.1
	1989	4	24.4	8.0	6.5	0.07	0.23	0.19	n/a	0.02	n/a	37.4	31.6
	1990	7	24.7	8.2	5.9	0.03	0.07	0.23	n/a	0.04	n/a	63.22	31.4
Haleiwa Beach Bay	1990	2	23.6	8.0	6.4	0.17	0.05	0.24	n/a	0.04	n/a	33.9	29.9

Table 3.7 Water quality data for Kalaka and Waialua Bays.September 9, 1987, data from Dept. of Public Works.

Site	Depth (m)	T	pH	DO (mg/l-O)	Nitrate & Nitrite (mg/l-N)	Ammonia (mg/l-N)	Kjeldahl Nitrogen (mg/l-N)	Total Nitrogen (mg/l-N)	Ortho-P (mg/l-P)	Total-P (mg/l-P)	NTU Turbid	Susp. Solids	Salinity	Entero-coccus	Fecal Coliform	Chl-a (mg/l)
State Water Quality Standards		1°C from amb.	7.6-8.6	>75% of satur.	0.005	0.0035	0.15		0.007	0.02	0.4	15.0	–			
WH-1	0	25.61	8.13	6.1	0.32	0.02	0.6	0.12	0.06	0.11	0.23	<1	34.04	12	24	0.06
	6	25.46	8.15	6.4	0.05	0.01	0.5	0.55	0.03	0.09	0.11	<1	34.91			0.41
	12	25.48	8.15	6.4	0.02	0.01	0.5	0.32	0.03	0.06	0.18	<1	34.98			0.13
WH-2	0	25.54	8.18	6.8	0.06	0.03	0.5	0.36	0.03	0.09	0.18	<1	34.78	8	12	0.05
	12	25.45	8.17	6.7	0.02	0.02	0.5	0.52	0.02	0.07	0.12	<1	34.99			0.19
	24	25.31	8.16	6.6	0.01	0.02	0.6	0.61	0.02	0.07	0.13	<1	34.99			0.16
WH-3	0	25.59	8.16	6.2	1.00	0.02	0.6	0.71	0.03	0.08	0.22	<1	34.99	12	18	0.18
	6	25.48	8.17	6.4	0.02	0.02	0.5	0.53	0.02	0.08	0.14	<1	34.97			0.39
WH-4	0	25.54	8.11	5.4	0.05	0.02	0.5	0.55	0.03	0.07	0.17	<1	34.82	3	6	0.21
	12	25.35	8.15	6.2	0.02	0.03	0.7	0.72	0.03	0.09	0.13	<1	34.96			0.25
	24	25.15	8.18	6.6	0.01	0.02	0.5	0.51	0.02	0.12	0.09	<1	34.99			0.27
WH-5	0	25.45	8.16	6.4	0.02	0.03	0.3	0.32	0.02	0.09	0.12	<1	34.93	<1	<1	0.11
	12	25.43	8.16	6.3	0.02	0.02	0.4	0.42	0.02	0.06	0.08	<1	34.94			0.11
	24	25.31	8.17	6.3	0.02	0.03	0.4	0.42	0.02	0.08	0.08	<1	34.96			0.15
WH-6	0	25.45	8.17	6.3	0.01	0.03	0.4	0.41	0.02	0.07	0.14	<1	34.94	<1	<1	0.07
	6	25.41	8.19	6.4	0.01	0.02	0.4	0.41	0.02	0.15	0.09	<1	34.94			0.21

Upon inspection of the available water quality data from Kaiaka and Waialua Bays, it can be seen that all parameters covered by State standards are exceeded, with the exception of dissolved oxygens and pH. The most notable violations are for total and orthophosphate phosphorus, nitrite and nitrate nitrogen, turbidity, and suspended solids. The possible pollutant sources are sediment from soil erosion within the drainage basin, household cesspools, and septage pits and injection wells from the one municipal and 12 private WWTSs.

Bacteriological data from DOH for five open-water sites in the North Shore region are presented in Table 3.8. In nearly all cases the DOH standard fecal coliform (FC) limitation (<200 FC/100ml) are met. A one-day bacteriological survey by the Department of Public Works of both shoreline and open-water sites, as shown in Table 3.9, gave similar results in which there were no sites where the DOH FC limitations were exceeded. Previously reported surveys throughout the north shore region have shown that bacteriological conditions can change markedly between survey dates, and bacteria levels can greatly exceed DOH standards (BCA, 1987). Fecal coliforms are indicative of warm-blooded organisms fecal material entering the water. The material may be of human, domestic livestock or wild and feral animal origin.

(d) Bacteriological Survey

Bacteriological surveys were conducted at 14 monitoring stations within the Waialua-Hale'iwa planning area. Wet and dry weather data was collected from these sampling stations between February and June 1985. Results obtained from this survey are summarized in Tables 3.10 and 3.11.

Evaluations of the data indicates that only Stations No. 1, 2, 8, 12, 13, and 14 (located along the shoreline) meet current State Department of Health (DOH) fecal coliform (FC) limitations (≤200 FC/100 ml) during both wet and dry weather conditions. Samples from Station 3 (located at the mouth of a small stream) meet DOH limitations only during dry weather conditions. All other stations are located on inland portions of streams in the area and greatly exceed DOH limitations. Figure 3.10 shows the bacteriological sampling sites.

Stations found to be in violation of DOH limitations were further evaluated in terms of the fecal coliform to fecal streptococcus ratio (FC:FS). FC:FS ratios are utilized to determine the potential source of the high coliform count. Samples with FC:FS ratios greater than four are interpreted to be of human origin, ratios less than one are from animal sources, and ratios between one and two are of undetermined origin.

Based on analysis of the available data, it appears that the high coliform counts are of non-human origin. From the general location of these stations (on or near streams or stream outlets) it is highly possible that the pollution is generated from nearby agricultural areas. The exact location or type of source, however, cannot be pinpointed based on the data available. It is, therefore, anticipated that above standard coliform counts will continue to occur in this area.

(e) Nonpoint Source

The amount of sediment reaching Kaiaka and Waialua Bays is not known. The TCNPS estimated that 25,500 tons of sediment is being discharged into receiving waters in Hydrographic Area VI. Most of the sediments from forest, pineapple and sugarcane lands are deposited in the embayments. It is proposed that by the year 2000, more than 96 percent of the basin will be under an adequate conservation program.

Table 3.8 **Bacteriological data for North Shore region (DOH).**

Site	Year	Total Coliform Mean	Max	Min	N	Fecal Coliform Mean	Max	Min	N
Kaiaka	1973	175.7	2400	3	23	33	110	1	23
Bay	1974	357.9	4300	23	12	124.3	930	2	12
	1975	278.4	2300	17	8	60.1	2300	2	8
	1976	51.3	240	17	3	32.4	79	13	3
	1977	253	2400	11	8	43	330	2	8
	1978	1600	1600	1600	1	1600	1600	1600	1
	1988	8	8	8	1	2	2	2	1
	1989	28.6	50000	2	13	6.5	800	2	1
	1990	72.4	5000	2	28	19.2	1700	2	28
	1991	110	110	110	2	4	4	4	2
Kawela	1973	8.7	460	1	22	4.8	240	1	22
Bay									
	1974	28.9	230	2	12	18.4	130	2	12
	1975	15.6	240	4	6	8.6	240	2	6
	1977	8	8	8	1	8	8	8	1
	1988	22	22	22	1	4	4	4	1
	1989	132.9	1300	2	13	12.3	110	2	13
	1990	17	500	2	28	4.4	620	1	28
	1991	55.9	240	13	2	16.1	130	2	2
Hale'iwa	1973	6	460	1	22	3	93	1	22
Beach	1974	10.9	230	2	12	2.8	13	1	12
Park	1975	11.8	130	4	8	9.6	79	4	8
	1976	25.11	240	2	3	9.9	240	2	3
	1977	6	23	2	5	2.9	13	2	5
	1988	11	11	11	1	4	4	4	1
	1990	51.5	5	2	11	6.8	1700	2	17
	1991	34.6	300	4	2	2.8	4	2	2
Waimea	1974	4.3	46	2	12	2.6	46	2	1
Bay	1975	5.5	24	2	8	3	22	2	8
	1976	11.7	43	4	3	2	2	2	3
	1977	12.6	79	2	2	5.1	13	2	2
	1988	1100	1100	1100	1	30	30	30	1
	1990	77.1	1600	2	11	8.8	500	2	16
	1991	8.2	17	4	2	2.8	4	2	2
Chuns	1990	9.9	240	2	9	2.3	30	2	14
Reef	1991	6.8	23	2	2	6.8	23	2	2

Table 3.9 **Bacteriological survey of selected shoreline sites of the Hale'iwa and Waialua coastline, May 22, 1980. Dept. of Public Works, Wastewater Division.**

Site	Site Location	Fecal Coliform (per 100mL)	Enterococcus (per 100mL)
1	Papailoa Road (Public access)	2	2
2 (WHS-1)	Hale'iwa Beach Park (In front of memorial)	<1	1
3	Hale'iwa Boat Harbor Jetty (End of jetty)	30	13
4 (WHS-2)	Hale'iwa Beach Park (In front of surf center)	<1	1
5	Anahulu Stream Bridge (Kam Hwy)	49	42
6 (WHS-3)	Pikai St. (Public access)	<1	1
7 (WHS-4)	Kahaone Place (Public access)	1	<1
8 (WHS-6)	Mokule'ia Beach (Public access on Crozier Dr.)	<1	<1
9	Mokule'ia Beach "(Au St., no public access)"	<1	<1
10 (WHS-1)	Puuiki Beach "(No public access, end of Au)"	<1	<1
11	Kaiaka State Rec. Area	1	<1

Table 3.10 Bacteriological Survey - Wet Weather Conditions

Site No.		Date (1985)	Organism/100 ml Total Coliform	Fecal Coliform	Fecal Strep	FC:FS Ratio
1	Mokule'ia Beach off empty lot	2/4	4	4	6	<1
		2/26	1	1	18	<1
		3/6	2	<1	4	<1
2	Mokule'ia Beach off condominium	2/4	6	2	10	<1
		2/26	80	29	87	<1
		3/6	23	15	14	<1
3	Mokule'ia Beach off Hawthorne Stream	2/4	6	4	52	<1
		2/26+	9.6×10^4	3.2×10^4	2.0×10^4	1.6
		3/6	1.1×10^2	40	20	2.0
4	Ki'iki'i Stream at Waialua Beach Road	2/4	6.1×10^3	2.8×10^3	2.0×10^3	1.4
		2/6	1.0×10^4	6.0×10^3	6.3×10^3	<1
		3/6	1.1×10^4	1.1×10^4	4.6×10^3	<1
5	Ki'iki'i Stream at Farrington Hwy	2/4	6.6×10^3	1.2×10^3	8.0×10^3	<1
		2/26	5.0×10^3	9.0×10^2	2.9×10^3	<1
		3/6	1.5×10^4	2.0×10^3	5.3×10^3	<1
6	Paukauila Stream at Hale'iwa Road	2/4	3.5×10^3	1.7×10^3	1.5×10^3	1.1
		2/26	1.5×10^4	5.5×10^3	7.1×10^3	<1
		3/6	1.4×10^4	2.5×10^3	4.7×10^3	<1
7	Paukauila Stream at Kamehameha Hwy (Wahiawa fork)	2/4	1.6×10^4	7.7×10^3	1.5×10^4	<1
		2/26	2.4×10^3	4.0×10^2	2.1×10^3	<1
		3/6	5.3×10^3	1.2×10^3	7.2×10^3	<1
8	Waialua Bay off Pikai St.	2/4	8	8	4	2.0
		2/26	9	6	<1	>6
		3/6	5	4	5	<1
9	Anahulu River at Kamehameha Hwy	2/4	6.3×10^3	4.3×10^3	6.1×10^3	<1
		2/26	2.2×10^4	7.5×10^3	1.2×10^3	6.3
		3/6	5.6×10^3	1.2×10^3	2.8×10^3	<1
10	Anahulu River off Emmerson Road	2/4	7.2×10^4	1.4×10^4	8.0×10^4	<1
		2/26	1.3×10^4	4.1×10^3	1.1×10^4	<1
		3/6	4.8×10^3	2.0×10^3	4.2×10^3	<1
11	Waialua Bay off Jetty	2/4	4.0×10^2	4.0×10^2	1.1×10^2	3.6
		2/26	9.8×10^2	4.2×10^2	4.4×10^2	<1
		3/6	2.5×10^2	86	2.3×10^2	<1
12	Hale'iwa Beach Park	2/4	2	2	16	<1
		2/26	27	22	42	<1
		3/6	4	2	16	<1
13	Kawailoa Beach off Papailoa Road	2/4	2	<2	4	<1
		2/26	<1	5	11	<1
		3/6	4	<1	1	<1
14	Kawailoa Beach at Laniakea	2/4	4	4	2	2
		2/26	18	18	30	<1
		3/6	4	3	5	<1

Weather Conditions:

2/4: Heavy rains 24 hours prior, moderate rains during and after sampling. Streams slightly turbid. High surf.

2/26: Heavy rains 24 hours prior, light rains during sampling. High flow in streams with moderate turbidity.

3/6: Heavy rains 24 hours prior, moderate to light rains during sampling. High to moderate flow in streams with slight turbidity.

+ Hawthorne Stream opened to ocean by Waialua Sugar Co. approx. 2.5 hrs. prior to sampling.

Source: City & County of Honolulu, Dept. of Public Works, Div. of Wastewater Management.

Table 3.11 Bacterial Survey - Dry Weather Conditions

Site No.		Date (1985)	Organism/100 ml Total Coliform	Fecal Coliform	Fecal Strep	FC:FS Ratio
			Total Coliform	Fecal Coliform	Fecal Strep	
1	Mokule'ia Beach off empty lot	5/14	8	<1	<1	<1
		6/03	3	<1	13	<1
		6/17	1	<1	<1	<1
2	Mokule'ia Beach off condominium	5/14	17	<1	2	<1
		6/03	<1	<1	7	<1
		6/17	1	<1	1	<1
3	Mokule'ia Beach off Hawthrone Stream	5/14	150	<10	10	<1
		6/03	13	4	15	<1
		6/17	1	<1	2	<1
4	Ki'iki'i Stream at Waialua Beach Rd.	5/14	300	140	110	1.3
		6/03	1,600	110	140	<1
		6/17	1,800	70	100	<1
5	Ki'iki'i Stream at Farrington Hwy.	5/14	7,700	1,600	1,300	1.2
		6/03	7,000	100	560	<1
		6/17	9,500	2,800	710	3.9
6	Paukauila Stream at Hale'iwa Road	5/14	4,100	150	230	<1
		6/03	1,800	250	350	<1
		6/17	230	90	70	1.3
7	Paukauila Stream at Kamehameha Hwy. (Wahiawa fork)	5/14	3,800	280	220	1.3
		6/03	270	40	80	<1
		6/17	540	100	140	<1
8	Waialua Bay off Pikai St.	5/14	<1	<1	1	<1
		6/03	4	<1	1	<1
		6/17	<1	<1	<1	<1
9	Anahulu River at Kamehameha Hwy.	5/14	3,400	370	510	<1
		6/03	1,500	170	150	1.1
		6/17	460	150	110	1.4
10	Anahulu River off Emerson Road	5/14	9,000	300	730	<1
		6/03	2,500	50	400	<1
		6/17	140	90	400	<1
11	Waialua Bay off Jetty	5/14	370	55	40	1.4
		6/03	2	<1	2	<1
		6/17	5	5	2	2.5
12	Hale'iwa Beach Park	5/14	140	17	400	<1
		6/03	<2	<2	770	<1
		6/17	20	3	240	<1
13	Kawailoa Beach off Papailoa Road	5/14	1	1	<1	>1
		6/03	1	<1	<1	<1
		6/17	<1	<1	<1	<1
14	Kawailoa Beach at Laniakea	5/14	22	6	37	<1
		6/03	<1	<1	11	<1
		6/17	<1	<1	1	<1

Weather Conditions:

6/03: Clear weather 24 hours prior to and during sampling. Low stream flow with relatively clean waters. Seas calm with the tide rising. Beach site #12 was turbid.

6/17: Clear weather 24 hours prior to and during sampling. Low stream flow with relatively clean waters. Seas calm at low tide. Beach site #12 was turbid.

Source: City & County of Honolulu, Dept. of Public Works, Div. of Wastewater Management.

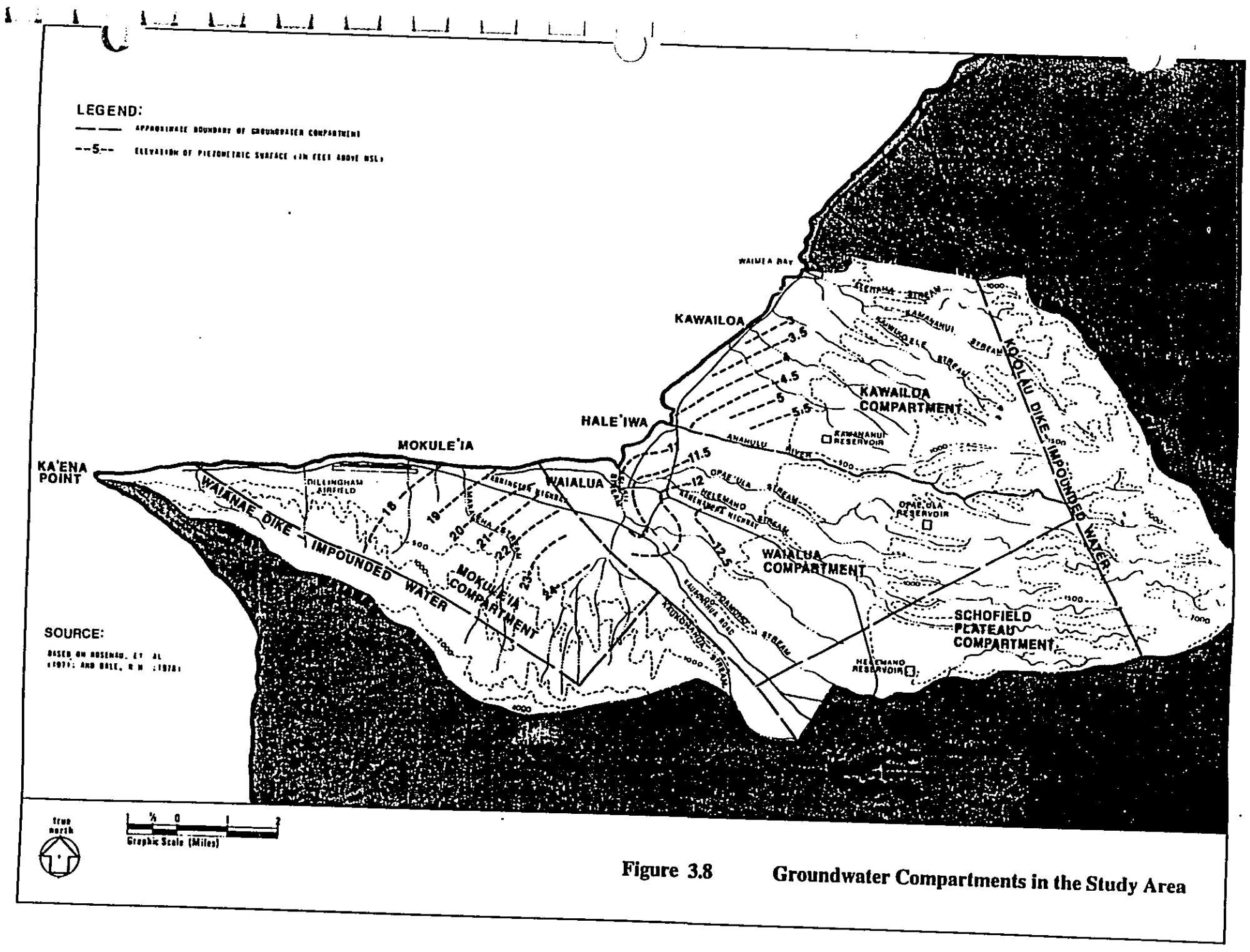


Figure 3.8 **Groundwater Compartments in the Study Area**

Table 3.3 **Existing water quality data for various streams in study area .**

Stream	Year	Site	Conductivity (micromhos) or Salinity (ppt)	Turbidity (NTU)	Nitrite & Nitrate (mgN/l)	Total Phosphorus (mgP/l)	Ortho-phosphorus ($mgPO_4/l$)
State Water Quality Standard			300.0	2.0	0.3	0.3	0.3
Helemano	1970	n/a	105	1.00	0.400	-	n/a
	1971	n/a	540	1.00	5.600	-	0.060
	1972	n/a	750	110.00	1.800	-	n/a
	1973	n/a	554	1.00	1.300	-	n/a
	1974	n/a	93	90.00	0.970	-	0.040
	1975	n/a	262	1.00	0.770	-	0.080
	1976	n/a	243	30.00	0.900	-	0.020
Opaeula	1971	n/a	310	15.00	3.600	-	0.060
(Near	1972	n/a	460	1.00	0.800	-	n/a
Hale'iwa)	1973	n/a	495	0.00	2.200	-	n/a
Opaeula	1970	n/a	40	5.00	0.500	-	n/a
(Near	1971	n/a	65	0.00	0.000	-	0.000
Wahiawa)	1972	n/a	50	1.00	0.000	-	n/a
	1973	n/a	54	2.00	n/a	-	0.100
	1974	n/a	35	4.00	0.000	-	0.020
	1975	n/a	52	2.00	0.000	-	0.020
	1976	n/a	49	3.00	0.000	-	0.000

(Source: Historical data from USGS annuals, 1970-1977, as cited in BCA 1987 Facility Plan.)

To present a more complete description of stream water quality conditions, Hydro Resources International (HRI) sampled most streams in the Waialua-Hale'iwa area. Samples were collected on June 6, 1992, during dry weather conditions. Opae'ula, Anahulu, Ki'iki'i, Paukauila, and Kaukonahua streams were sampled at one or more sites. The results of HRI stream sampling are shown in Table 3.4. Sampling sites were at low elevations in the streams, with the exception of Kaukonahua stream which was sampled once upstream near the Wahiawa Reservoir dam and twice at two sites located in the lower reaches of the stream. Site Ka-4 was in the reservoir impoundment itself. All other streams were sampled low enough that saltwater ingress from Kaiaka or Waialua Bays probably caused brackish water estuarine conditions on occasion. Salt water ingress would be especially noticeable during dry weather-low water conditions when reduced seaward flows allow brackish water to intrude farther upstream.

Only the most upstream site of Kaukonahua stream met the state standard of specific conductance. Sites Pa-1, Ki-1, Ki-2, An-1, and He-1 were apparently getting some influence from brackish water. Nutrient levels (as measured by nitrite and nitrate nitrogen and/or phosphorus) only met state standards at the site Ka-2 (Kaukonahua stream) and Paukauila stream. In general, turbidity was high and no sites met state standards, as were fecal coliform counts for which only three sampling sites met state water quality criteria.

SOURCE: DIVISION OF WASTEWATER MANAGEMENT,
CITY & COUNTY OF HONOLULU, MARCH 1985.

LEGEND: ② SAMPLING STATION

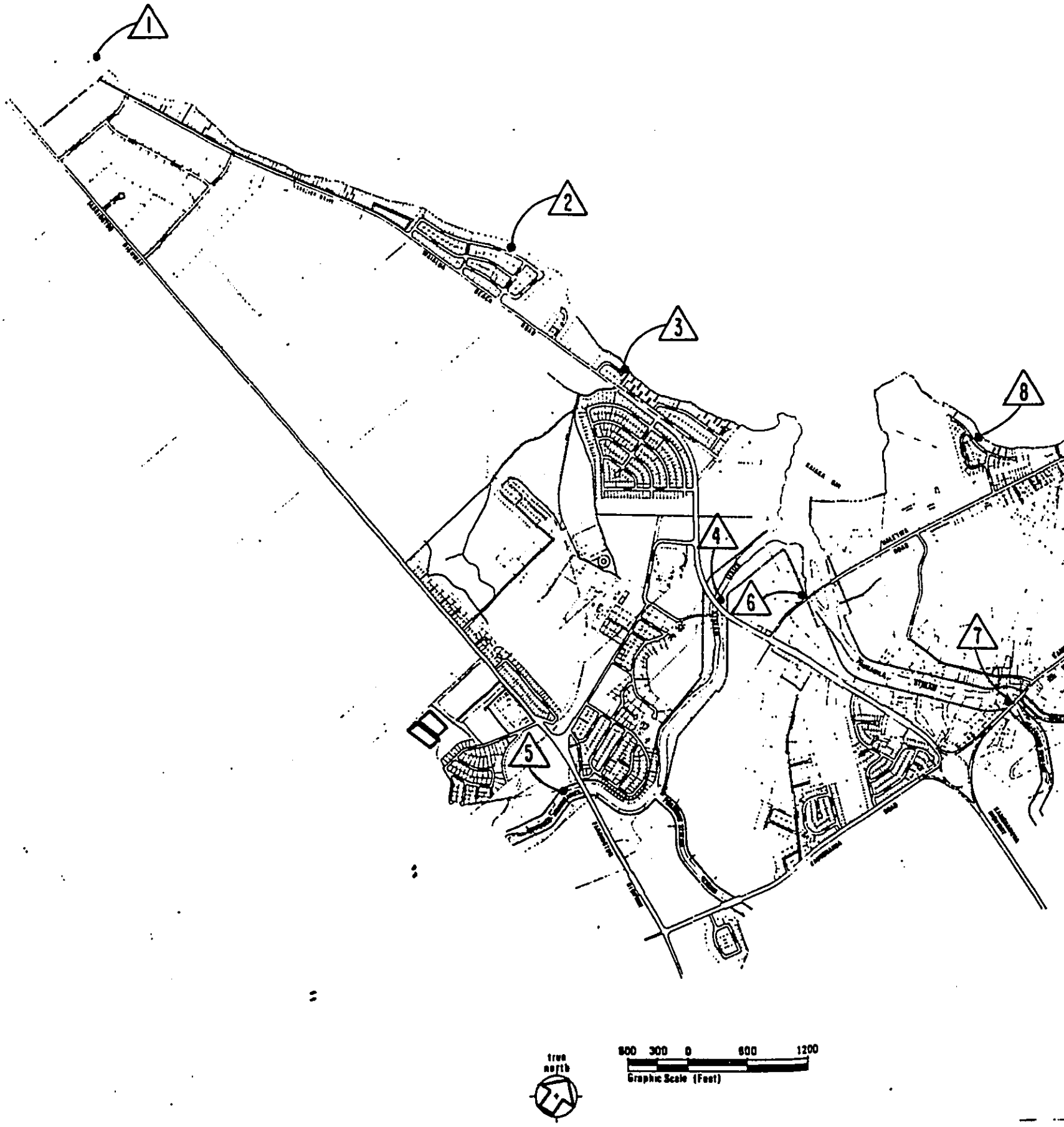


Figure 3.10 Bacteriological Survey Sampling Stations

Wahiawa Reservoir

The Waialua Sugar Company built Wahiawa Reservoir in 1906, as an impoundment for irrigation water. Surface flows from the north and south forks of Kaukonahua stream are held behind a dam placed just downstream of their confluence. Table 3.12 shows a typical annual water budget for the Wahiawa Reservoir. Total volume of water stored is about 11,355,000 m^3 (3 billion gallons).

Presently, there are two sewage treatment facilities discharging effluent into the reservoir, the Whitmore Village sewage treatment plant (0.15 mgd), and the Wahiawa sewage treatment plant (1.6 mgd). The water budget indicates that the two treatment plants account for 2.4% of the total inflow into the system. Irrigation drawdown accounts for the greatest amount of outflow (60%). Peak demand for irrigation occurs during the period of least rainfall (June through October) and the minimum storage volumes usually occur in October.

The limnological characteristics of Wahiawa Reservoir fall between oligomictic (stable stratification, irregular circulation), and warm monomictic (one annual circulation cycle). Normally, thermal stratification of reservoir water persists throughout the impoundment. If turnover and circulation occurs, it happens during a period of unusually cold weather, usually January.

Low and high water conditions surface water quality data for the Wahiawa Reservoir, input Kaukonahua Stream and nearby Ku Tree Reservoir are presented in Table 3.13. High nutrient content and low dissolved oxygen concentrations are most pronounced in Wahiawa Reservoir during periods of low stream inflow and low storage volume. Several large scale fish kills have occurred under these conditions and some annual fish kill information is given in Table 3.14. It is interesting to note the difference in water quality between Wahiawa and Ku Tree Reservoir. Ku Tree Reservoir is more pristine and does not receive wastewater effluent.

3.2.3 Soils

The U.S. Department of Agriculture, Soil Conservation Service (August 1972) has identified three soil associations in the planning area. The Tropohumults-Dystrandepts association is found on the east side of the Waianae Range. These soils are gently sloping to very steep and are well drained. There are ten soil types in this association, however, the Tropohumults and Dystrandepts account for 55% of the total. Since this association is composed of mostly steep and inaccessible land, these soils are used primarily for watershed, although some of the soils that comprise a minor portion of this association are used for woodland, pasture, pineapple, or sugarcane.

The Helemano-Wahiawa association comprises the soils of the central plateau. These deep soils are nearly level to moderately sloping, and are well drained. They occur in board flat areas dissected by steep gullies. Overall, the Helemano soils make up about 40% of the association, are found on the sides of gulches, and are used for pasture. The Wahiawa soils form 30% of the association, are located on the broad upland areas, and are used largely for sugarcane and pineapple. Three other soils series complete the remaining 30% of the association.

Table 3.12 Annual water budget for Wahiawa Reservoir (1973 data from Young et al, 1975)

Inflow	(million gal.)	Outflow	(million gal.)
Streamflow	13,641.0	Irrigation	8,719.0
Treatment plants	365.0	Leakage	84.4
Rainfall	371.0	Overflow	5,373.5
Runoff Input	806.0	Evaporation	386.0
Total	15,183.0	Total	14,544.9

(Difference of 638.1 mil gal is probably lost to groundwater.)

Table 3.13 Mean annual surface water quality values for Wahiawa Reservoir, Kaukonahua Stream, and nearby Ku Tree Reservoir (1973 data from Young et al., 1975).

LOW WATER CONDITIONS

Location	Total P (mg/l-P)	Ortho P (mg/l-P)	Chl-a (mg/sq m)	Total Kjeldahl (mg/l-N)	Ammonia (mg/l-N)	Nitrite & Nitrate (mg/l-N)
Wahiawa Reservoir						
Station 2s	0.36	0.18	37.0	0.27	0.19	0.51
Station 5	7.32	5.58	4.0	24.36	30.73	0.51
Station 17	7.51	7.41	3.0	5.78	4.54	0.64
Station 19	--	--	--	--	--	--
Stream Water						
South Fork	0.52	0.38	37.0	0.25	0.12	0.28
North Fork	0.22	0.08	45.0	0.51	0.51	0.47
Ku Tree Reservoir						
Station 10	0.14	0.02	1.5	0.14	0.07	0.04
Station 11	0.09	0.03	8.0	0.11	0.04	0.03

HIGH WATER CONDITIONS

Location	Total P (mg/l-P)	Ortho P (mg/l-P)	Chl-a (mg/sq m)	Total Kjeldahl (mg/l-N)	Ammonia (mg/l-N)	Nitrite & Nitrate (mg/l-N)
Wahiawa Reservoir						
Station 2s	0.25	0.11	31.0	0.21	0.07	0.06
Station 5	7.58	6.95	3.0	21.91	19.17	0.66
Station 17	10.65	9.81	5.0	4.45	3.71	0.81
Station 19	0.06	0.02	0.1	0.08	0.05	0.02
Stream Water						
South Fork	0.22	0.13	27.0	0.14	0.06	0.02
North Fork	0.13	0.05	16.0	0.21	0.09	0.08
Ku Tree Reservoir						
Station 10	0.12	0.02	0.2	0.09	0.01	0.05
Station 11	0.06	0.02	5.0	0.05	0.04	0.04

Table 3.14 Fish kills in Wahiawa Reservoir attributed to anoxia.

Date	Mortality (kg)	Mortality (tons)	Water Level (meters)	Water Level (feet)
Nov. 1962	45,350.0	50.0	8.2	27.0
Nov. 1968	8,163.0	9.0	10.4	34.0
Sept. 1972	1,361.0	1.5	12.5	41.0

(Note: the 1962 kill resulted in an estimated loss of 90% of fish biomass in the reservoir.)

The coastal plain has soils of the Ka'ena-Waialua association. These are formed in alluvium and have widely varying texture and drainage characteristics. In general, the Ka'ena and Waialua soils are 50% of the association, while the remainder is split among eleven other soil series. This association is used for sugarcane, truck crops, pasture, orchard, recreation and urban development.

The specific soils on which urban development within the planning area occurs are Jaucus sand (JaC), 'Ewa silty clay loam (EaB), Fill land (Fd), Hale'iwa silty clay (HeA), Kawaihapaai clay loam (KlA and KlB), Kea'au clay (KmA and KmbA), Mamala stony silty clay loam (MnC), Mokule'ia loam (Ms), Waialua silty clay (WkA), Waialua stony silty clay (WlB), and Waipahu silty clay (WzA). Figures 3.11, 3.12 and 3.13 show the various soil distributions in the Mokule'ia, Waialua and Hale'iwa study areas, respectively. Selected characteristics of these and other soils in the study area are shown in Table 3.15.

Only the soils marked with an "asterisk" are listed by the U.S. Department of Agriculture's Soil Conservation Service (August 1972), as having all features favorable for foundations of low buildings. The others mentioned above are listed as having slight to serious limitations for this use.

The capability classification shown for each soil type in the table indicates its general usefulness for agriculture. Capability is rated by roman numerals I through VIII, a higher number indicating greater limitations on the use of the soil for agriculture. The subclasses are designated by one of four letters after the roman numeral. These subclasses and their meanings are: e - there is risk of erosion; w - there is water in the soil; s - the soil is shallow or stony; and c - the climate is too dry.

Two soils series in the planning area that can be marshy are the Hale'iwa and Tropaquept soils. Generally, the Tropaquepts are "poorly drained soils that are periodically flooded by irrigation in order to grow crops that thrive in water," (U.S. Department of Agriculture, Soil Conservation Service, August, 1972:121). The Hale'iwa series are found on alluvial fans or along drainage ways of the coastal plain. They are usually well drained but included in the Hale'iwa silty clay mapping unit (HeA) as "areas of poorly drained clayey soils in depressions," (U.S. Department of Agriculture, Soil Conservation Service, August 1972). The area northeast of Lokoea Pond is classified as a marsh (MZ).

Table 3.15 Characteristics of the soils in the study area.

Source: U.S. Dept. of Agriculture (1972: Guide to Mapping Units & Table 3)		Capability		Classification
Map Symbol	Mapping Unit	Irri-gated	Non Irri-gated	Degree and kind of limitations for septic tank filter fields
CR	Coral outcrop	–	-VIIIs	n.a.
EaB	Ewa silty clay loam, 3-6%	IIe	IVc	Slight: moderate permeability; severe where soil is moderately shallow
EaC	Ewa silty clay loam, 6-12%	IIIe	IVe	
EmA	Ewa silty clay loam, mod. shallow, 0-2% slopes	IIs	IVs	
EwC	Ewa stony silty clay, 6-12% slopes	IIIe	IVe	Slight: moderate permeability
Fd	Fill land	–	–	n.a.
FL	Fill land, mixed	–	–	n.a.
HeA	Hale'iwa silty clay, 0-2% slopes	IIe	IIIc	Slight: except where subject to local flooding
HLMG	Helemano silty clay 30-90%	–	VIIe	Sever on slopes of 30-90%
JaC	Jaucus sand, 0-15% slopes	IVs	VIe	Slight: rapid permeability
KaB	Ka'ena clay, 2-6% slopes	IIIw	IVw	
KaeB	Ka'ena stony clay, 2-6% slopes	IIIw	IVW	Severe: slow permeability; seepage
KaeC	Ka'ena stony clay, 6-12% slopes	IIIw	IVw	
KanE	Ka'ena very stony clay loam, 10-35% slopes	–	VIw	
KeA	Kawaihapai clay loam, 0-2% slopes	I	IIc	Slight
KlB	Kawaihapai clay loam, 2-6% slopes	IIe	IIe	Slight
KlaA	Kawaihapai stony clay 0-2% slopes	IIs	IIs	Slight
KlaB	Kawaihapai stony clay 2-6% slopes	IIe	IIe	Slight
KlbC	Kawaihapai very stony clay loam, 0-15% slopes	–	VIs	Slight to moderate, depending on slope

Table 3.15 (Continued)

KmA	Kea'au clay, 0-2% slopes	IIIw	Vw	Severe:slow permeability; high water table
KmbA	Kea'au clay, saline 0-2% slopes	–	VIw	
KpF	Kemo'o silty clay, 35-70% slopes	–	VIIe	Severe due to slope
LaB	Lahaina silty clay, 3-7% slopes	IIe	IIIc	Slight
LaC	Lahaina silty clay, 7-15% slopes	IIIe	IIIe	Moderate, due to slope
LaC3	Lahaina silty clay, 7-15% slopes, severely eroded	IVe	IVe	Moderate, due to slope
Mnc	Mamala stony silty clay loam, 0-12% slopes	IIIs	IVs	Severs: coral at a depth of less than 20 inches
Ms	Mokule'ia loam	IIs	VIs	Slight: rapid permeability
Mt	Mokule'ia clay loam	IIs	VIs	below a depth of 20 inches
Mz	Marsh	–	VIIIw	n.a.
Ph	Pearl Harbor clay	TVw	TVw	Severe: ponds grained, slow
PsA	Pulehu clay loam, 0-3% slopes	I	IVc	Slight on slopes of 0-7%;
PuB	Pulehu stony loam, 2-6% slopes	IIe	IVs	moderate in low areas subject to occasional flooding
rSY	Stony steep land	–	VIIs	n.a.
rRK	Rock land	–	VIIs	n.a.
TR	Tropaquepts	IVw	IVw	Severe: high water table
WaB	Wahiawa silty clay, 3-8% slopes	IIe	IIe	Slight
WaD2	Wahiawa silty, clay 15-25% slopes, eroded	–	IVe	Severe, due to slope
WkA	Waialua silty clay, 3-8% slopes	I	IIIc	Slight on slopes of 0-8%; moderate permeability
WlB	Waialua stony silty clay, 3-8% slopes	IIIe	IIIs	
WzA	Waipahu silty clay, 0-2% slopes	I	IVc	Severe: moderately slow permeability

The soils series present in the developed areas that the Soil Conservation Service has classified as having severe limitation for septic tank leaching fields are Ka'ena (KaB, KaeB, KaeC, and KaeE); Kea'au (KmA and KmbA); Kemo'o (KpF); Mamala (Mnc); Pearl Harbor (Ph); Tropaquepts (TR); and Waipahu (WzA). Figures 3.14, 3.15 and 3.16 show the extent of agricultural lands in the areas of Mokule'ia, Waialua and Hale'iwa. The State Department of Agriculture (1977) has designated most of the arable acreage in the Waialua District as either "prime agricultural land" or "other important agricultural land". The total area of significant agricultural lands that exist in the district is 24,200 acres.

3.2.4 Climate

3.2.4.1 Winds

The prevailing winds in the Waialua District are the northeast tradewinds. A wind rose based on data collected at the Dillingham Airfield site in Mokule'ia is shown in Figure 3.17. It indicates that wind direction comes from the northeast through southeast about 80% of the time. Long-term data from other recording stations suggests that there is considerable seasonal variation in this number with the tradewinds prevailing over 90% of the time in the summer and about 60% of the time in mid-winter. Over the open ocean the tradewinds have a somewhat more northerly component than those recorded at Mokule'ia. Hence, it appears that the nearby Waianae Mountains exert some influence on wind direction there. Similar local influences undoubtedly affect winds elsewhere in the district, and winds at other locations will vary accordingly. There also appears to be a prevailing daily wind pattern. At sunset, the wind shifts and appears to come from a more easterly direction and is labeled as the Schofield wind. Nevertheless, the pattern shown in Figure 3.17 provides a reasonably good indication of what may be expected elsewhere near the coast in the Waialua District.

Wind speed also varies somewhat on a seasonal basis. Winds greater than 12 miles per hour occur less frequently during the winter than during the summer (e.g., 30% in January versus 70% in August). While there are more calms in the winter, winter storms generate the strongest gusts (about 70 mph).

3.2.4.2 Temperature

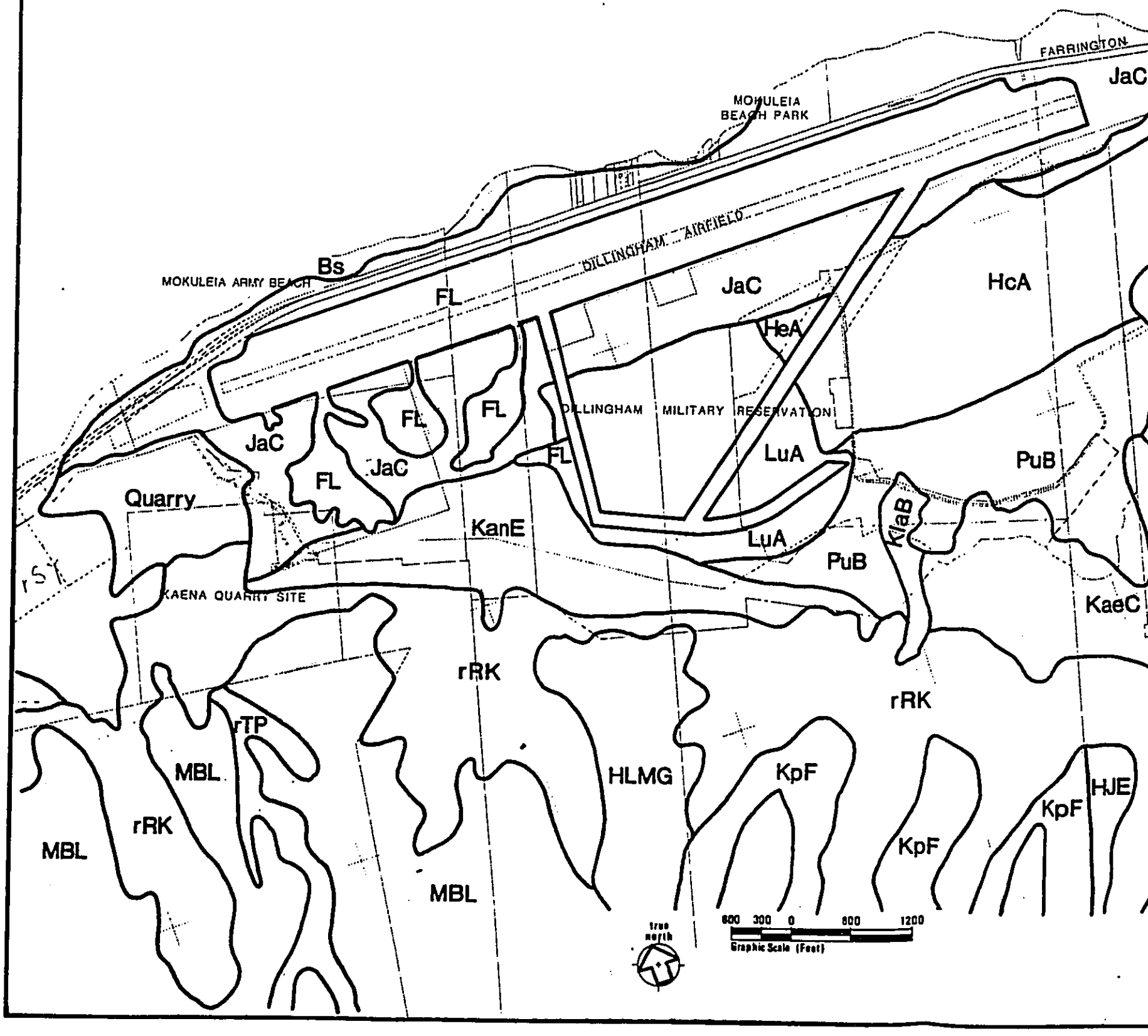
The mean annual temperature in Waialua is 73.5°F, and the seasonal variation is slight as can be seen in Figure 3.17. During the coldest month the mean monthly temperature is just over 70°F; during the warmest it is about 77°F. Normal daily lows at the coast in the winter are in the low to mid-60°F, in the summer they are closer to 70°F. The low of record at Waialua is in the upper 40°F. High temperatures at Waialua are typically in the low to mid-70°F in the winter and the mid-80°F in the summer. The highest temperature ever recorded at Waialua is 92°F.

3.2.4.3 Precipitation

Mean annual rainfall in Waialua town is about 30 inches. However, rainfall within the Waialua District exhibits great spatial variability, largely as a result of the orographic effects of terrain. Near the crest of the Ko'olau Mountains, the mean annual rainfall is close to 300 inches, or ten times the amount received at Waialua on the coast. Figure 3.18 shows the mean annual rainfall distribution in the Waialua District.

SOURCE:
U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE (1972)

LEGEND:
FOR EXPLANATION OF SOIL SYMBOLS
SEE TABLE



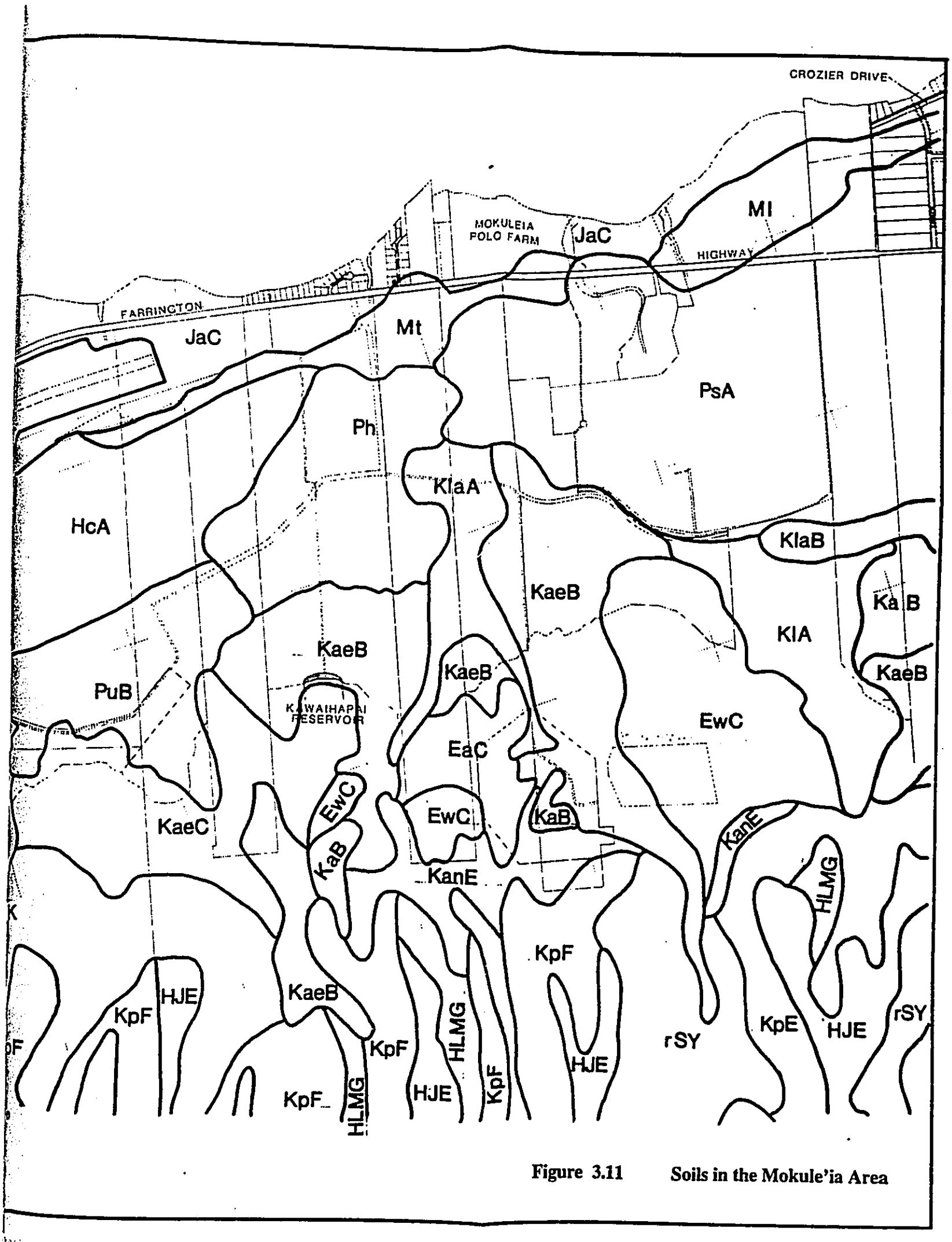
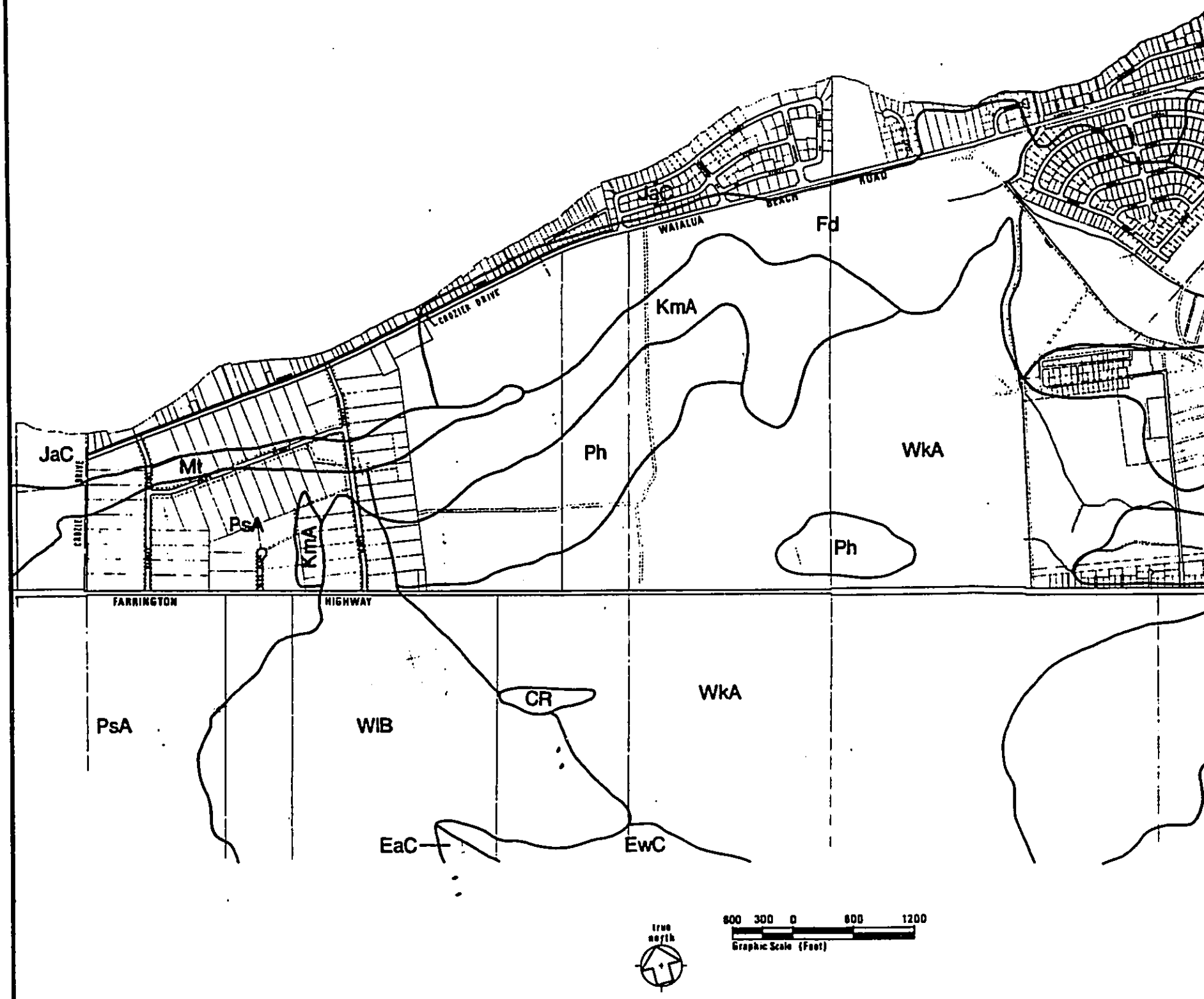


Figure 3.11 **Soils in the Mokule'ia Area**

SOURCE:
U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE (1972)

LEGEND:
FOR EXPLANATION OF SOIL SYMBOLS
SEE TABLE



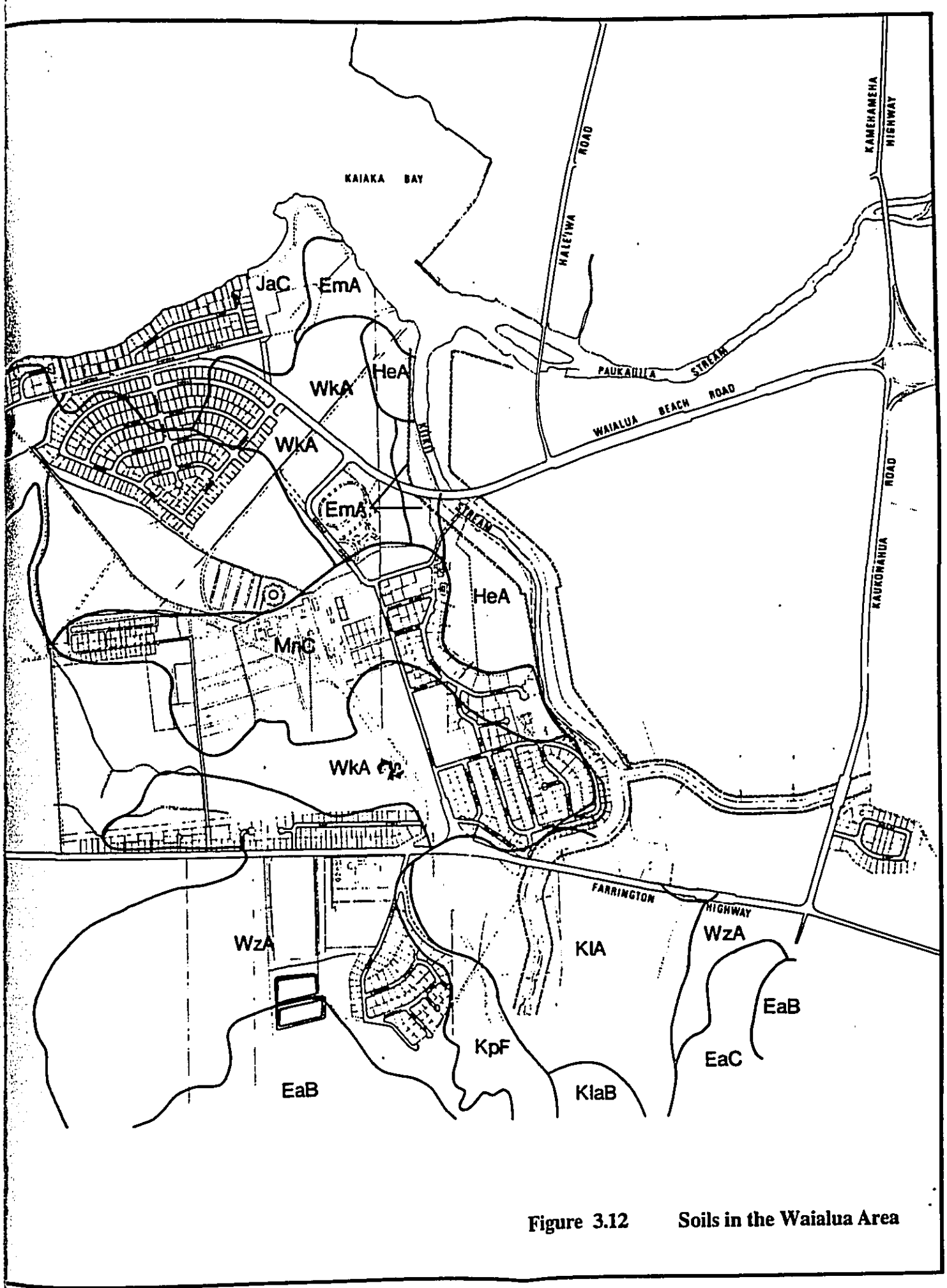
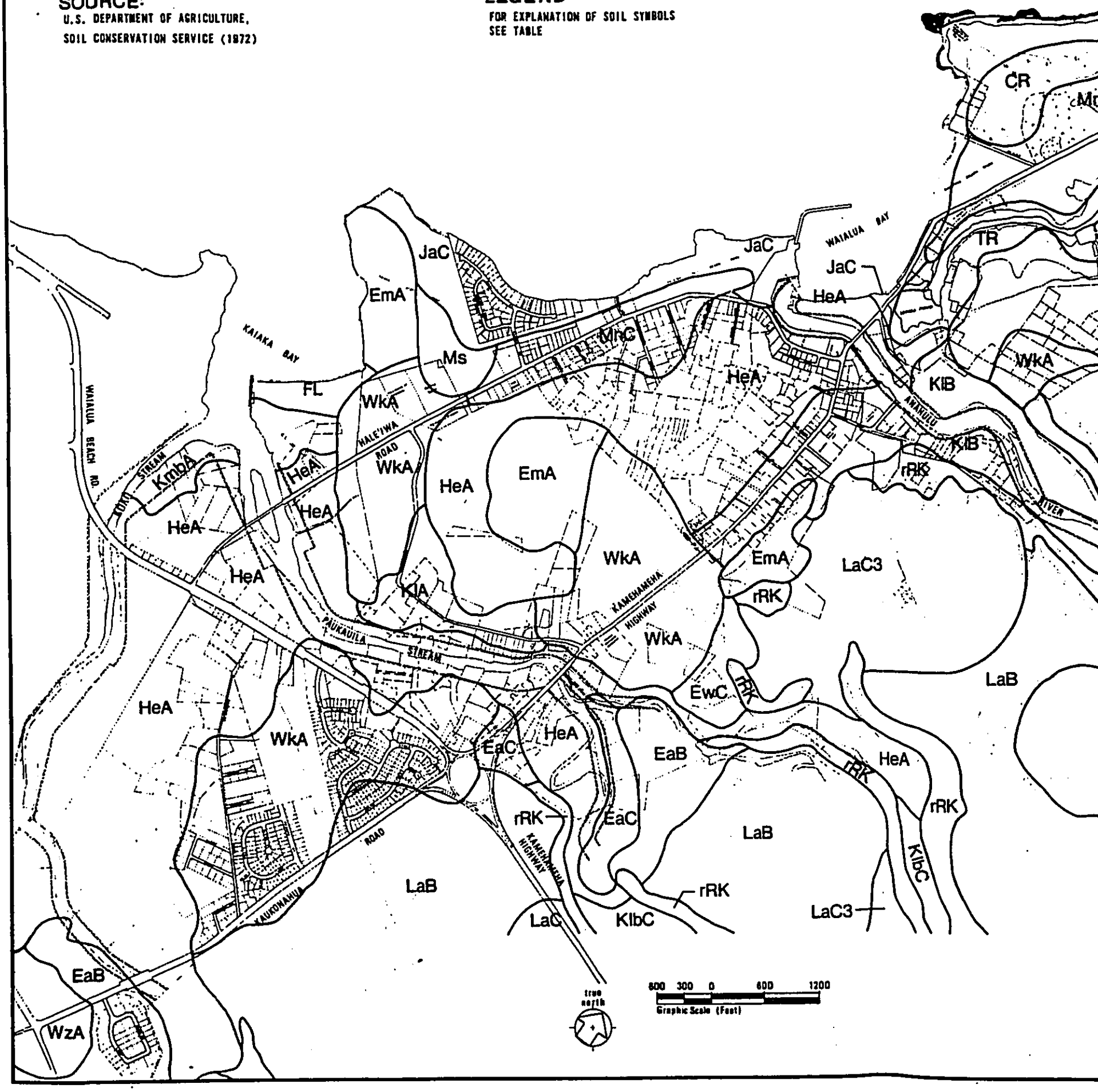


Figure 3.12 Soils in the Waialua Area

SOURCE:
U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE (1972)

LEGEND:
FOR EXPLANATION OF SOIL SYMBOLS
SEE TABLE



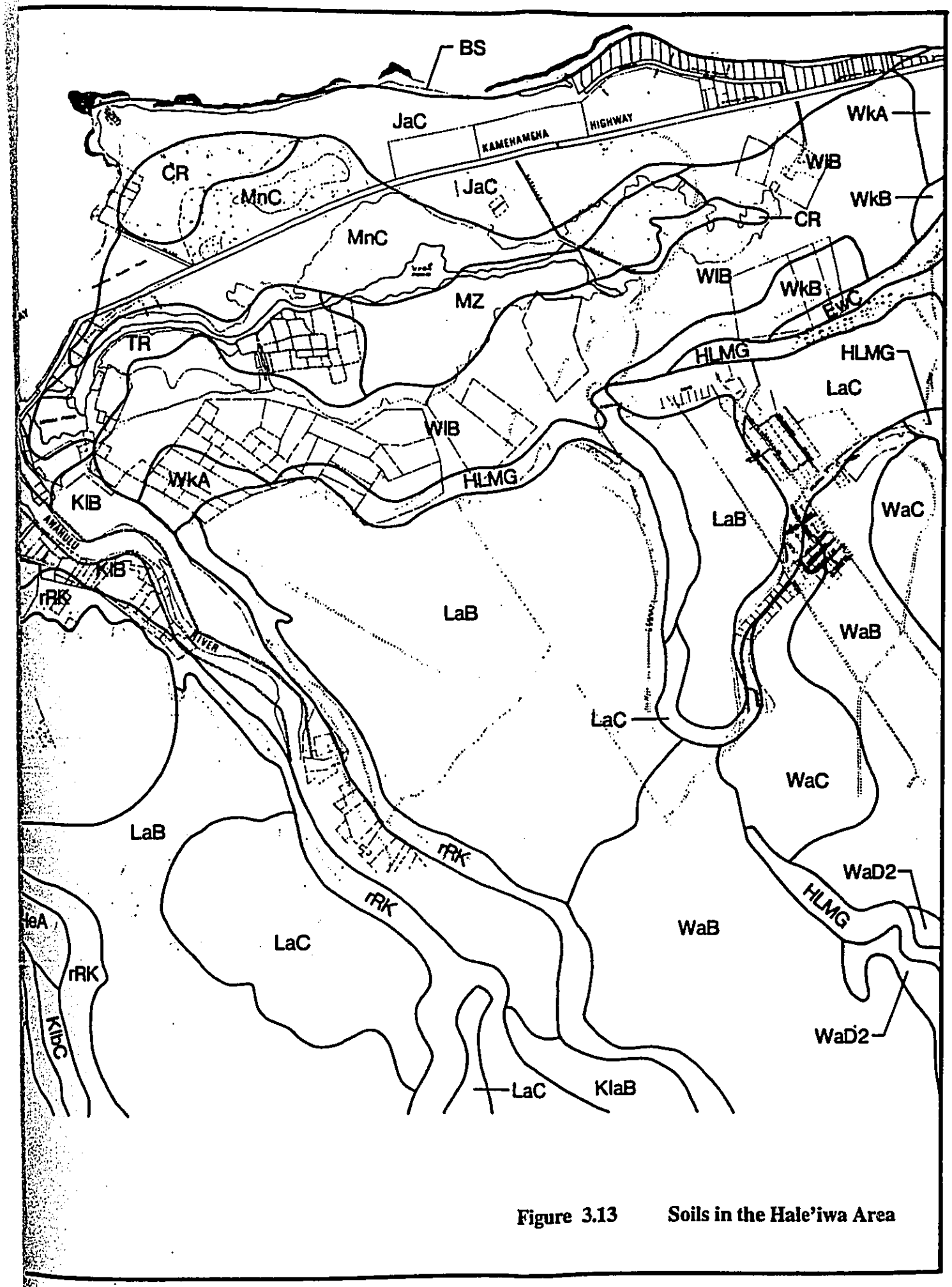


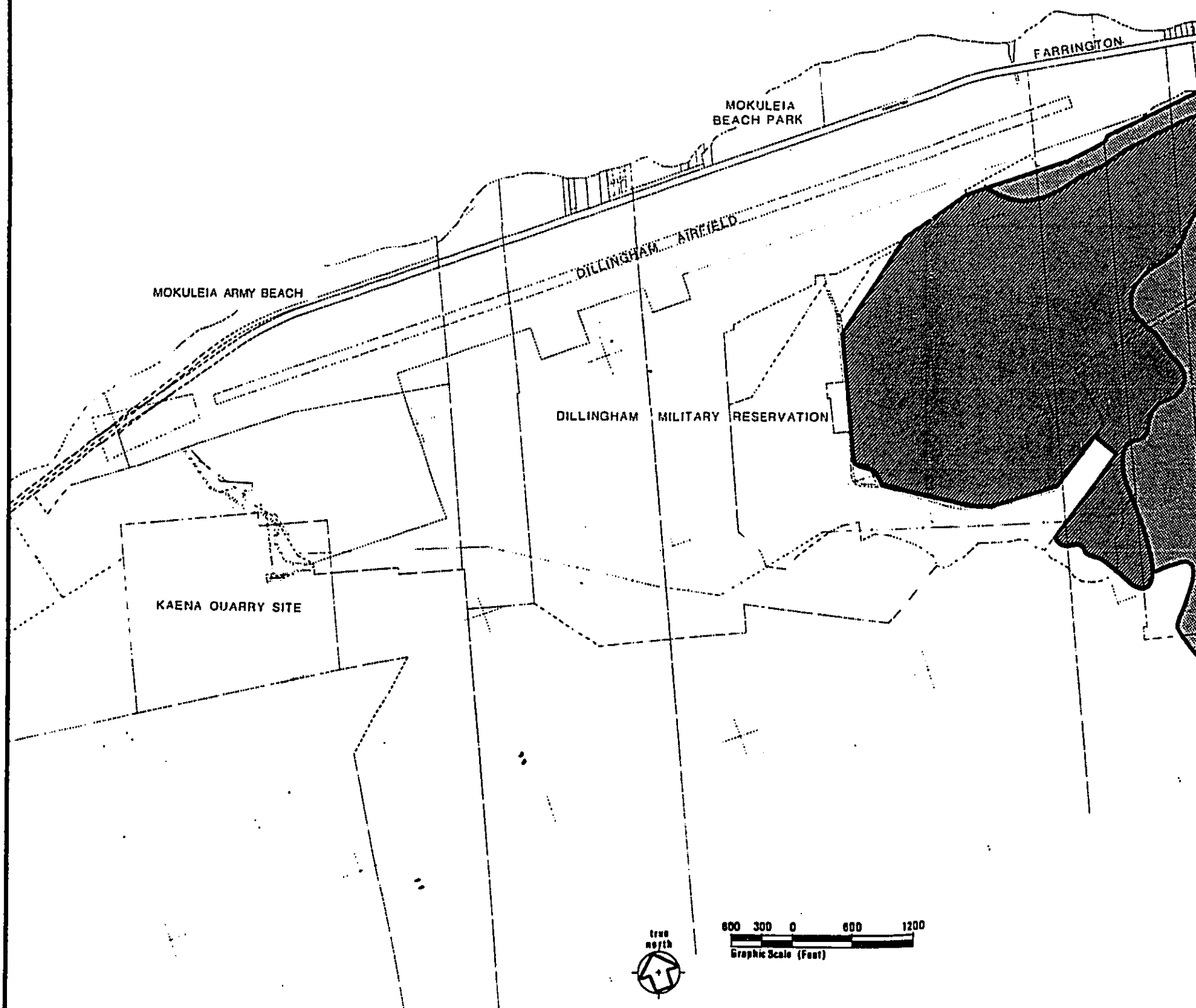
Figure 3.13 **Soils in the Hale'iwa Area**

SOURCE:

DEPARTMENT OF AGRICULTURE
STATE OF HAWAII

LEGEND:

- PRIME AGRICULTURAL LAND
- UNIQUE AGRICULTURAL LAND
- OTHER IMPORTANT AGRICULTURAL LAND



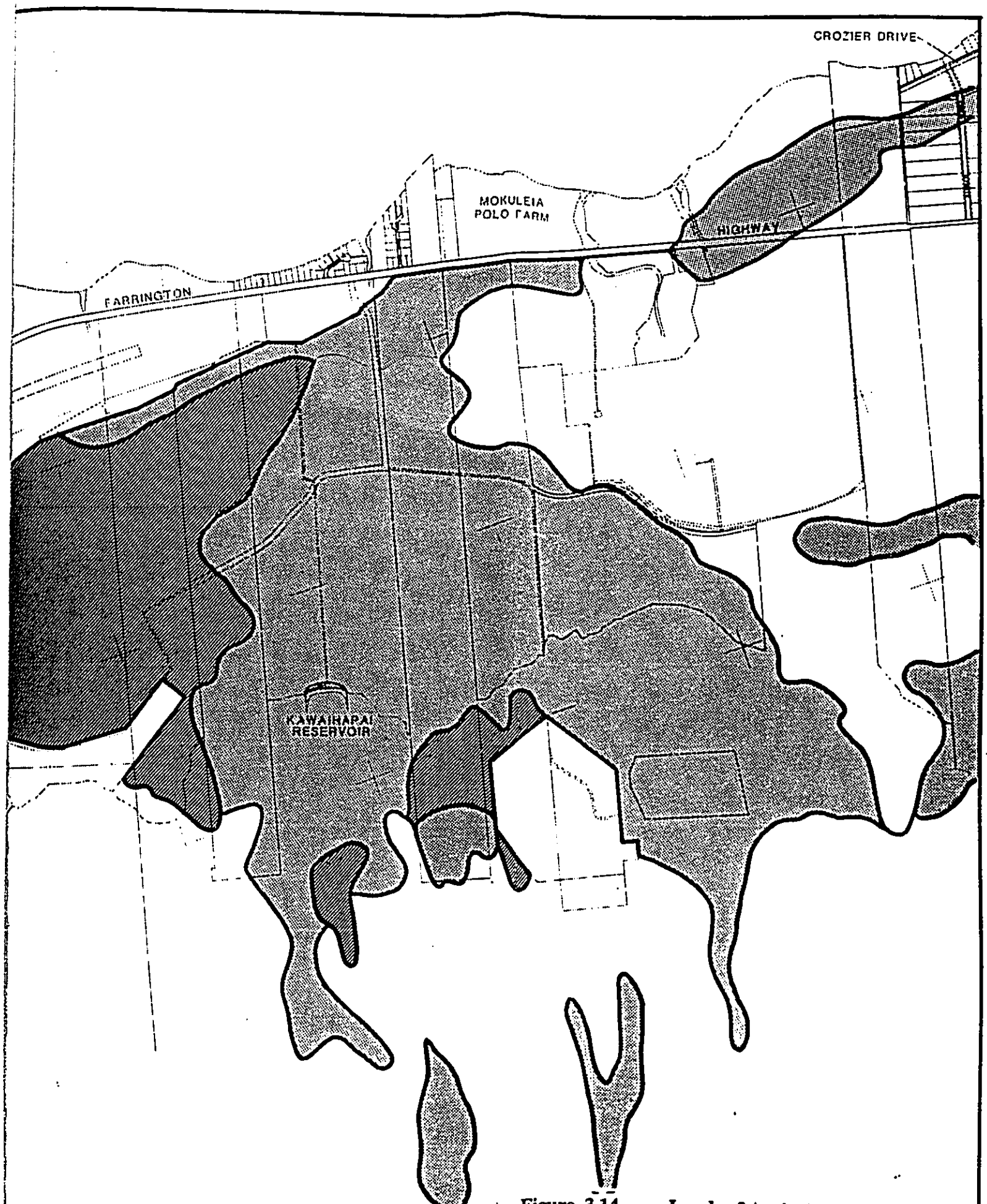


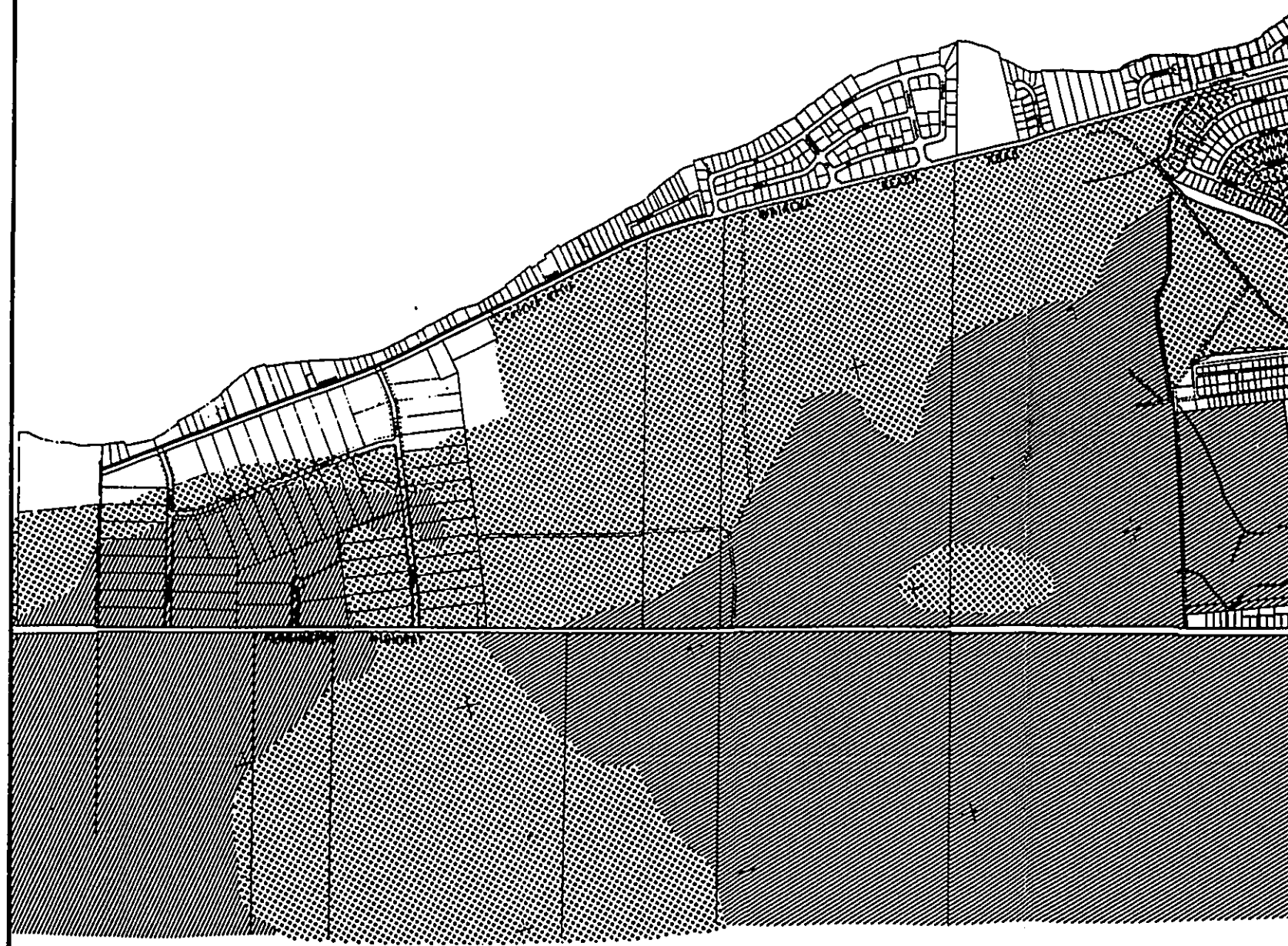
Figure 3.14 **Lands of Agricultural Importance Mokule'ia**

SOURCE:

DEPARTMENT OF AGRICULTURE
STATE OF HAWAII

LEGEND:

- PRIME AGRICULTURAL LAND
- UNIQUE AGRICULTURAL LAND
- OTHER IMPORTANT AGRICULTURAL LAND



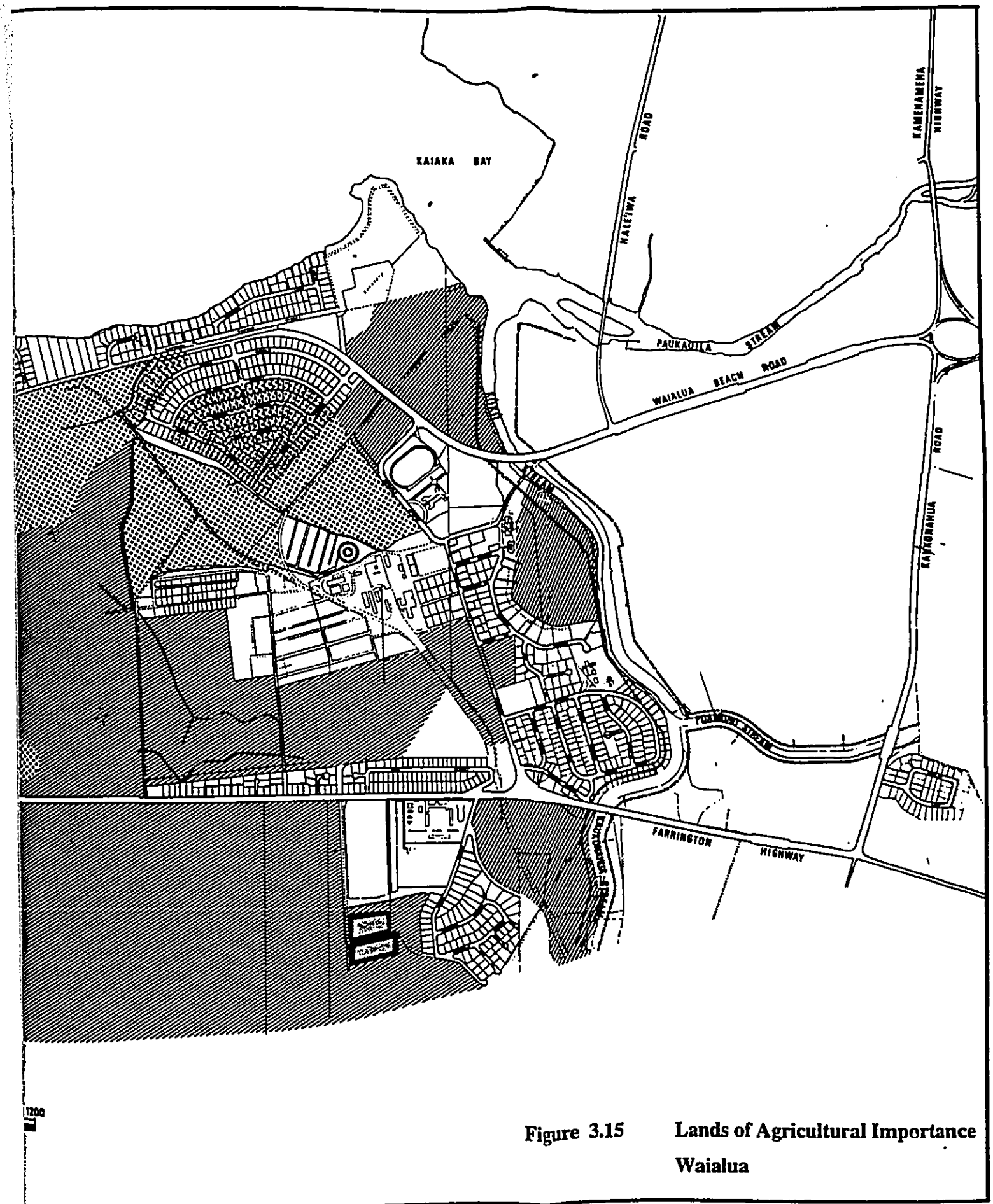


Figure 3.15 **Lands of Agricultural Importance**
Waialua

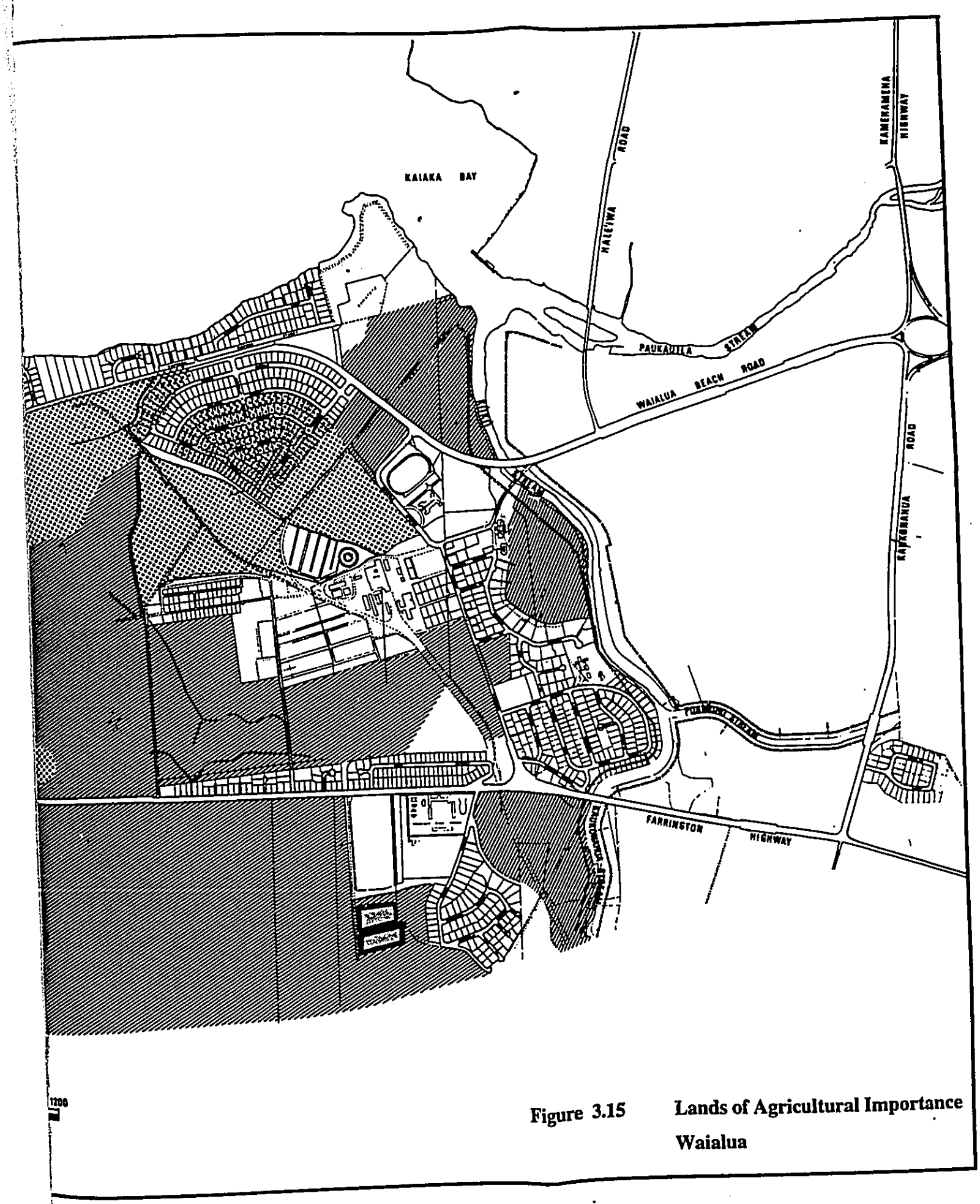


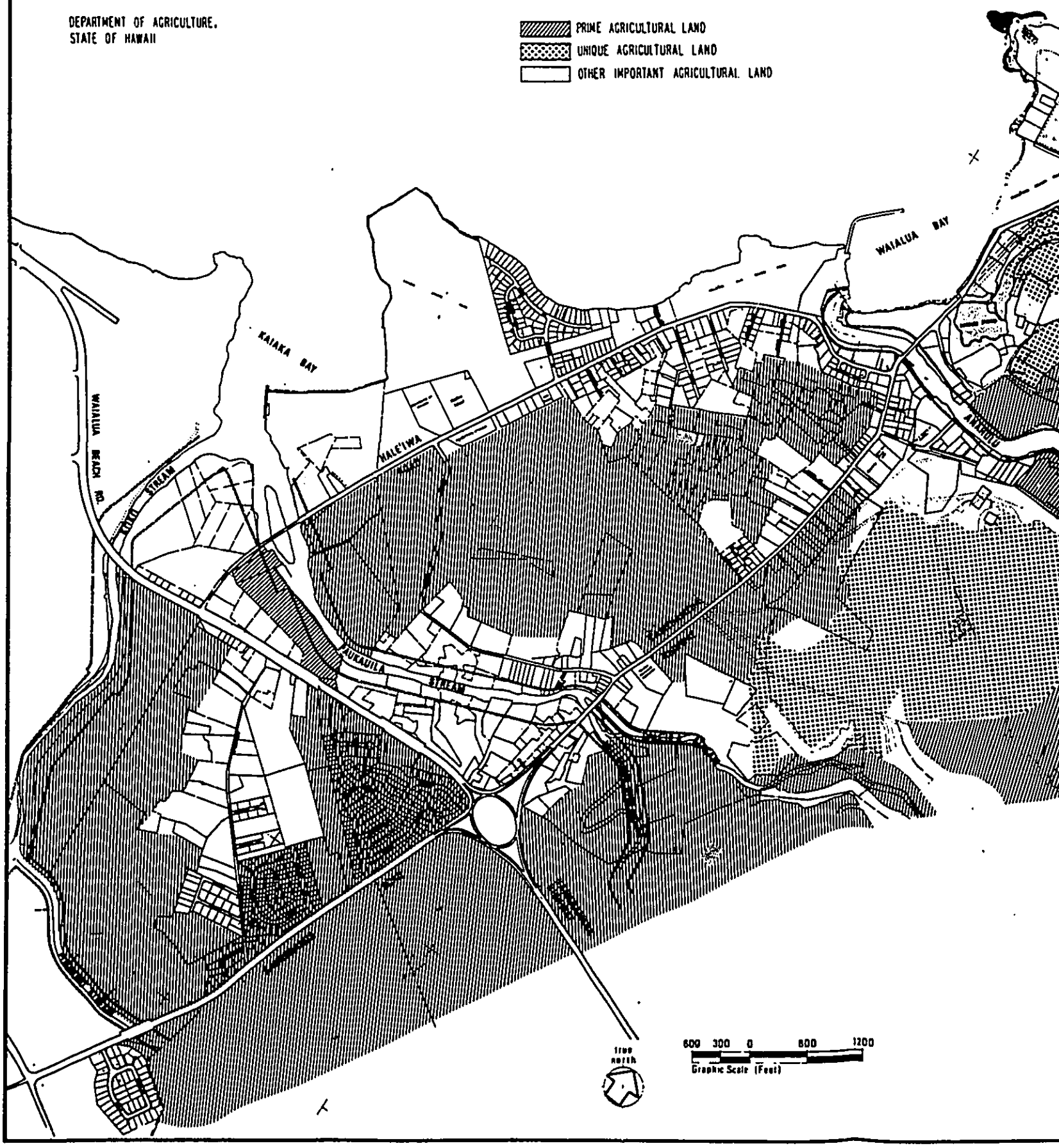
Figure 3.15 **Lands of Agricultural Importance**
Waialua

SOURCE:

DEPARTMENT OF AGRICULTURE,
STATE OF HAWAII

LEGEND:

PRIME AGRICULTURAL LAND
UNIQUE AGRICULTURAL LAND
OTHER IMPORTANT AGRICULTURAL LAND



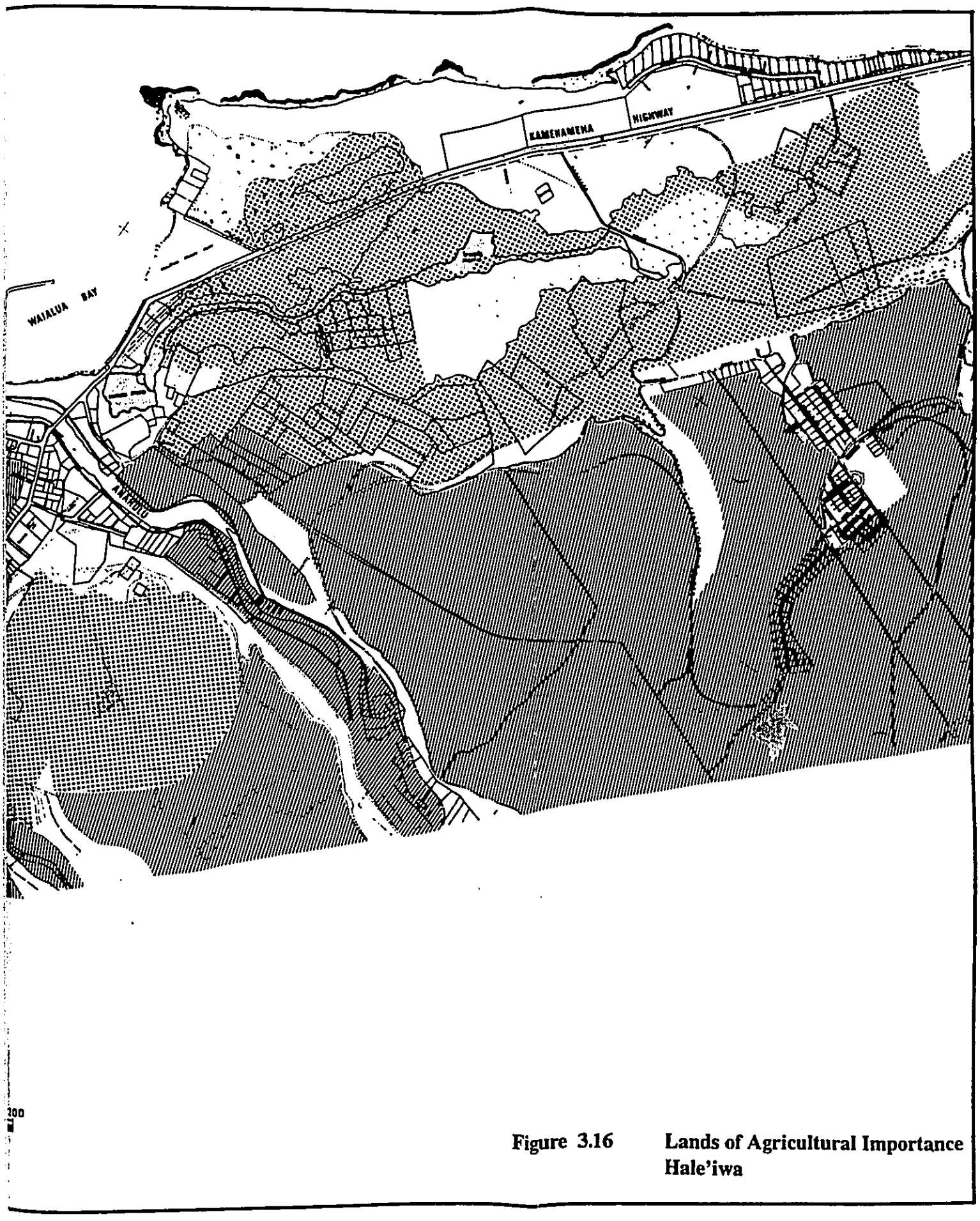
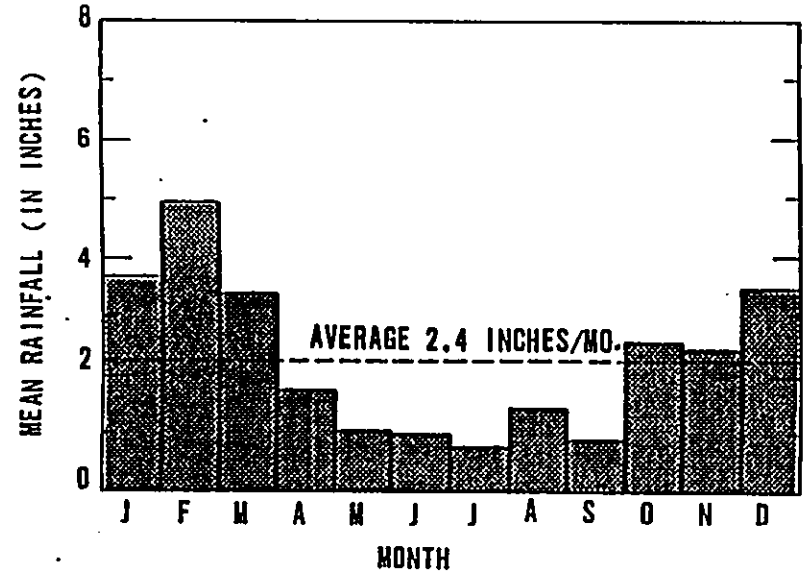
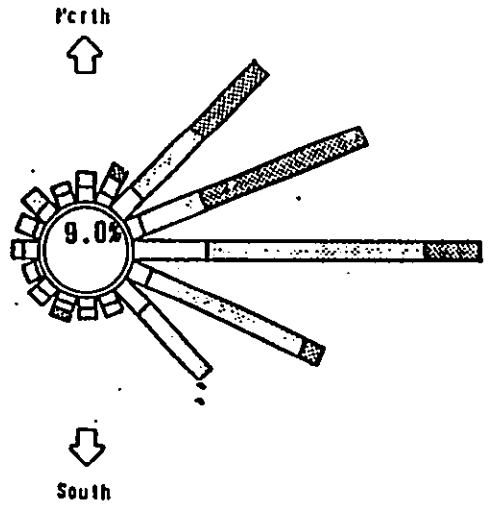
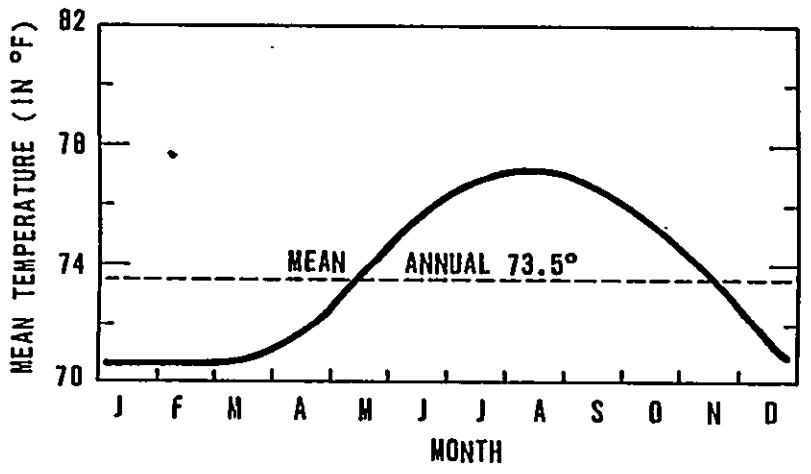


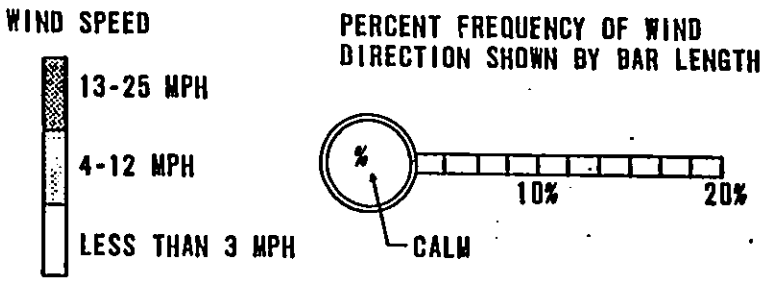
Figure 3.16 **Lands of Agricultural Importance**
Hale'iwa







MEAN MONTHLY TEMPERATURE AND RAINFALL AT WAIALUA (STATION 847): 1931-1955



SOURCE:

NATIONAL WEATHER SERVICE, PACIFIC REGION

SURFACE WIND ROSE: DILLINGHAM AIRFIELD, MOKULE'IA, OAHU

Figure 3.17 **Selected Climatological Characteristics**

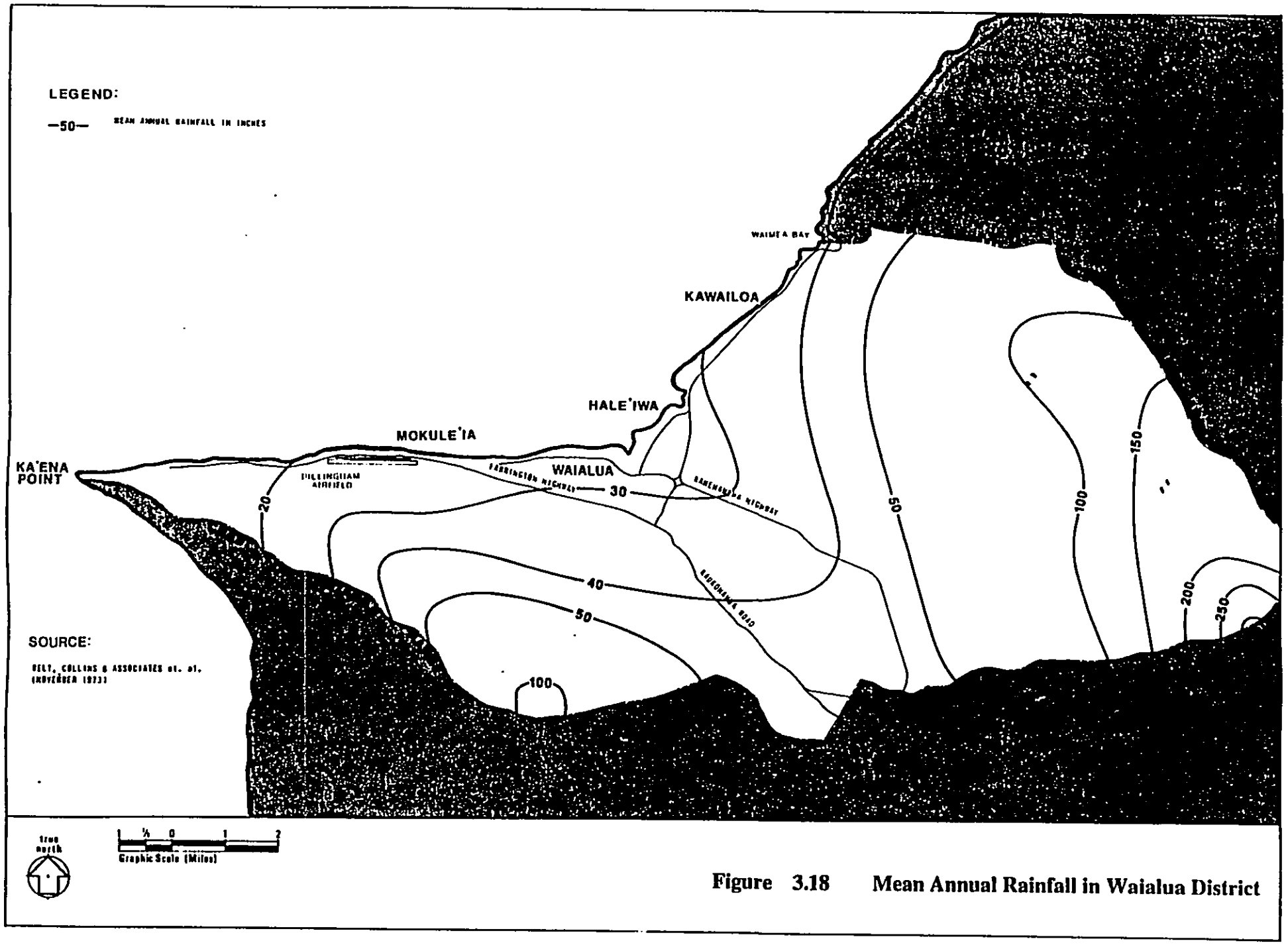


Figure 3.18 Mean Annual Rainfall in Waialua District

Storms can produce much higher rainfall intensities at the coastline than the figures would suggest. A total monthly rainfall of at least 14 inches has been recorded at Waialua town one or more times in each of the winter months (October through March). During one very wet February, over 35 inches of precipitation was measured, or more than is received in an average year. The rainfall-frequency maps prepared by the Weather Bureau of the U.S. Department of Commerce (1962) show that at Waialua town the one-hour rainfall having a recurrence interval of 100 years is just under four inches; the comparable rainfall amount for a 24-hour period is nearly 14 inches. The "probable maximum rainfall" for a six-hour period at that point is estimated at 26 inches.

3.2.4.4 Humidity/Class A Pan Evaporation

Average daily maximum humidity at Waialua is 80%; the average minimum humidity is 65%. Most of the daily fluctuation comes as a result of changes in ambient air temperature rather than changes in the vapor pressure. Hence, the minimum relative humidity tends to occur in the daytime and the maximum at night. The mean annual Class A pan evaporation rate in the vicinity of Hale'iwa and Waialua is about 70 inches. Maximum evaporation rates (7.5 to 8.5 inches per month) occur during the summer; in December and January the average loss is about 3.5 to 4 inches per month.

The closest precipitation and pan evaporation data was collected in Mokule'ia. Figure 3.19 shows a bar chart of average monthly rainfall and Pan Evaporation. For the Mokule'ia area there is about 32 inches of rainfall a year and 70 inches of pan evaporation. The wettest period of the year, November through March, is the period of minimum irrigation requirement. The key to irrigation management is the number of days without a significant precipitation. Quite often wet season pacing of storms still presents opportunities to irrigate. It is important to have flexibility in terms of storage and application rate to optimize the irrigation of targeted plants.

3.2.4.5 Air Quality

Since the Waialua-Hale'iwa District is largely a rural area of low population density, there are few air pollution sources. In addition to these sources, it is noted that high surf periods produce high amounts of salt mist that may be corrosive to many metals.

In the past, the Waialua Sugar Mill has been cited by federal officials for violation of visible emissions (opacity) standards (U.S. Environmental Protection Agency, 11 July 1979), but this seems to be a transient problem that has been largely brought under control through the installation of pre-dryers which drive off moisture from wet bagasse and result in cleaner, more efficient combustion.

Although the DOH does not maintain a permanent air monitoring station in the area, and there are no monitoring data available, it seems reasonable to assume that existing air quality is generally quite good due to the relatively low level of development and man's activities. In the air quality impact analysis done for the Hale'iwa Bypass highway project (U.S. Department of Transportation, April 1980), the maximum carbon monoxide concentration predicted along Kamehameha Highway for existing traffic levels was 30.7 milligrams per cubic meter, thus exceeding the State's one-hour standard but meeting the Federal standard. Future levels were predicted to meet State standards due to Federal emission controls on new motor vehicles. Officially, the Waialua District is "considered an attainment area with respect to both federal and state ambient air quality standards" (Morrow; June 1982:4).

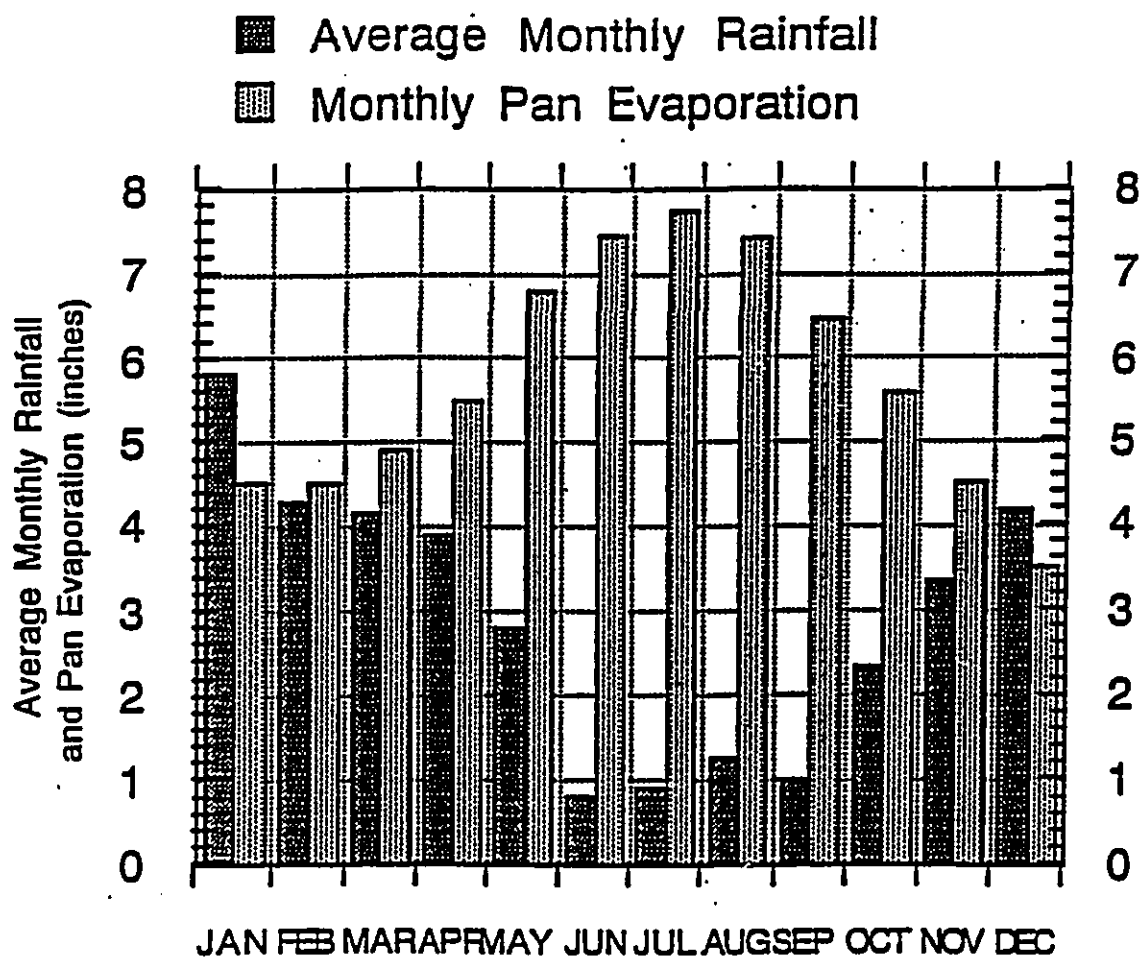


Figure 3.19 Average monthly rainfall and pan evaporation.

3.2.5 Sonic Environment

Existing noise levels within the Waialua District vary widely with the time of day and distance from natural and human noise sources (Darby-Ebiisu & Associates, Inc., April 29, 1982). Background ambient noise levels are controlled by natural sources such as surf, wind-blown leaves, crickets, and birds. When these are present, *minimum* noise levels will generally range from 38 to 45 dB. Areas which are adjacent to vacant brush or to cultivated fields of maturing sugarcane can experience higher background ambient levels of 50 to 60 dB, particularly during the first two hours following sunset. These natural noise sources provide a nearly continuous masking effect over other distant sounds during the night. They can also exceed state and local noise limits, particularly during the nighttime hours.

Noise sources associated with human activity, such as motor vehicles and aircraft, are generally louder than the natural sources and generate intermittent noise levels of 70 to 96 dB. However, because of their intermittent nature (particularly at night), they do not provide a reliable source for masking (or making inaudible) the natural noise sources, which are always present in one or more forms.

The existing L_{dn} noise levels probably range from 55 dB to 70 dB, depending upon distance of a particular location from major streets. Locations immediately fronting major streets such as Kamehameha and Farrington Highways, Waialua Beach Road, Goodale Avenue, and Hale'iwa Road probably experience L_{dn} values of 65 to 70 dB. Locations which are shielded or remote (in excess of 200 feet) from these major streets probably experience L_{dn} levels of 55 to 60 dB.

3.2.6 Biological Environment

3.2.6.1 Vegetation

The predominant "natural" vegetation in the vicinity of Waialua and Hale'iwa consists of dry scrub and mixed lowland vegetation. However, these have been displaced by sugarcane in virtually all of the areas where cultivation is possible. Only near Dillingham Airfield does the sugarcane give way to pasture land grazed by cattle belonging to Mokule'ia Ranch. On the southern side of the planning area, Kaukonahua Gulch and a sharp break in slope on the Waianae Mountains marks the change from irrigated sugarcane to natural vegetation.

Kiawe (*Prosopis pallida*) occurs on undisturbed coral outcrops north of the Anahulu River; it forms relatively dense stands that have an undergrowth of grasses. Other trees also present in this area include date palm (*Phoenix dactylifera*), Koa haole (*Leucaena leucocephala*), and Java plum (*Eugenia cumini*). The koa haole scrub vegetation is also found on the steep sides of stream valleys and on disturbed areas.

Uko'a Marsh is one of the largest freshwater wetlands on O'ahu. The extent of Uko'a Marsh can be seen in Figure 3.20. Its limits were demarcated for the environmental impact statement prepared for the Kamehameha Highway/Hale'iwa Bypass Project (U.S. Department of Transportation, May 1981:III-11) using an aerial photograph taken in December 1969. Elliott and Hall (1977) reported that the marsh is dominated by a sedge (*Cladium leptostachyum*), two species of bulrush (*Scripus californicus* and *S. validus*), and California grass (*Brachiaria mutica*). According to the Hale'iwa Bypass EIS:

> Roughly 10-15 acres in the southeastern portion of the marsh were formerly cultivated in taro and lotus (neither of which remain), and large areas of the southerly and westerly portion are accessible to cattle. As a result of these

> disturbances, plus irrigation water diversion, the southerly and westerly portions of the marsh are periodically dry... Two shrubby species, (*Pluchea indica* and *P. odorata*), give these areas a very non-marshy appearance, but the presence of water hyssop (*Bacopa monnieria*) confirms that the areas are frequently inundated. (U.S. Dept. of Transportation, 1981:III-12).

At the time of the preparation of the EIS the outlet to the marsh was completely filed with large bulrushes and with California grass floating in a tight mat of roots and old stems. A dike and weir at the Lokoea fishpond control the water level in the channel.

3.2.6.2 Mammals and Birds

Hawai'i has only two endemic land-based mammals, a species of monk seal and a subspecies of hoary bat (Tomich, 1969:1). Even these are not truly terrestrial, for the seal arrived by water and the bat by air. However, many others have been imported by people, and the mammalian fauna of the Waialua District consists primarily of these imports. The material on mammals presented below is based on the synopsis prepared by Tomich (1969).

The hoary bat (*Lasiurus cinereus*) is the sole endemic mammal found in the Waialua area. It is scattered sparsely in areas with suitable sheltering tree growth. Since it is highly unselective in the kind of tree used for roosting, it is able to adapt relatively well to changes in the species composition of wooded areas.

Several species of rodents are found in the study area. These are the roof rat (*Rattus rattus*), the Norway rat (*Rattus norvegieus*), Polynesian rat (*Rattus exulans*), and the house mouse (*Mus musculus*). The roof rat and the house mouse appear to thrive equally well in forests, fields, and towns; the Norway rat prefers agricultural fields and human settlements. Mongooses (*Herpestes auropunctatus*), feral house cats (*Felis catus*), and feral dogs (*Canis familiaris*) complete the list of smaller mammals that are present. The first prospers well in cultivated fields where it feeds primarily on rats. The others range wherever food is available.

The two larger mammals known to be present are the wild pig (*Sus scrofa*) and the feral goat (*Capra hircus*). The pigs are abundant in mountainous areas, especially in the Ko'olau Range. Their rooting causes significant environmental degradation when their numbers become excessive. Hunting is used as the major means of population control. Goats, which constitute significant control problems on the island of Hawai'i, Maui, and Kaho'olawe, are few in number on O'ahu.

Mynahs (*Acridotheres tristis*), cardinals (*Richmondena cardinalis* and *Paroaria coronata*), doves (*Streptopelia chinensis* and *Geopelia striata*), house finches (*Carpodacus mexicanus frontalis*), and English sparrows (*Passer domesticus*) are probably the most common of the lowland bird species that are present. In the upper, naturally vegetated parts of the Waianae and Ko'olau Mountains, one finds such introduced species as the ring-necked pheasant (*Phasianus colchicus torquatus*), Erckel's Francolin (*Francolinus erckelii*), shama thrush (*Copsychus malabaricus*), and the Chinese thrush (*Garrulax canorus*). The amakihi (*Loxops virens chloris*) and the apapane (*Himatione sanguinea*), as well as the endangered alauwahio (*Loxops maculata*) and i'iwi (*Vestiaria coccinea*) are native birds present in upland areas.

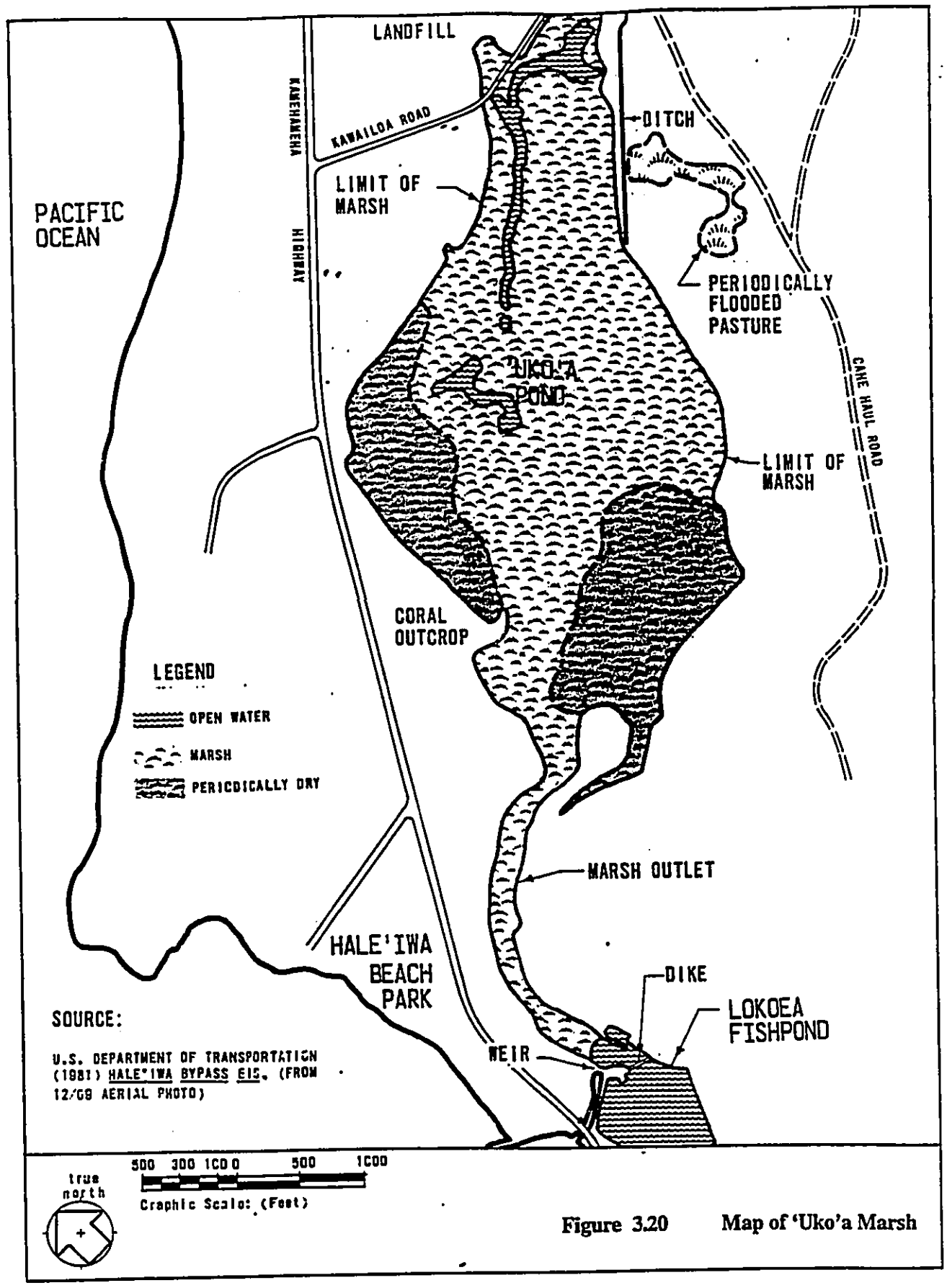


Figure 3.20 **Map of 'Uko'a Marsh**

According to a survey conducted by Elliott and Hall (1977) for the U.S. Army Corps of Engineers, Uko'a Marsh is an important waterbird habitat. It is used by three species of endangered waterbirds, the Hawaiian gallinule (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica americana alae*), and Hawaiian stilt (*Himantopus himantopus knudseni*). A breeding population of at least 30 Hawaiian gallinule has been observed there. Their primary feeding area is centered around the open water in Uko'a Pond at the northern end of the marsh, but it is believed that the remainder of the marsh is used as well. The Hawaiian coots and Hawaiian stilts utilize the marsh primarily as a feeding area, but the coots may also nest there on occasion. During periods of high water, stilts have also used a flooded pasture east of the marsh as a temporary feeding area. Hawaiian ducks, or koloa (*Anas wyvilliana*), the fourth endangered waterbird species found in Hawai'i, may occasionally visit the marsh as well. Besides the endangered species, Uko'a Marsh is also frequented by night herons (*Nycticorax nycticorax hoactli*) and cattle egrets (*Bubuleus ibis*). The pueo, or Hawaiian owl (*Asio flammeus sandwichensis*), another endangered species, has been seen flying over the marsh.

The Hawaiian Waterbirds Recovery Plan (Hawaiian Waterbirds Recovery Team, 1978) names Uko'a Marsh as an important waterbird habitat. However, the marsh has not been recommended by the U.S. Fish and Wildlife Service for official designation as a federally protected critical waterbird habitat. Although Uko'a Marsh is not designated as a critical habitat, this does not diminish its importance to the recovery of endangered waterbirds or negate any federal or state regulations pertaining to wetlands or endangered species. All actions involving the expenditure of federal funds that might affect the marsh will therefore need to be coordinated with the U.S. Fish and Wildlife Service.

3.2.6.3 Aquatic Fauna

A macrofaunal survey of Paukauila Stream and Anahulu River and of Uko'a Marsh was conducted by Timbol (August 21, 1979) for another study. It provides an indication of the kinds of aquatic fauna likely to be present throughout the planning area. It concluded:

> A total of nineteen species were found, including four species of prawns and shrimps, three species of crabs, and twelve species of fish. Of these, nine species are native to Hawai'i and only two of the fish are endemic (occurring naturally in Hawai'i only). The streams are characterized by the presence of one native prawn (Opae oeha'a), one native swimming crab (papa'i maku'e), and three native fishes (ama'ama, o'opu okuhe, and aholehole). The dominant species in Uko'a Marsh are introduced guppys, mollys, and [sic] swordtails (family *poeciliidae*), and crayfish. Only one goby fish (o'opu naniha) was found in the areas sampled. However, it is expected that another goby (o'opu nakea), which lives in the mid and upper reaches of streams, is present at least during its juvenile stage... None of the fish found in the project area are listed as endangered, rare, or threatened.

3.2.7 Historic and Archaeological Sites

Most of the readily accessible land within the Waialua District has been modified in the course of the urban and agricultural development that has taken place there over the past 150 years. These changes have resulted in the destruction of many of the physical remains of previous aboriginal Hawaiian settlements. However, the numbers, variety, and wide distribution of the archaeological sites that once existed throughout the region, as well as related historical records, indicate that a substantial native population and extensive agricultural activities thrived there well before the first contact with the Europeans and Americans. Many of the sites which once existed have been destroyed (Hammon, May, 1982). However, ten

properties are currently listed on the State Register of Historic Places; two of these are also on the National Register.

According to Hammon (May 1982:7):

> The archaeological record, including the information that has been preserved on destroyed sites, indicates that in pre-Contact times and during the 19th century the economic system in the project region included both wet and dry agriculture as well as aquaculture in at least two ponds. Little is known of the residential pattern, but the population was probably relatively dense, especially along the shore if we may judge from the number of religious sites (nine heiau and four known shrines and altars, now destroyed) that were recorded by McAllister.

In 1986, an additional archaeological study (Kennedy, 1986) was conducted to include the Dillingham Airfield area. The survey noted the presence of numerous archaeological remains on the lower slopes of the mountains and on federal property inland of Dillingham Airfield. However, none of these were located in areas affected by wastewater facilities. The rapid infiltration sites can be located in these coastal areas with considerable discretion depending upon archaeological findings.

3.2.8 Energy Consumption For Wastewater Treatment

At present, most of the sewage in the planning area is disposed of via cesspools. There is one treatment plant serving the Pa'ala'a Kai subdivision and various small private "package plants" used to treat sewage from apartment and commercial complexes which consume energy. The only other energy now being consumed in the operation of sewage treatment and disposal facilities in the Waialua District is for the trucks that must occasionally pump out overflowing cesspools. These trucks operate out of the City & County base yard in Wahiawa and dispose of the septage at the Wahiawa WWTP.

An order-of-magnitude estimate of current energy consumption for wastewater collection, treatment, and disposal is 4,400 million British thermal units (MBtu) per year. This is an average of about 358,000 Btu per person per year. Currently, a person in the Waialua-Hale'iwa area served by a cesspool uses about 2.8 times less energy for sewage collection, treatment, and disposal than does one who is served by the Pa'ala'a Kai WWTP. If it were not for the necessity of transporting the waste all the way to Wahiawa for disposal, the energy advantage of cesspools would be much greater still. On the other hand transporting septage to a more distant WWTP increases the cesspool user costs. In many cases multiple pumpings must occur in the wet months due to high groundwater.

3.3 SOCIO-ECONOMIC CHARACTERISTICS

This section begins with a brief review of the historical development of the region. Particular emphasis is placed upon factors which acted as major land use determinants and/or affected the size and/or geographic distribution of the area's residents. It continues with a more detailed discussion of the district's current land use pattern, economic base, and population. Finally, it concludes with a discussion of the growth that is likely to occur within the planning area over the next twenty years.

3.3.1 Historical Development

The Waialua District encompasses about 115 mi^2 of northwestern O'ahu. The portion of the region surrounding Waialua and Kaiaka Bays is as generously endowed with fresh water as any on the island. As a result, it was an area of active settlement and considerable agricultural activity for centuries before Captain James Cook's 1778 arrival in the Hawaiian Islands began a slow, but complete transformation.

In the aboriginal period (i.e., in the years before the influence of Western civilization became significant), wetland taro was cultivated in many of the fields around Waialua where the combination of constant streamflow and spring discharges made this possible. Extensive plantings of sweet potatoes were grown on the lower slopes of the Waianae Mountains, and the nearby upland areas provided a rich hinterland from which many of the people's needs could be met. The broad bay and fine beaches gave ready access to the ocean, and several fishponds were available to supplement the catch from the sea. According to McAllister (1933:133), the area contained the longest irrigation ditch (auwai) on O'ahu (two miles). Due to limited rainfall, the absence of perennial streams, and relatively poor fishing conditions, the area from Mokule'ia to Ka'ena Point was sparsely settled, and inhabitants depended on sweet potato as their staple food (Handy and Handy, 1972:467).

The first western missionaries to land in the Waialua District arrived in 1832. They established a church and school at the mouth of the Anahulu River. The school was named Hale'iwa, or house (*hale*) of the frigate bird (*'iwa*), possibly because it, like the frigate bird, was believed to be possessed of great beauty (Pukui et al., 1974:37; Thrum, 1900:130-133). Until at least 1900, the name was used only to refer to the school and the nearby Hale'iwa Hotel (built in 1899); the broader area, from Mokule'ia to Pua'ena Point on the north side of Waialua Bay, was all considered to be part of Waialua. Over time, however, the name Hale'iwa began to be applied to more than just the hotel. By 1930 it was being used to refer to all of the development around the mouth of the Anahulu River, and by the 1960s, when official boundaries for towns and villages (i.e., census defined placed) were adopted, Hale'iwa was considered a separate town that stretched from the Anahulu River to Waialua Beach Road.

The heritage of small-scale agriculture that was established during the early development of the area is still apparent in the pattern of small parcels in the lowland areas adjacent to Paukauila Stream and the Anahulu River. However, since the turn of the century the large-scale cultivation and processing of sugarcane has been the dominant influence on land use patterns in the region. The Waialua Agricultural Co. (now Waialua Sugar Co.) was founded in 1898 by Castle & Cooke and B.F. Dillingham as a successor to numerous previous, and generally unsuccessful, agricultural operations around Waialua. Beginning with about 6,000 acres that were acquired from previous owners, the plantation expanded quickly during the early years. By 1915 approximately 20,000 acres were under cultivation.

In these early days, working the sugar fields required a large labor force, and the plantation imported laborers from China, Japan, the Philippines, and elsewhere. As a result, the population of the Waialua District jumped from 3,289 in 1900 to 6,083 in 1910 and 7,641 in 1920. By 1930, the plantation had finished its period of great growth and the population of the district remained steady at about 8,000 people over the next 30 years before starting to grow again at about one percent per year between 1960 and 1980.

3.3.2 Existing Land Use Pattern

The vast majority of the land in the Waialua District is either in its natural state or is used for agriculture, primarily the cultivation of sugarcane. As a result, over 75% of the

district's population is clustered in the small twin towns of Waialua and Hale'iwa. Most of the remainder live in low-density single-family homes strung along the coastline between Waiale'e to the northeast and Mokule'ia to the west. Road access to the area from central and windward O'ahu is provided by Kamehameha Highway and Kaukonaahua Road; Farrington Highway serves the development west of Thomson's Corner.

3.3.2.1 Mokule'ia

The Mokule'ia area includes very few residential areas. Developed lands within this area are primarily utilized for agricultural purposes (cultivation of sugarcane) or recreational purposes (including the Mokule'ia Polo Field and Ka'ena State Park). Other major land usage's in the area are the general aviation airfield and the adjoining military training facility. Large sections in this area still remain undeveloped, as can be seen in Figure 3.21.

3.3.2.2 Waialua

The present land use pattern in the Waialua area is in large part a reflection of past influences as can be seen in Figure 3.22. The sugar mill, with its associated housing areas, remains the focal point for the town of Waialua. The commercial "town center" lies just to the east of the mill and the great majority of the residential units lie within a half-mile of the mill site. Other stores are situated near the intersection of Goodale Avenue and Farrington Highway. The Fujioka Store, a prototypical general store serving the plantation houses just west of the mill, still does a good business with residents of the surrounding homes. However, Waialua's businesses suffer somewhat from the fact that the town's location makes access inconvenient for anyone not living there. As a result, recent commercial development has occurred primarily along Kamehameha Highway in Hale'iwa. Stores there can attract customers not only from Hale'iwa, but also from the residential development between Sunset Beach and the Anahulu River. Visitors and recreators passing through the town on Kamehameha Highway constitute another source of business.

The residential development makai of Waialua Beach Road is of fairly recent vintage, and some parcels remain vacant or under construction. Of particular note is the only apartment-zoned area in Waialua (bounded by 'Aweoweo Street and Pu'uiki Park) which is situated about one mile northwest of the mill. Only about half the lots in this apartment area have been developed thus far, and over 1,000 more people could live there if units are developed on the vacant lots at approximately the same density (about 48 units/acre) as that of the apartment buildings already constructed. However, in the most recent version of the North Shore Development Plan (June 1985), the vacant lots in the apartment area were designated low-density rather than medium-density. The maximum development density under this designation is 30 units per acre; and under this land use control fewer than 650 additional people would live there.

3.3.2.3 Hale'iwa

The town of Hale'iwa is physically separated from Waialua by the flood plain of Ki'iki'i Stream. Figure 3.23 shows typical land use in the Hale'iwa area. The westernmost portions of the town, as well as the area adjacent to Paukauila Stream, consist mostly of relatively large parcels containing from one to six houses. A number of active farms are present, and sugarcane is still cultivated on a large (about 150 acres) area north and west of Pa'ala'a Road. Commercial development is strung along Kamehameha Highway between Weed Circle and the Anahulu River. Some of these stores cater to passing tourists, but the recent development of the Hale'iwa Shopping Center and the renovation of several other nearby commercial establishments has reaffirmed Hale'iwa's claim as the commercial center for residents of the entire North Shore area as well.

Residential development in Hale'iwa is split into a number of clusters. The three oldest consist of the houses along Hale'iwa Road and Kamehameha Highway north of Achiu Lane, the homes north and west of Weed Circle near Paukauila Stream, and the houses along Ka'amo'oloa Road. The 307-unit Pa'ala'a Kai Subdivision developed between the latter two areas greatly increased the number of residential units in Hale'iwa.

3.3.3 Relevant Land Use Plans and Controls

3.3.3.1 State Land Use Law

Land use in Hawai'i is subject to several levels of controls. The first, and most general, is the State Land Use District Regulations administered by the Land Use Commission of the State of Hawai'i, an independent body established by Act 187 of the 1961 State Legislature. In line with its legislative mandate (Chapter 205, Hawai'i Revised Statutes), the State Land Use Commission's regulations are intended to:

> "preserve, protect, and encourage the development of lands in the State for those uses to which these land are best suited in the interest of public health and welfare of the people of the State of Hawai'i." (Hawai'i, State of, Land Use Commission, December 1975:38).

In accordance with these regulation, all lands in the State have been placed in one of four Land Use Districts: Urban, Agricultural, Conservation, and Rural. There is no Rural District on O'ahu. General standards for establishing district boundaries are clearly defined in Section II.2.2 of the *Land Use District Regulations; Section VI outlines procedures by which* District boundaries may be amended.

State Land Use District boundaries for the Mokule'ia, Waialua, and Hale'iwa areas are shown in Figures 3.21, 3.22 and 3.23, respectively. As can be seen from those maps, much of the land in the Urban District has not been intensively developed, particularly in Hale'iwa. Two factors are primarily accountable for this: (1) County regulations [General Plan/Development Plan Land Use Maps (DPs)] are more restrictive than the State Land Use law and (2) there has been insufficient market for additional commercial properties to justify development of all the land that is available.

3.3.3.2 The State Plan and State Functional Plan

The Hawai'i State Plan (Chapter 226, Hawai'i Revised Statutes) was enacted in 1978 and revised in 1986. It serves as a long-range guide for the future development of the State by establishing important goals, objectives, policies, and priorities. The objectives and policies most relevant to the wastewater treatment and disposal facilities proposed for the Waialua-Hale'iwa area are contained in Sections 226-11, 226-13, 226-14, 226-15, 226-16(b)3, and 226-104(a)(1), (a)(3) and (b)(3).

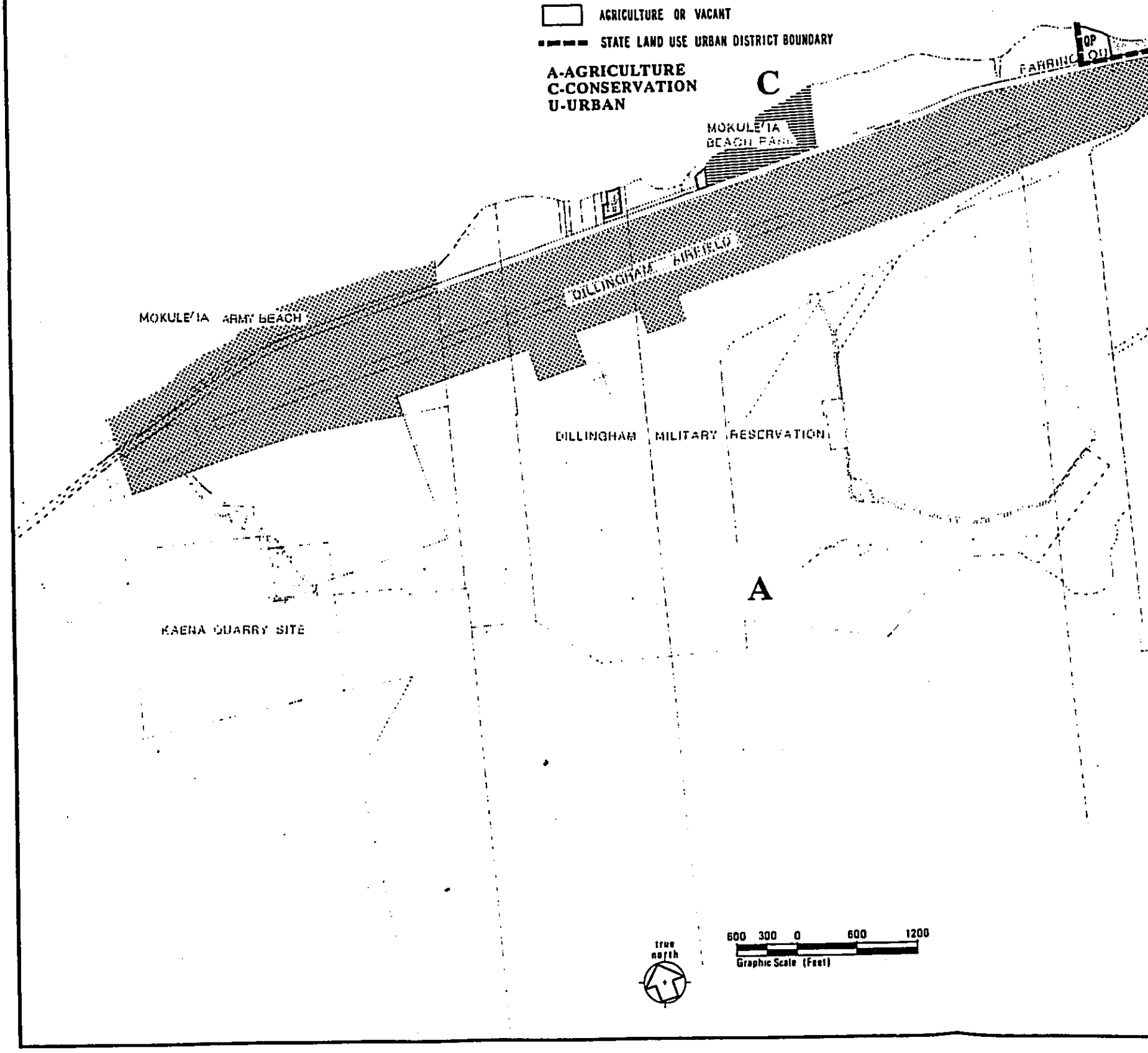
Section 226-14 makes it the policy of the State to accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with State and County plans. With specific refereñce to wastewater disposal, Section 226-15 makes it the policy of the State to encourage the adequate development of sewerage facilities that compliment planned growth. The proposed project is intended to

SOURCE:
HONOLULU, CITY AND COUNTY OF,
DEPARTMENT OF LAND UTILIZATION (1982)

LEGEND:

- SINGLE-FAMILY RESIDENTIAL
- APARTMENT
- PARK
- MILITARY
- QP — QUASI-PUBLIC FACILITY
- AGRICULTURE OR VACANT
- STATE LAND USE URBAN DISTRICT BOUNDARY

A-AGRICULTURE
C-CONSERVATION
U-URBAN



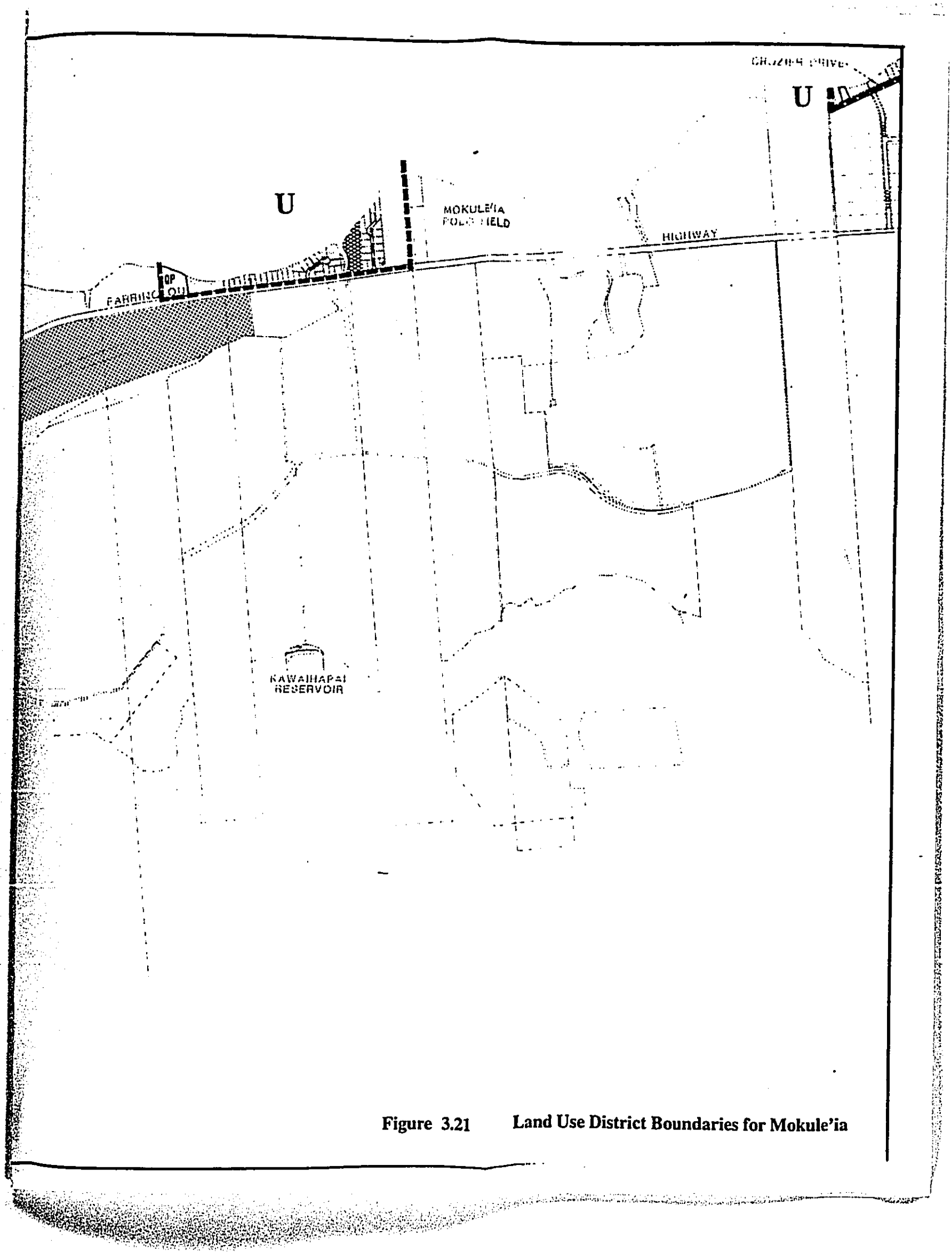


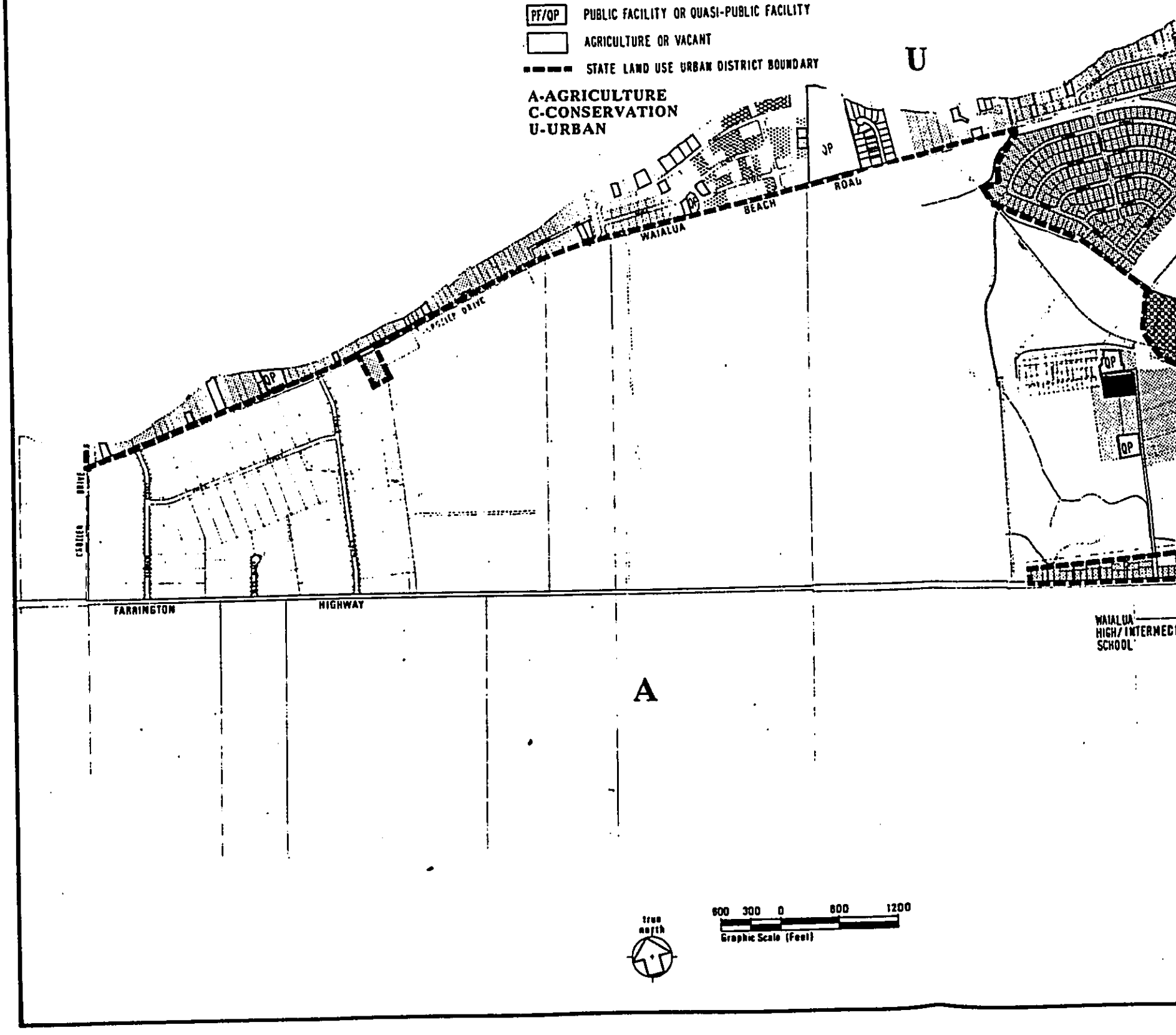
Figure 3.21 **Land Use District Boundaries for Mokule'ia**

SOURCE:
HONOLULU, CITY AND COUNTY OF,
DEPARTMENT OF LAND UTILIZATION (1982)

LEGEND:

- SINGLE-FAMILY RESIDENTIAL
- APARTMENT
- COMMERCIAL
- INDUSTRIAL
- PARK
- PF/QP — PUBLIC FACILITY OR QUASI-PUBLIC FACILITY
- AGRICULTURE OR VACANT
- STATE LAND USE URBAN DISTRICT BOUNDARY

A-AGRICULTURE
C-CONSERVATION
U-URBAN



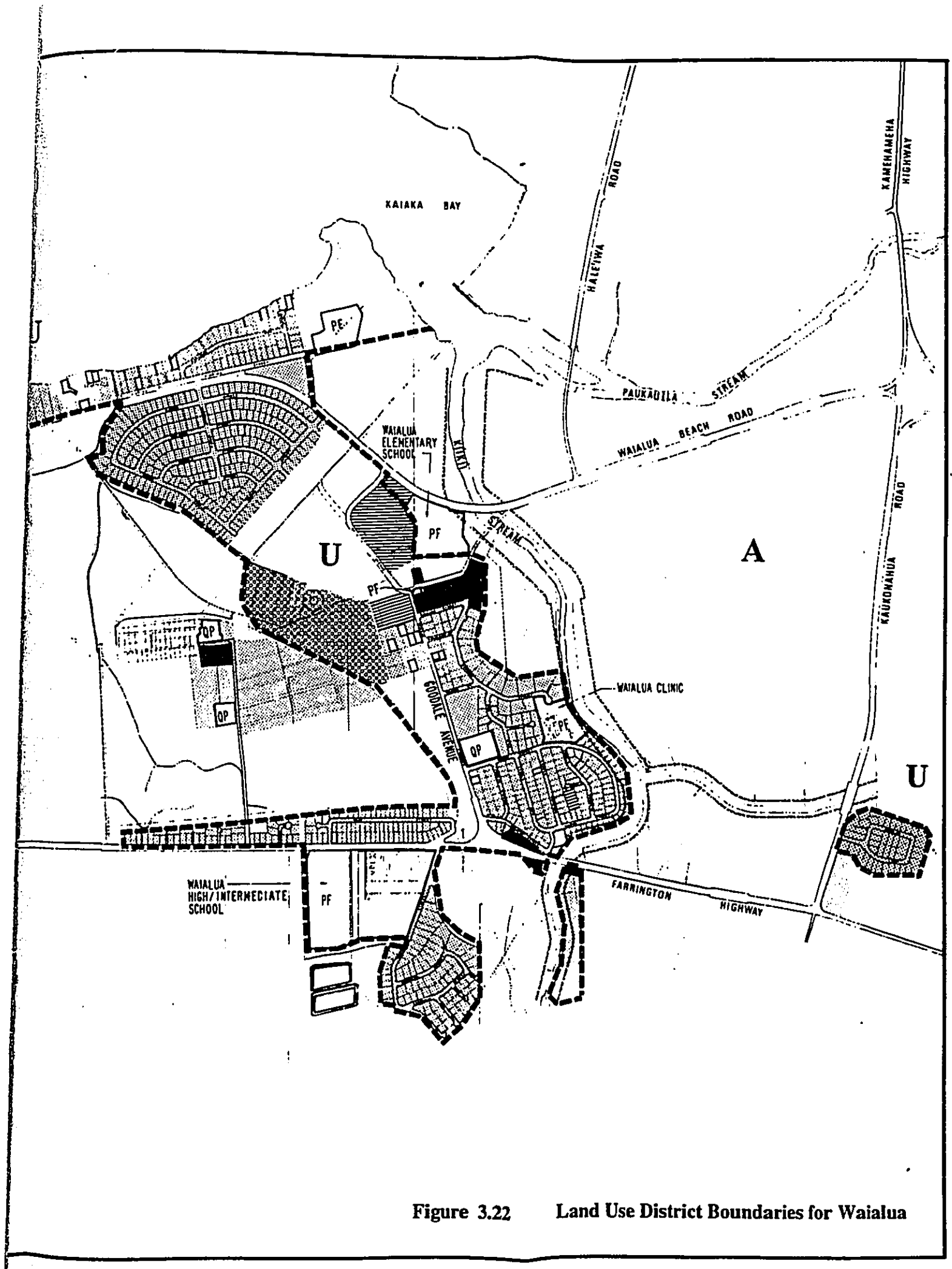


Figure 3.22 **Land Use District Boundaries for Waialua**

SOURCE:
HONOLULU, CITY AND COUNTY OF,
DEPARTMENT OF LAND UTILIZATION (1982)

LEGEND:

- SINGLE-FAMILY RESIDENTIAL
- APARTMENT
- COMMERCIAL
- INDUSTRIAL
- PARK
- PF/QP — PUBLIC FACILITY OR QUASI-PUBLIC FACILITY
- AGRICULTURAL OR VACANT LAND
- STATE LAND USE URBAN DISTRICT BOUNDARY

A-AGRICULTURE
C-CONSERVATION
U-URBAN

KAIAKA BAY
WAIALUA BEACH RD.
YOKO STREAM
HALE'IWA ELEMENTARY SCHOOL
HALE'IWA ROAD
WAIALUA BAY
HALE'IWA SMALL BOAT HARBOR
ANAHULU
KAMEHAMEHA HIGHWAY
PAUKAUILA STREAM
KAUKONAHUA ROAD
true north
800 300 0 600 1200
Graphic Scale (Feet)

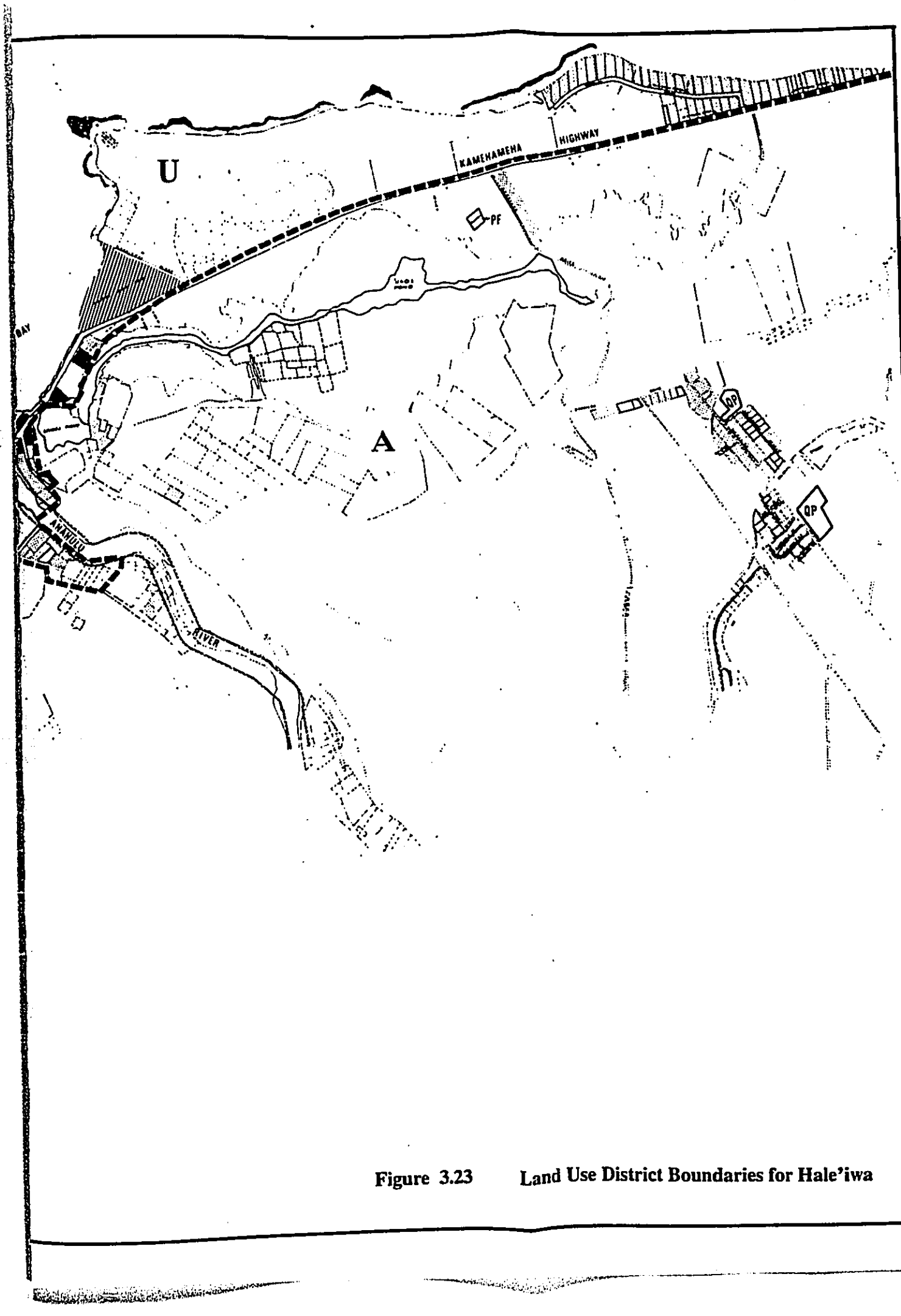


Figure 3.23 **Land Use District Boundaries for Hale'iwa**

insure the maintenance of healthful and sanitary conditions within existing and planned development by providing improved disposal of sanitary wastes.

Sections 226-11 and 226-13 of the State Plan make it State policy to maintain and enhance environmental quality while accommodating the State's population and economic growth. The proposed facilities are designed to reduce the volume of pollutants reaching O'ahu's ground and surface waters, thereby, improving water quality.

Section 226-16, Policy (b)(3) makes it State policy to reclaim and encourage the productive use of runoff water and wastewater discharges. During the course of evaluating the various effluent disposal alternatives for this project, priority was given to identifying alternatives that would reclaim and reuse the effluent generated by wastewater treatment facilities.

Section 226-104, Priority Guideline (a)(1) encourages planning and resource management to insure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawaii's people. Priority Guideline (a)(3) encourages that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the state. The population projections used to size the proposed facilities reflect the limited growth projected for the area, consistent with existing Development and General plans.

Section 226-104, Priority Guideline (b)(6) seeks participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces. A portion of the funds for construction of a wastewater treatment system typically come from the private sector via the improvement district assessments that would be paid by the individual property owners.

The twelve State Functional plans specifies in great detail the policies, guidelines, and priorities within specific fields of activities. The document most applicable to these proposed actions is the State Health Functional Plan. Objectives and policies most relevant to this proposed action include the following:

Objective A: To prevent degradation and enhance the quality of Hawaii's air, land and water.

It is anticipated that if present wastewater management practices are left unchanged, conditions would deteriorate with time. The resulting increase in system failures would be an increasing threat to the quality of land and waters in the area. The proposed wastewater management systems would significantly reduce the number of individual wastewater treatment and disposal facilities and reduce the high concentration of cesspools in the area. As a result, this action would limit potential degradation and improve the quality of Hawaii's water and land.

The design of the centralized subregional wastewater management system will be designed to include adequate odor control systems. Therefore, no degradation of existing air quality would occur.

Objective B: To minimize the threat to Public Health from unsanitary conditions by ensuring that facilities are built and maintained so that products and services are provided in a healthful manner.

The reduction of the number of cesspools and private WWTSs and disposal systems in the area greatly reduces the risk of public exposure to untreated or partially treated wastewaters

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Objective B: To minimize the threat to Public Health from unsanitary conditions by ensuring that facilities are built and maintained so that products and services are provided in a healthful manner.

The reduction of the number of cesspools and private WWTSs and disposal systems in the area greatly reduces the risk of public exposure to untreated or partially treated wastewaters

that may otherwise overflow from failing facilities. The proposed centralized subregional system will be designed, built, operated, and maintained to meet appropriate regulatory agency requirements, thus protecting the health and welfare of the public.

Objective H: To reduce the amount and intensity of noise to acceptable levels.

Activities related to the construction, operation and maintenance of the proposed wastewater management systems will be in compliance with DOH noise regulations. The design of the wastewater collection and treatment systems will include provisions for the attenuation of equipment noise levels.

3.3.3.3 Coastal Zone Management Plan

The Hawai'i Coastal Zone Management (CZM) Plan is an expression of State policy with respect to the use, protection, and development of land and ocean resources within the State's coastal areas. The cornerstone of the program is the Hawai'i Coastal Zone Management law, Chapter 205A, Hawai'i Revised Statues. This section assesses the consistency of the Waialua-Hale'iwa Facility Plan with each of the seven major objectives of that law.

Objective 1: Provide coastal recreational activities accessible to the public.

The proposed wastewater treatment and disposal facilities are intended to decrease the potential for pollution of the region's streams and coastal waters due to the discharge of untreated or inadequately treated wastewater. By maintaining and improving water quality, the project will insure the continued availability of the shoreline for recreational uses. No surfing sites or sandy beaches will be destroyed. Preliminary investigations indicate that there will be no significant adverse effects on marine biota as a result of the construction studies.

Objective 2: Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and cultural.

Archaeological surveys of potential wastewater treatment plant sites were conducted as part of the facilities planning process. These indicate that the proposed sites do not contain significant archaeological or historical remains. If remains are encountered during the course of trenching, foundation excavation, or other project related work, construction activity in the vicinity of the threatened resources will be suspended until the remains are evaluated by a qualified archaeologist and an appropriate mitigation program developed.

Objective 3: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

Essentially all of the proposed collection and disposal methods will be below ground. Hence, only the wastewater pump stations and the wastewater treatment plant itself will be visible. The WWTPs are located well away from existing development; with landscaping that would be provided as part of the final design, it would be largely invisible to area residents and passers-by. Several of the wastewater pump stations are located in developed areas, and because of the need to provide adequate flood-proofing, it is impossible to completely bury these structures. However, they are relatively small and will be designed to blend in with surrounding development.

Objective 4: Provide public or private facilities and improvements important to the state's economy in suitable locations.

The proposed wastewater treatment and disposal facilities are designed to serve the existing population. The collection system is limited primarily to areas already designated for urban development on State and County land use plans. The proposed facilities are not expected to generate or support significant amounts of urban growth which would not otherwise occur.

Objective 5: Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

As previously noted, the project is expected to reduce the volume of untreated wastewater reaching coastal waters. No direct discharge of treated effluent to coastal waters will occur.

Objective 6: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.

The proposed facilities are designed to comply with the requirements of the Federal Flood Insurance Program, and they will not increase the flood hazard in surrounding areas. They are located and designed so as to minimize the potential for damage from storm waves, tsunami, erosion, riverine flooding, and subsidence.

Objective 7: Improve the development and review process, communication, and public participation in the management of coastal resources and hazards.

The Waialua-Hale'iwa Wastewater Facility Plan is the result of an extensive planning process that has sought (and been responsive to) input from the general public, surrounding landowners, government agencies, public interest organizations, and other interested parties.

3.3.3.4 County Plans

The present City & County of Honolulu Charter was adopted in 1973. It mandates a two-level planning process (zoning is considered an implementation tool rather than a separate planning level). The first level consists of the 1982 revised O'ahu General Plan. It contains a concise statement of the City's objectives and policies with respect to ten different subject areas, e.g., population, housing, transportation, etc. The second level is the regional Development Plan. The North Shore Development Plan (NSDP) allocates very little land for new development between now and the year 2000. In fact, within the Waialua-Hale'iwa urban area, the only substantial concentration of land where additional development would be permitted during this period is situated in the apartment district along Waialua Beach Road. The remaining growth is limited to construction on the few vacant parcels that remain within existing built-up areas.

3.3.4 Economic Base

The Waialua Sugar Company is still the most important economic force in the Waialua-Hale'iwa area. Figures developed by the State of Hawai'i Department of Labor and Industrial Relations (1977) indicate that in 1975, there were about 1,450 jobs in the area, about 20% more than there were 10 years earlier. Of these, over 600 (i.e., about 40%) were with the plantation. Industries which showed the greatest employment growth (in absolute terms) during the period were retail trades (+95 jobs) and the Federal Government (estimated at +81 jobs). The data reflects the underlying stability of the area's economic base as well as the

Waialúa District's increasing importance as a commercial center for both North Shore residents and tourists passing through.

A comparison of the distribution of employment by type for the Waialua-Hale'iwa area in 1975 with the distribution for the entire island highlights several very important characteristics of the region:

- The dominant economic position held by the sugar plantation is evident in the fact that employment in agriculture (mostly the sugar fields) and employment in manufacturing (mostly the sugar mill) are 23 and 3.5 times the island wide average, respectively. This situation will change as Waialua Sugar makes a transition away from sugarcane.

- The transportation, communication, and utility sector; the wholesale trades sector; and the finance, insurance, and real estate sector -- all of which are typically concentrated in cities rather than rural towns -- employ relatively few persons.

- Employment in the service sector is also relatively small compared with the island wide average; this is largely because of the low profile of the visitor industry in the regions.

A comparison of the employment figures with the labor force shows that the number of jobs in the Waialua District in 1975 was far lower than the number of employed persons (1,443 versus 3,005). As a result, well over half of the workers must commute out of the area for work. Only in agriculture and manufacturing, the two industries most affected by the presence of the Waialua Sugar Company, is the employment to labor force ratio greater than 1.0, indicating that workers commute into the region for their jobs.

A comparison of employment by industry of the Waialua District with that of the entire island further emphasizes the dominant position which sugar plays in the economic life of the region. Government, service, and retail employment are also important employment in the area.

In recent years the price of raw sugar and, therefore, the profitability of the Waialua Sugar Co., has fluctuated widely. In recent years, the average market value was below the production costs of even the most efficient of the Hawaiian sugar producers. This has led to the closing of the Puna Sugar Company on the island of Hawai'i, to plans for reductions in the labor force at many plantations, and to speculation that the era of large-scale sugar production in Hawai'i might be drawing to a close. Some sugar industry representatives continue to believe that continued government support, the cooperation of workers, and improved economic efficiency on their part will insure the survival of the sugar industry as a major employer in the State. There is an increasing tendency to see an end to sugar cultivation at all but the most efficient plantations. Waialua Sugar has announced the gradual closing of their facility over the next two years. It is unknown whether new agricultural operations will fully replace Waialua Sugar as an important economic force in the Waialua district.

Closure of the Waialua Sugar Company would be an economic blow to the region, however, many of the company's employees are long-time residents of the region, own homes there, and have strong social ties to their neighbors. It seems likely that most of them would remain there even if they were forced to commute to other parts of the island for employment. Hence, the population projections that have been made here are believed to be reasonably valid regardless of the fate of the sugar company.

3.3.5 Selected Demographic Characteristics

The 1990 potential civilian labor force in the North Shore Division, was 8,072 people and the employed civilian labor force was 5,101. Approximately 5% were involved in agricultural, forestry, fisheries, and/or mining. Retail trade and professional employment make up the largest categories at 18% each. Construction and manufacturing account for the other high percentage employment categories at 10 and 12% each. About 31% of the workers commute more than 45 minutes.

The median income, in 1990, was $36,841, and 15% of the population had an income less than $15,000. Fifty five percent of the population in the North Shore Division are on social security or retirement incomes. The North Shore Division has the highest percentage of fixed income people in the state. For example, the Pupukea CDP has 20% of the population on fixed incomes. The median gross monthly rental in the North Shore Division was $595 in 1990. Twenty eight percent of the population pays 35% or more of their monthly income towards housing.

3.3.6 Existing and Future Population

Figure 3.24 shows the relevant planning and statistical area boundaries of the study area. Relevant statistics from the 1990 census for population and housing for the study area are shown in Figure 3.25. They indicate that as of April 1, 1990, approximately 9,850 persons resided within the Waialua District. Of these, approximately 54% resided in census tract (CT) 99.01, 17% in CT 99.02, and 19% in CT 100.

The North Shore Development Plan Area (NSDPA) includes all of the Waialua District plus Block Group 2 of CT 101. It is of interest primarily because it is the area for which population allocations have been made in the County Development Plans. Adding the 3,212 persons reported in this sub-area to the 9,849 within the Waialua District gives a total of 13,061.

The 1982 revised O'ahu General Plan, the City and County's principal policy planning document, projected very little growth to the North Shore Area (Honolulu, City & County of, January 5, 1978). The projected population estimate, for the year 2000, ranged from 14,700 persons to 16,500 persons. A more detailed account of the number of people residing in the planning area in the year 2000 was conducted to incorporate land use controls in assessing the affects of development in the planning area and is contained in Appendix B of the BCA Facility Plan. This effort determined that an estimated 14,720 people will reside in the planning area by the year 2000. Thus, the population of the Waialua-Hale'iwa planning area is projected to increase by 1,600 to 3,400 persons by the year 2000.

3.3.6.1 Non-Residential Land Use Estimates

As of December 1990, approximately 60 acres were devoted to commercial uses within the North Shore Development Plan area. Of this, 45 acres were within the Waialua-Hale'iwa urban area, primarily along Kamehameha Highway.

Industrial uses in the Waialua District amounted to about 140 acres. The fact that over 95% of this was in just two places, the Waialua Sugar Mill and the Mokule'ia rock quarry, is an indication of how little diversified industrial activity there is in the area.

Institutional uses in the urban area include three schools, (Waialua Elementary, Waialua Intermediate and High School, and Hale'iwa Elementary School), several parks, the boat harbor, and several small government offices and facilities. Of these, only the schools

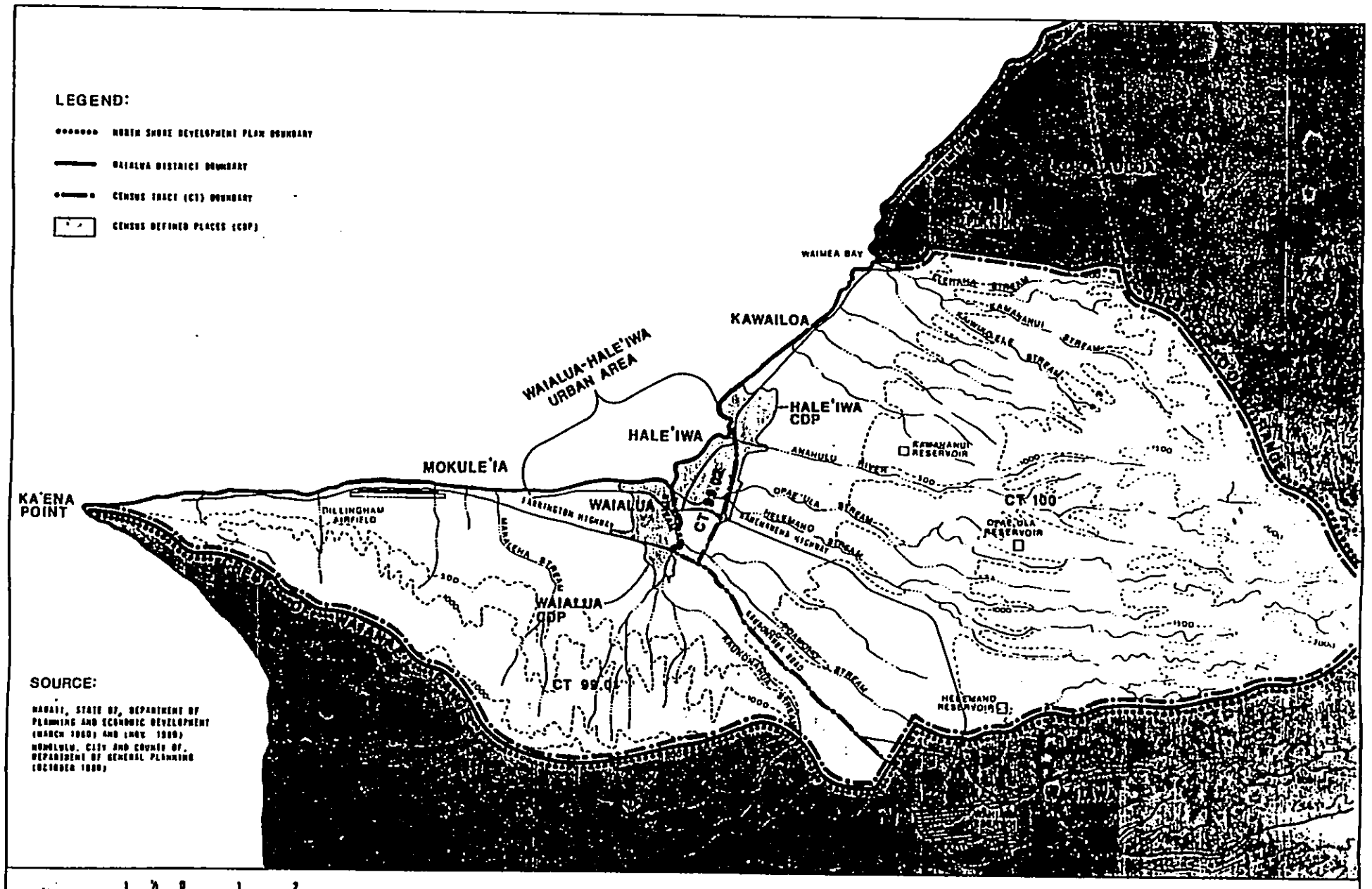


Figure 3.24 **Relevant Planning and Statistical Area Boundaries**

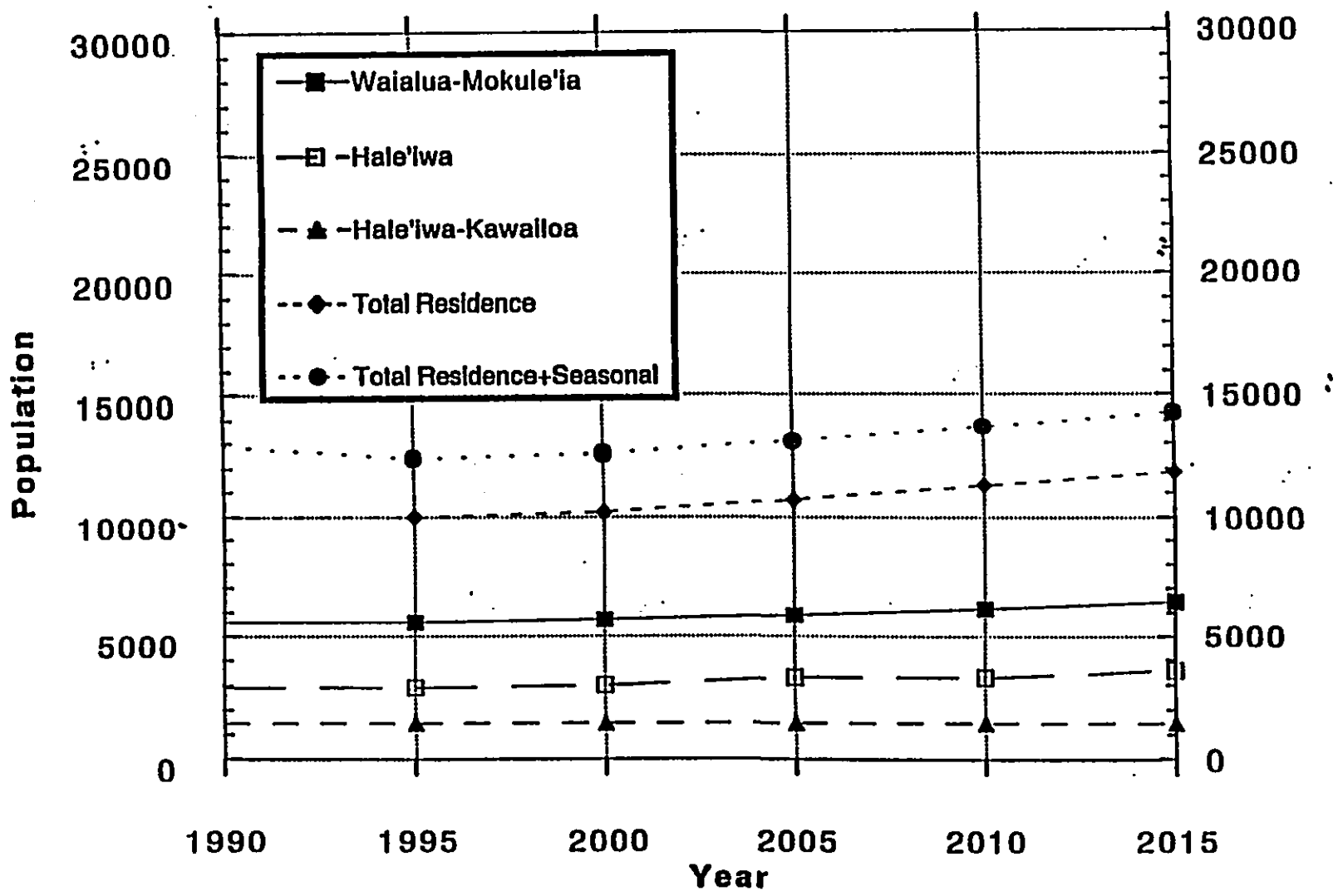


Figure 3.25 Past Existing and Future Population Predictions

and parks are significant sewage generators. The schools presently have approximately 2,090 students, teachers, and staff. Since sewage generation from neighborhood parks (which are primarily used by area residents) is already accounted for in calculations for residential wastewater flows, only the boat harbor and the beach parks (which are used by many people from outside the planning area) have to be considered as additional sources of wastewater. The acreage of the regional parks in the planning area totals 109 acres.

3.4 EXISTING WASTEWATER SYSTEMS

POINT SOURCES

Waialua-Hale'iwa Sewerage District

The Waialua-Hale'iwa sewerage district is located in Hydrographic area VI which extends from Ka'ena Point to Waimea Bay. The sewerage district includes two towns, Hale'iwa with an area of 1,207 acres and Waialua with an area of 784 acres. The tributary service area extends beyond the two town limits and includes Kawailoa, Mokule'ia, and Pa'ala'a Kai Housing Tract. Total resident population of the entire area (CT 99.01, 99.02, 100) was 9,849 in 1980, and 10,085 in 1985 (BCA, 1987). The 1989 population for the Waialua-Hale'iwa service area was estimated at 10,551 (Parametrix, Inc., 1992), which includes the Waimea area. About 380 of the resident population were military personnel and their dependents who were assigned to the Helemano Military Reservation.

Most of the residents in the district are served by household cesspools. In 1989, there were 3,152 cesspools in the Waialua-Hale'iwa service area (Parametrix, 1992). According to a study in 1985 (R. M. Towill Corp.), there are 566 cesspools in Hale'iwa-Kawailoa, 786 in Hale'iwa and 1,526 in Waialua, for a total of 2,878. There were also 70 non-residential cesspools (BCA, 1982).

There are 12 private WWTSs in the Waialua-Hale'iwa service area. All of the plants utilize the sludge extended aeration process or cavitettes. Disposal of the effluent is either by discharging into injection wells or seepage pits.

The Pa'ala'a Kai WWTP is the only municipal WWTP in the Waialua-Hale'iwa area, serving the Pa'ala'a Kai housing development. The Pa'ala'a Kai WWTP is an advanced secondary treatment facility with effluent being discharged into a series of exfiltration wells for final disposal.

The Waialua Sugar Company discharges 14.0 mgd of thermal water into Ki'iki'i stream near Waialua Beach Road.

Eventually, cesspools in the Waialua-Hale'iwa area, the 12 private WWTSs, and the Pa'ala'a Kai WWTP will be abandoned. All generated wastewater flows from the above systems will be connected to the proposed City and County centralized subregional WWTPs.

3.4.1 The Pa'ala'a Kai System

a) General

The only publicly owned wastewater treatment works in the Waialua District is situated in the Pa'ala'a Kai subdivision southwest of Weed Circle. The facility serves only the 307 single-family homes contained in the subdivision. It was constructed by the developer and dedicated to the City for operation and maintenance with the understanding that the treatment

plant is temporary and will be abandoned if a regional system is developed by the City. The treatment plant began operation in late 1980.

b) System Description

The Pa'ala'a Kai WWTP is an advanced secondary treatment facility designed for an average daily flow of 122,800 gpd. Pretreatment facilities include grit removal chambers, comminuters and aerated surge tanks. Wastewater is then pumped to the aeration tanks for biological secondary treatment. The treated effluent is clarified in two secondary clarifiers and then pumped to a package tertiary sand filter. The filtered effluent gravity flows to a chlorine contact chamber for disinfection. Following disinfection, the effluent flows to a series of exfiltration (gravity feed) wells for final underground effluent disposal.

Bio-solids treatment is accomplished by an aerobic digester. The digester receives wasted activated sludge and scum from the final clarifiers. The aerobically digested sludge gravity flows to a sludge thickener. The thickened sludge is pumped to sand drying beds and the dried sludge cake is then disposed of at the City's Kappa's landfill site. Supernatant from the digester, thickener and filtrate from the sludge drying beds are recycled back to the headworks.

c) Performance

Present average daily flow is approximately 130,000 gpd and slightly exceeds the plant design average flow capacity (Parametrix, Inc., 1992). However, data indicate that this facility produces an effluent with quality of 12 mg/l BOD_5 and 7 mg/l SS (City and County of Honolulu, 1986). Currently, no problems have been observed with the disposal exfiltration wells.

3.4.2 Cesspools

a) General

Most of the structures in the Waialua District dispose of their wastewater via cesspools. The 208 Plan (Hawai'i, State Dept. of Health and City & County of Honolulu, 1978:10-2) estimated that there were about 2,000 cesspools in the area and that 63% of these were "defective." More detailed analyses were conducted as part of the 1987 Facility Plan (BCA, 1987) study using the criteria contained in the City's draft design standards for individual wastewater treatment systems to determine which cesspools are "defective". The results indicate that the actual cesspool failure rate is between 15 and 30%.

In a more recent study, it was estimated that the number of existing cesspools in the Waialua-Hale'iwa area is 3,152 (Parametrix, Inc., 1992), which included cesspools located in the Waimea area. Also included in the 3,152 cesspool count is the 70 non-residential cesspools that serve commercial establishments (BCA, 1987).

b) System Description

A cesspool consists of a simple cylindrical structure, typically hollow tile or pre-cast concrete rings, that are six to eight feet in diameter and buried to a depth of 10 to 40 feet. Wastewater treatment and disposal are both accomplished within the single compartment.

A properly function cesspool basically operates in the following manner. As wastewater enters the cesspools, solids settle to the bottom and accumulate. Scum, oil and grease typically float on the top of the liquid. Semi-clarified wastewater, which is located in

the center of the cesspool, seeps through openings in the structure wall into the adjacent soil for further treatment and disposal. A properly operating cesspool requires minimum maintenance.

c) Problems

Cesspools are susceptible to failure if constructed on sites with poor soil conditions and/or high groundwater levels. High strength wastewaters, for example from restaurants, can also cause failure of cesspools due to premature clogging of sidewall openings by excess solids deposition or excessive microorganism growths. Failure of a cesspool is indicated by sewer backup, and reduced wastewater seepage rates, which in turn causes cesspool ponding and overflow.

Failure of cesspools generally require pumping to remove accumulated solids, scum and excess wastewater. Chemical treatment or high pressure washing can also be used to clean clogged holes in the sidewalls.

Cesspool septage can be described as a highly variable anaerobic waste having a high solids and organic content. However, under conditions of failure, a cesspool contains a larger volume of liquid than a typical septic tank. As a result, cesspool septage is considered to be similar to a weak septic tank septage. The location at which the cesspool is pumped can have a substantial effect on the waste characteristics. Cesspool septage taken within or near the bottom sludge layer would be expected to have a very high solids and organic content, similar to septic tank septage. Septage taken from the liquid portion between the lower sludge layer and upper scum layer would be expected to have a lower solids and organic content, similar to high strength domestic wastewater (Parametrix, Inc., 1992).

Residents whose cesspools are failing must either replace the unit at a cost of from $400 to $5,400 each (Hawai'i, State of, Department of Health and City & County of Honolulu, December 1980:10-9) or have them pumped when they overflow. Cesspool pumpings must be disposed of at County approved disposal locations, usually manholes near wastewater treatment plants. Pumped cesspool septage from the entire North Shore area, is discharged to four WWTPs; Kahuku WWTP, Pa'ala'a Kai WWTP, Honolulu WWTP and Wahiawa WWTP. Only Pa'ala'a WWTP is within the study area; the remaining three WWTP are outside the study area. Operators at the Pa'ala'a' Kai WWTP report that the plant receives approximately 20 to 30 loads of cesspool septage from municipal pumper trucks each day, which is about 830,000 to 1,240,000 gallons per month (Parametrix, Inc., 1992). It should be noted that Pa'ala'a Kai WWTP will only take cesspool septage from municipal pumper trucks, private contractors are required to haul the septage to Honouliuli or Wahiawa WWTPs. At present, nearly all of the pumped cesspool septage from the Waialua District is disposed of at the Wahiawa WWTP.

The Parametrix, Inc. study further estimated the number of failed cesspools and the volume of cesspool septage generated in the Waialua-Hale'iwa service area. It was estimated that 1,331 failed cesspools exist in the Waialua-Hale'iwa service area (see Table 3.16). Based on a 2,000 gallon load per cesspool per pumping, it was also estimated that 578,000 gallons per month of septage is pumped in the service area. As can be seen from Table 3.16, for FY 1988-1989, it was determined that 3,377 cesspool pumpings occurred. Based on the 3,152 cesspools within the service area, it was calculated that 1.1 pumpings per cesspool occurred within the Waialua-Hale'iwa service area each year. According to Table 3.16, 80 failed cesspools and 209 cesspool pumpings occurred in Waimea, which is outside of the study area for this Facility Plan.

Table 3.16 Pumper Truck Activity - FY 1988-1989[1]

Area	No. of Failed Cesspools	No. of Pumping Loads
Waialua-Hale'iwa Service Area		
Waialua	824	2,185
Hale'iwa	355	920
Kawailoa	72	63
Waimea	80	209
Total - Waialua-Hale'iwa Service Area	1,331	3,377
Estimated Total No. of Cesspools		3,152
Estimated No. of Pumpings per Cesspool		1.1
Gallons per Month at 2000 gal/per load		578,000

1. Parametrix, Inc., 1992

Besides the cost and inconvenience of pumping associated with failed cesspools, they also constitute potential health hazards if the spillage reaches streams or coastal waters. Following is a rough estimate of the amount of cesspool wastewater that potentially enters the groundwater. The following calculations were based on an 80 gpcd wastewater flow; population figures for people serviced by cesspools within the service area and pumped cesspool septage volumes were taken from referenced reports. From the calculation shown in Table 3.17 it was estimated that approximately 0.71 mgd of cesspool wastewater seeps into the groundwater and eventually reaches the embayments.

Table 3.17 Calculations approximating the amount of cesspool wastewater discharging to groundwater in the Waialua-Hale'iwa area.

Data:

People served by cesspools.[1]:	9,111 persons
Amount of pumped cesspool septage.[2]	578,000 gallons per month

Calculations:

Daily cesspool pumping = 578,000/30 day = 19,300 gpd

Daily wastewater flow to cesspools = 9,111* 80 gpcd = 728,900 gpd

Cesspool wastewater to groundwater = 728,900 -19,300 = 709,600 gpd

1. Table 3.14, this Facility Plan.
2. Parametrix, Inc., 1992.

3.4.3 Private Sewage Treatment Systems

(a) General

As shown in Table 3.18 there are 12 private WWTSs in the study area. These private systems primarily service the 508 multi-family apartments and condominiums in the Waialua-Hale'iwa area. Three commercial establishments: Hale'iwa Shopping Center Phase III, Waimea Falls Park and McDonalds are also serviced by private treatment systems.

Table 3.18 Other existing wastewater systems.

Loads from Wastewater Treatment Plants (WWTP) in Study Area[1]

	Design Flow (mgd)	WWTP Process
Hale'iwa Shopping Plaza	0.0055	Underground activated sludge
Konane Kai	0.0148	Underground extended aeration
Mokule'ia Sands Condo	0.0140	Underground extended aeration
Mokule'ia Shores Condo	0.0050	
Mokule'ia Surf Condo	0.0053	Underground activated sludge
Mokule'ia Beach Colony	0.0130	Cavitette
Hale Ku'ai Plaza	0.0042	Batch Reactor
Hale'iwa Surf	0.0200	Cavitette
Mokule'ia Beach Apt.	0.0076	Underground extended aeration
Pu'uiki Hale	0.0028	Cavitette
Hale'iwa Senior Citizen Center	0.0128	Underground extended aeration
Ono Vista	0.0224	Underground extended aeration
McDonald's Hale'iwa	0.0024	Underground extended aeration
Kapuna Home O'Waialoa	0.0100	Activated sludge
Subtotal	0.1398	
Loading From Public WWTP		
Pa'ala'a Kai	0.1200	Activated sludge
Total Collected Flow	**0.2598**	

1. Parametrix, Inc., 1992

(b) System Descriptions

All of the treatment systems consist of on-site underground WWTSs. The treatment systems utilize the extended aeration process or cavitettes, solids separation and chlorine disinfection. Most of the systems have grease traps (preloaders). The effluent is disposed of by means of either seepage pits or gravity feed injection wells. Sludge is removed by private pumping services and disposed of in City and County sludge treatment systems.

(c) Problems

These private systems have a history of poor performance and citations for Notice of Violation. The most common problems experienced by these facilities is plant upset, seepage pit and well clogging, sewer backups, overflows and nuisance odors. Several of the systems are well over their rated hydraulic capacity. In most cases these problems are attributed to improper and inadequate operation and maintenance (O&M) practices. Most of the systems are over 20 years old and have reached the end of their mechanical and engineering life. The combination of poorly trained apartment resident managers (operators of the system) and insufficient operating budgets contribute to the poor O&M conditions. Many of the facilities are affected by high groundwater resulting in surface overflow and/or sewer backup.

A major concern is that most of these WWTSs are close to the coast which increases the possibility of partially treated or raw sewage contaminating the coastal water. Many of the

restaurants are either serviced by these systems or are in close proximity to these systems which also presents a potential waterborne - food borne contamination pathway.

3.4.4 Commercial and Industrial Establishments

(a) General

Most commercial and industrial establishments in the area are small-scale enterprises serviced by cesspools, many of which are experiencing O&M problems as described earlier for cesspools in general. The Hale'iwa Shopping Center -- Phase III, the Hale'iwa McDonald's and Waimea Falls Park are the only commercial exceptions to this rule, they are serviced by private WWTSs. The only agro-industrial operation, with special wastewater handling provisions, is the Waialua Sugar Company mill, which is discussed in more detail below.

(b) Waialua Sugar Company

Wastewater discharges from the Waialua Sugar Mill are of three types. The largest is the 10 to 12 mgd of sugarcane wash water from the mill's hydro-separator that is produced during the eight-month long grinding season. This wastewater is used to irrigate the company's western fields. Second, cooling water for the mill's power generators is pumped to condensers and is then discharged to Ki'iki'i near Waialua Beach Road. This discharge is under a NPDES issued by the DOH. Finally, toilet and shower facilities at the mill and offices are all serviced by cesspools.

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES OF THE ACTIONS UNDER CONSIDERATION

The discussion contained in this chapter pertains to the environmental consequences of the selected alternatives for both the rural and urban areas. For the rural area the optimal operation of existing systems alternative was chosen. In the urban area the centralized subregional alternative was chosen, thus, the environmental consequences of the collection systems, centralized subregional WWTPs, effluent disposal by irrigation and rapid infiltration, and the reclaimed water line will be discussed.

4.1 PHYSIOGRAPHIC AND GEOLOGIC IMPACTS

Neither of the WWTP sites under consideration would create substantial physiographic or geologic impacts. Construction of a centralized subregional system would require excavation of between 200,000 and 600,000 cubic yards of earth. A portion of the excavation would be for the collection system network and approximately three-quarters of it would be returned as cover for the pipes once they have been laid. Most of the remaining excavation would be in the construction of the WWTPs. All excavated material will be used in either covering pipes or building dikes at the WWTPs.

4.2 HYDROLOGIC IMPACTS

4.2.1 Changes in Storm Runoff Volume

Construction of the centralized subregional WWTPs would only marginally increase the amount of impermeable surface in the area. Nearly all of the increase would come from the wastewater treatment plant site rather than from the pump stations or collection system. All the wastewater treatment plant site locations under consideration are situated in rural areas and are surrounded by substantial amounts of vacant land. They would be graded so that runoff flows onto these open areas. The additional runoff for a 10 year design storm is estimated at approximately 6 cfs, too little to cause flooding. The oxidation ponds/wetland/filter system will capture approximately 68 acre-feet of rainfall per year on its surface. The optimal operation of existing systems alternative would not affect runoff volumes.

4.2.2 Susceptibility to Damage or Disruption From Flooding

4.2.2.1 Centralized Subregional System Alternative-Urban Area

The WWTP sites at Waialua and Hale'iwa are outside of the Federal Emergency Management Agency (FEMA) area of study for the area. However, due to the elevation of each of the WWTPs (130 feet), and the vicinity to any rivers or streams, any possible flood threats would be minimal. If any flood threats do exist, it would be possible to eliminate threats to these WWTP sites through appropriate grading and other design features.

A substantial portion of the collection mains and most of the sewer pump stations would (of necessity) be in flood-prone areas. Because of this, the wastewater pump stations would be flood proofed to the projected flood level so that water would not enter (or leave) the system through them. The sewers would be sized to accommodate increased infiltration from groundwater that would occur when flooding saturates the surrounding soil and stormwater

enters through manhole covers. The hydraulic and treatment capacity of the plant would be sufficient to accommodate the higher influent volumes and pollutants caused by flooding or the high groundwater table conditions that accompany flooding.

4.2.2.2 Optimal Operation of Existing Systems Alternative-Rural Area

Some of the cesspools in the rural area under the selected alternative would be inundated by the design flood and/or adversely affected by the high water table conditions that would accompany it. In many instances this would cause the contents of the cesspools to contaminate floodwaters and wastewater to back up into homes or into the yard and/or surface drainage.

4.2.3 Water Quality Effects

4.2.3.1 Centralized Subregional System Alternative-Urban Area

While it is not possible to quantify its effects, concern over the possible impact of seepage from a high density of cesspools and under-maintained private wastewater treatment plants on coastal water quality was one of the principal concerns of the "208 Plan" and WQPO documents and provided the primary reason for preparing the Waialua-Hale'iwa Wastewater Facility Plan. Cesspool malfunctions in February of 1993, in the Sunset Beach area as noted by the much publicized problems resulted in a special meeting chaired by local elected officials.

The "No-Action" alternative for the urban areas would do nothing to alleviate this concern. In fact as time progresses, the aging of the existing cesspools compounded by their relatively high density, generally unsuitable soils, and close proximity to public beaches would seem to imply the inappropriateness of the "No-Action" alternative. All new development and modified existing homes must have a septic tank system. Both Kaiaka and Waialua Bays are considered to be sensitive to pollutional loadings because of their water quality limited segment designations. The fact that Waialua Bay has been designated Class AA (the highest possible classification) by the State Department of Health indicates it should receive the highest possible protection from contamination.

The centralized subregional WWTP alternative calls for the abandonment of the majority of the cesspools in the Waialua-Hale'iwa District and virtually all of those in the urban core. Without these cesspools, seepage of wastewater would eventually cease and the potential for adverse water quality effects from this source would be eliminated.

Over 90% of the planned collection system consists of gravity mains, which have low internal pressure. Hence, little exfiltration of untreated effluent is expected. In fact, groundwater infiltration into the system in areas where the pipes are below the water table is much more likely, and the system has been designed to accommodate the higher flow rates this will produce. Breaks in force mains (which comprise only 5 to 8% of the system) can result in leakage of untreated wastewater, but such occurrences are very rare. Force main breaks usually surface and show pressure drops at the pump station and can be quickly discovered and rectified.

The wastewater that leaves the reclamation plant will meet DOH guidelines for reuse in public access areas. The treatment system is designed to have a series of redundancies which would minimize the probability of untreated wastewater (not meeting reuse quality guidelines) from entering the surface water or the groundwater. The long retention period within the oxidation ponds and wetlands, along with slow sand filters and disinfection allows for 10^5-10^6 removal of public health significant organisms. The excess storage volume in the oxidation

ponds and wetlands allows for zero discharge for extended periods of time. If a public significant organism does break through, then the soil system (irrigation or rapid infiltration) will serve as a final treatment process. Soils systems can remove 90 to 99.9% of the public health significant organisms in 2-5 feet of contact.

4.2.3.2 Optimal Operation of Existing Systems Alternative-Rural Area

The direction of groundwater flow in the Waialua-Hale'iwa area is towards the shoreline and percolating sewage (that may enter the groundwater) contains nutrients and pollutants which may, in sufficient concentrations, be detrimental to nearshore marine ecosystems and/or public health.

Due to the generally good soil conditions and low population density in the rural area, the potential for adverse water quality impacts is expected to remain low. Those rural areas in regions of high groundwater table and severe topography and subsurface geological conditions have the potential to create water quality problems.

4.3 IMPACTS ON SOILS AND AGRICULTURAL PRODUCTIVITY

4.3.1 Loss of Prime Agricultural Land

The collection system and wastewater pump stations, and reclamation line would be constructed in mostly urbanized areas and would have minimal affect on agricultural lands.

If the WWTP site were to be selected purely on the basis of minimizing adverse impacts on agricultural potential, the SBR/ocean discharge alternative would be preferable since it is not currently in agricultural use and has soils with low agricultural potential. The other centralized subregional treatment plant alternative involve sites which are currently cultivated. The withdrawal of approximately 70 acres from sugar production could have a minimum effect on the operations of the Waialua Sugar Company. It is noted that the Waialua Sugar Company has voiced their concerns on actions affecting their operations, such as land lost from production, interference with irrigation water flow, increased traffic on cane haul roads (and subsequent liability concerns), and stricter harvesting controls in close proximity to the site. It is also noted that Waialua Sugar's entire operation is problematic.

The 70 acres utilized for the two centralized subregional WWTPs would only occupy 0.375% of the 16,000 acres of agricultural land in the Waialua-Hale'iwa service area. The existing agricultural uses and potential of the proposed wastewater treatment plant sites evaluated are in Table 4.1.

4.3.2 Soil Erosion

The areas that would be served by a centralized subregional wastewater treatment and disposal system is relatively flat, and rainfall volumes are moderate. The use of standard erosion control measures during grading, grubbing, trenching, and other construction activities will prevent a significant increase in erosion.

Table 4.1 Land use rating for centralized subregional WWTP sites.

Location	Existing Use	SCS Capability Rating	ALISH Designation	Land Area (acres)	Significance of Loss
Waialua	Sugarcane	I	Prime	30	Remove productive acreage from Waialua Sugar Co. operations.
Hale'iwa	Sugarcane	I	Prime	30	Remove productive acreage from Waialua Sugar Co. operations.

4.4 AIR QUALITY IMPACTS

4.4.1 Applicable Ambient Air Quality Standards

Both Federal and State governments have promulgated ambient air quality standards for major air pollutants. These specify maximum allowable concentrations of these "criteria pollutants" and are intended to directly protect the public's health and welfare. The standards are summarized in Table 4.2. Wastewater treatment facilities which employ fossil-fuel combustion for sludge drying or incineration emit criteria pollutants, but no such combustion is envisioned in the facilities under consideration for the Waialua-Hale'iwa area.

Hydrogen sulfide, a by-product of anaerobic decomposition, can be produced during the course of wastewater treatment. It constitutes a health hazard only at concentrations far higher than those which could be produced by the processes that would be used. However, humans can detect its characteristic "rotten egg" odor at very low concentrations. The State Department of Health has proposed a 1-hour ambient air quality standard of 0.1 ppm for hydrogen sulfide. In order to achieve this, it may be necessary to include a hydrogen sulfide emissions control system in the design of the WWTP. The inclusion of this emission control system combined with the location of the treatment plant sites under consideration will help to minimize the release of malodorous gases.

4.4.2 Emission Standards

In addition to ambient air quality standards, the Federal government has established standards which limit the rate and/or volume of air pollutants emissions from individual facilities. Three of these regulations are applicable to wastewater treatment plants. One is listed under the New Source Emission Standards for Hazardous Air Pollutants (40 CFR 61), Subpart), and pertain to incinerators which burn sewage sludge. The second is contained in the National Emission Standards for Hazardous Air Pollutants (40 CFR 61, SubPart E) and pertains to mercury emissions from sludge incineration and sludge. Since sludge will be stored within the oxidation ponds rather than through incineration, the project will not violate these standards. The final regulation also pertains to incineration of sewage sludge and is found in the Federal Standard for the Use and Disposal of Sewage Sludge (40CFR Parts 503, Subpart E).

Table 4.2 Summary of State of Hawai'i and Federal Ambient Air Quality Standards.

Pollutant	Sampling Period	Federal Standards		State Standard
		Primary[1]	Secondary[2]	
Suspended Particulate Matter (TSP) (micrograms per cubic meter)	Annual Geometric Mean	75	60	60
	Annual Arithmetic Mean	–	–	–
	Maximum Average in Any 24 Hours	260	150	150
Sulfur Dioxide (SO_2) (micrograms per cubic meter)	Annual Arithmetic Mean	80	–	80
	Maximum Average in Any 24 Hours	365	–	365
	Maximum Average in Any 3 Hours	1300		1300
Carbon Monoxide (CO) (milligrams per cubic meter)	Maximum Average in Any 8 Hours	10	–	5
	Maximum Average in Any 1 Hour	40		10
Hydrocarbons (HC) Non-methane (micrograms per cubic meter)	Maximum Average in Any 3 Hours	160		100
Photochemical Oxidants (micrograms per cubic meter)	Maximum Average in Any 3 Hours	240		100
Nitrogen Dioxide (NO_2) (micrograms per cubic meter)	Annual Arithmetic Mean	100		70
	Maximum Average in Any 24 Hours	--		150
Lead (micrograms per cubic meter)	Calendar Quarter	1.5		1.5

[1]Intended to prevent adverse effects on public health.

[2]Intended to prevent adverse effects on public welfare including effects on comfort, visibility, vegetation, animals, aesthetic values and soiling and deterioration of materials.

Source: Morrow (June 1982:Table 4; Chapter 54 of Title 11, Administrative Rules, State of Hawai'i).

4.4.3 Other Emission Regulations

The State Department of Health's Administrative Rules (Title 11, Chapter 60) empower it to control "dust, fumes, mist, smoke, other particulate matter, vapor, gas, odorous substances, or any combination thereof" to the extent necessary to prevent air pollutant concentrations that might constitute a health risk or interfere with human welfare. The provisions of this chapter are broad enough to cover viable particles such as bacteria and viruses, as well as odors and will be addressed in the following sections concerning air quality impacts associated with the proposed project.

4.4.4 Construction Impacts on Air Quality

The potential for significant particulate emissions from the wastewater treatment plant and pump station sites during grubbing and grading is slight due to the limited areas involved and the dust control measures that will be taken by the contractor. The U.S. Environmental Protection Agency (EPA) has estimated uncontrolled dust emissions (i.e., emissions when no special mitigation measures are taken) from construction sites at about 1.2 tons per acre per month in an area having soils with 30% silt content and a Precipitation/Evaporation (P/E) Index of about 50 (EPA, October 1980). The lower P/E Index (40) and higher silt content of the soils on the sites under consideration (U.S. Department of Agriculture, August 1972; Buckman & Brady, 1969) indicate that the rate of dust emissions would be even higher from them if no control measures are taken. However, frequent watering and other dust control measures can reduce dust emissions by up to 50%, and are required in the City's construction contracts. These measures, together with the modest size and rural location of the wastewater treatment plant, will help to minimize dust emission problems.

Excavation needed to install the collection system and reclamation line is likely to be a more significant source of construction dust. This is true because the collection system involves excavation much closer to homes, businesses, and other sensitive receptor sites and because passing vehicles provide a mechanism for lifting more soil particles into the air. Frequent watering of the streets can reduce particulate emissions substantially, as can careful cleaning of the street surface after each day's activities. Nonetheless, it is virtually impossible to provide complete control at night and during other non-working hours, and residents may expect dust to be a nuisance while the sewer mains are being constructed near their homes. The most effective means of minimizing the impact of these emissions is to keep construction in any particular area as short as possible.

The optimal operation of existing systems alternative involves very limited construction of new facilities and does not require a collection system. Consequently, it would have virtually no effect on air quality.

4.4.5 Long-Term Effects of Optimal Operation of Existing Systems Alternative-Rural Area

A properly working cesspool is odor free, but cesspool failure, a common occurrence in the study area, produces odors. Construction of a replacement septic tank/adsorption field system can solve the odor problem where the failure is the result of long use. It will not eliminate cesspool backups and consequent odors where the failures are the result of poor soil conditions. Cesspool odors tend to be localized, and this has limited the severity of the problem to date. However, given homeowners tendency to undertake minimal cesspool maintenance, the number of cesspool failures may be expected to rise as the average age of the cesspools in the area increases. Over time, this will result in a greater odor problem, particularly in the most densely settled areas. Furthermore, emissions from cesspool truck traffic will continue and increase should the existing system be kept.

4.4.6 Long-Term Air Quality Effects of Centralized Subregional System Alternative-Urban Area

4.4.6.1 Chemical Emissions

Wastewater facilities generally emit regulated pollutants only if they include sludge incineration or heating, or sludge drying, neither of which is proposed for the Waialua-Hale'iwa area.

4.4.6.2 Microbial Emissions

While the proposed WWTPs for the Waialua and Hale'iwa areas is not a potential source of airborne chemical pollutants, the nature of the waste that is handled makes it a potential emitter of bacteria, viruses, and other viable matter. In addition, any aeration of wastewater is a potential source of aerosols. The extent to which organisms become entrained in air is determined by such factors as the turbulence of the fluid flows, the amount of fluid exposed to air, and the turbulence and velocity of the air stream.

A number of studies have been funded by the U.S. Environmental Protection Agency in an attempt to evaluate the health risks associated with the treatment and disposal of municipal wastewater and sludge (see, for example, Clark, et al., May 1981; Majeti & Clark, April 1981; and Fiscus, et al., August 1978). These show that despite the possibility of relatively high levels of airborne microorganisms resulting from the operation of wastewater treatment facilities, there is no evidence of increased disease rates among WWTP workers. The downwind transport of these organisms to surrounding population also appears to have no measurable effect on the incidence of disease. Dispersion by the wind and die-off due to exposure to sunlight, desiccation, and other factors have been shown to significantly reduce the number of viable organisms as distance from the plant increases, and placement of a vegetative barrier around the plant can cut concentrations by up to 50%.

4.4.6.3 Odors

Odors, rather than the air pollutants discussed above, have historically been the most serious air pollution concerns relative to wastewater treatment plants. Such facilities are known to be potential sources of undesirable odors, whose control in the past have often been neglected, but increasing complaints of nearby residents and advances in treatment technology and reliability have greatly reduced the frequency and intensity of odor emissions.

Some treatment processes have an inherently greater potential for odor production than do others. In addition, because of the extensive collection system, relatively flat slopes, and modest flows, sewage will take several hours to reach the treatment plant from its place of origin. Consequently, odor-producing septic conditions will develop, and the potential exists for the release of these odors at the sewer pump stations, the junction of force and gravity mains, and at the headworks to the wastewater treatment plant. The bad-smelling anaerobic decomposition gases include small amounts of a full range of low-molecular weight mercaptans, organic disulfides, organic acids, and methylamines, indoles, skatoles, as well as much larger amounts of hydrogen sulfide and ammonia (National Academy of Sciences, 1979). Hydrogen sulfide is particularly troublesome because it has an odiferous, rotten-egg smell and is detectable at relatively low concentrations, as low as 0.47 parts per billion (by volume).

Various methods can be used to control odors (Adams, March 1974; Hemeon, March 1974). Some odor reduction can be achieved by injecting oxidizing agents such as hydrogen peroxide, chlorine, and ozone or by aeration into the wastewater at wastewater pump stations and the headworks at the treatment plant, but scrubbing the malodorous gases with scrubbers, soil absorbers, or granular-activated carbon (GAC) absorbers provides a more cost-effective, reliable control of odors. Consequently, soil filters will be provided, if required, for the headworks off gases. The WWPSs will use GAC filters if odors become a problem.

Under certain conditions oxidation ponds can cause odors. The most frequent cause of odors is poor design. If the ponds are organically over loaded they have the possibility of going totally anaerobic under conditions such as; long periods with minimum sunlight, periods of intense biodegradation, etc.

Proper inlet, outlet, length to width ratio, and organic loading can minimize this problem. A secondary design consideration is to have the ability to regulate final oxidation pond effluent to the primary oxidation pond. This could be used to supplement dissolved oxygen to the first pond. A treatment procedure is also available utilizing chemicals to supply oxygen for insuring aerobic conditions on the surface.

4.5 NOISE IMPACTS

4.5.1 Centralized Subregional System Alternative-Urban Area

Construction and operation of the various components of the centralized subregional WWTPs would generate noise impacts on the surrounding community. The character, magnitude and significance of these impacts, as well as possible noise mitigation measures were evaluated by the acoustical consulting firm of Darby-Ebisu and Associates, Inc. (April 1982).

4.5.1.1 Construction Noise and Mitigative Measures

Collection System and Reclamation Lines

Construction of the collection system and reclamation line required by the centralized subregional wastewater treatment alternative would produce some adverse short-term noise impacts on existing residential and commercial structures. As indicated below, many of these impacts are unavoidable. However, they are not expected to be severe, and noise mitigation measures can be used to insure that they do not become overly disruptive.

The primary noise sources during construction are expected to be trenchers, backhoes, front end loaders, pumps, small cranes, and trucks. The noise levels produced by such diesel-powered equipment typically range from 75 to 90 dB at a distance of 50 feet. Table 4.3 depicts the range of construction noise levels that are expected as a function of distance from operating diesel equipment. Noise measurements were made of a trencher while it was digging a trench for a sewer lateral; they showed noise levels of 70 to 80 dB(A) occurring nearly continuously during working hours. Only brief respites occurred when the equipment was idling or being repositioned.

Based on the available noise source data, it is projected that exterior construction noise levels will, at times, exceed 80 dB(A) when work is performed within 50 feet of a structure. Interior noise levels will probably exceed 60 dB(A) under such conditions. Because of their very limited setback (10 to 30 feet) the residences along Crozier Drive are expected to be most severely affected. Disruption of normal residential activities in the rooms facing the sewer line will probably occur when work is underway. However, since construction activity will move as work on the collection system and reclamation line progresses, significant noise exposure at any one location will last only two to four weeks.

The construction of wastewater pump stations will generate additional hammering, jackhammer, and concrete mixer noises. As the separation from residences increases, construction of the WWPSs will have less adverse impact. The construction of the WWPSs will generate audible construction noise, but its impact will be localized and less significant than noise generated during the installation of the collection lines.

Wastewater Treatment Plants

While construction of a wastewater treatment plant will involve sustained activity for about two years, all of the WWTP sites under consideration are relatively isolated from existing development. Because of this, significant construction noise impacts are not expected.

Mitigative Measures

Construction noise levels as well as noise levels created by vehicles going to and from the construction site must be kept within levels specified in Title II, Administrative Rules Chapter 43, Community Noise Control for O'ahu, and Chapter 42, Vehicle Noise Control for O'ahu (respectively). In addition, all construction equipment and on-site vehicles requiring the exhaust of gas or air must be equipped with mufflers. Should a baseyard or stockpile area by located near residences, mitigative measures, such as berms or barriers, will be constructed to minimize noise impacts from such areas. The construction period will be limited to the hours of 8 to 5 Monday through Friday.

Table 4.3 Anticipated range of construction noise levels as a function of distance.

Distance From Source (in feet)	Anticipated Construction Noise Level (in dBS)		
	Minimum	Maximum	Median
50	80	90	86
70	77	87	82
100	74	84	79
150	71	81	76
250	66	76	71
400	62	72	67
600	57	67	63
1,000	52	62	57

Source: Darby-Ebisu and Assoc., Inc. (April 1982).

4.5.1.2 Operating Noise and Mitigation Measures

Wastewater Treatment Plants

In order to predict wastewater treatment plant noise levels, the existing Wahiawa Wastewater Treatment Plant was used as an acoustical model. Sound level measurements were made at that facility and used to estimate the amount of noise that would be produced by a centralized subregional WWTP serving the Waialua-Hale'iwa area. These estimates indicate that total plant noise at a distance of 1,000 feet would be below 40 dB. This is below the A-weighted nighttime background ambient noise level. Since existing residential development is located over 1,000 feet from the WWTP sites, no adverse impacts from overall operating noise levels is expected.

Finally, the diesel-powered standby electric generator also constitutes a potential noise source. However, it will be operated only as necessary for periodic maintenance and during power outages.

Wastewater Pump Stations

Wastewater pump stations must, by necessity, be located closer to residential areas than the WWTP. Moreover, interior noise levels in these stations can be as high as 80 dB. Hence, there is a greater potential for adverse noise impacts from these WWPSs than from the WWTP.

The primary noise sources at the WWPSs are expected to be electric motors, air compressors, and a standby electrical generator. These are sufficiently loud to make careful treatment of the walls and ventilating openings mandatory. So long as the WWPS ventilation openings are treated with sound attenuating louvers, the State Department of Health nighttime noise limits can be met by providing a 20-foot setback from the property line. By locating the treated wastewater pump station buildings at least 60 feet from the nearest residence, noise levels at the residences will not exceed 40 dB, and minimal noise impact will result.

Mitigative Measures

To mitigate potential problems, noises from wastewater collection and treatment system must be to meet attenuated the allowable noise levels state in Title 11, Administrative Rules Chapter 43, Community Noise Control for O'ahu.

4.5.2 Optimal Operation of Existing Systems Alternative-Rural Area

There would be few noise impacts under this alternative. The only changes in the existing noise environment would result from construction of new septic tank/adsorption field and the replacement of failing cesspools with septic tanks. The expected increase in cesspool failures would also mean additional noise generated by cesspool pumping trucks. All of these noise sources would be temporary and are not expected to have significant impacts.

4.6 IMPACTS ON VEGETATION

The selected alternative for the rural area involves little new construction, and would have no significant effect on vegetation. Consequently, this analysis focuses on the areas that would be affected by construction of a centralized subregional wastewater treatment system.

In the urban area, construction of the proposed wastewater treatment plants, wastewater pump stations, sewer mains, reclamation lines and the rapid infiltration field involves land clearing. Thorough surveys of the affected areas were conducted to determine the extent to which this might adversely impact vegetation. The remainder of this section describes the survey methodology, and the nature and importance of existing vegetation.

4.6.1 Survey Methodology and Findings

Before fieldwork was initiated, maps, aerial photographs, and reports pertinent to the project were collected and studied. Wildlife management agencies were contacted for information regarding the possible presence of rare or endangered species. Field reconnaissance surveys were conducted in July 1992, and February 1993. Following an initial orientation trip, walk-through surveys were made at each of the WWTP and wastewater pump station sites under consideration. Cursory inspections were made of the routes followed by collection lines and the reclamation lines.

4.6.2 Probable Impacts on Vegetation

4.6.2.1 Collection Lines, Reclamation Line, Wastewater Pump Stations

Except for two minor segments running through sugarcane fields and for house laterals, the sewer mains and reclamation lines would be laid beneath existing roadways. The few vegetated areas which would be affected would be immediately replanted, thereby insuring adequate groundcover and minimizing undesirable changes in floristic composition.

Clearing the wastewater pump station sites will result in the loss of approximately 10,000 square feet of vegetative cover at each location. No known rare or endangered species will be affected, and the change will not significantly reduce the regional abundance of the species.

4.6.2.2 Wastewater Treatment Plant Sites

Construction of each of the wastewater treatment plants involves the clearing of approximately 35 acres of agricultural land at each site. No known rare and endangered species are located at any of the sites. The effect on sugarcane production is discussed in Section 4.3 of this report. No cumulative effects on vegetation are expected.

4.7 IMPACTS ON FAUNA

The selected alternative for the rural area involves very little new construction with the potential to adversely affect fauna. Similarly, by virtue of their location under areas not heavily used by fauna (such as existing paved areas), the collection system and reclamation line does not have the potential for significant faunal effects.

The following impact analysis focuses on the wastewater treatment plant sites.

4.7.1 Survey Methodology and Findings

Walking surveys were made of each of the wastewater treatment plant sites in the BCA, 1987 Facility Plan (Bruner, 1982 and 1986). In addition, all birds and mammals seen or heard in accessible areas were enumerated using the eight-minute count method. Fecal droppings and tracks left by mammals were also recorded. Data from these counts form the basis for the relative abundance figures presented in Tables IV.4 and IV.5, of the BCA, 1987 EIS.

No additional fauna studies were done by HRI as part of the Supplemental Facility Plan and EIS. However, the study conducted by BCA covers many of the areas chosen in the Supplemental Facility Plan. Two areas that were not accessed for fauna species were the two 30 acre WWTP sites. However, these sites have been sugar fields for over 100 years and it is believed that the conversion from agricultural land to the WWTP sites will not adversely affect fauna.

Following are some sections of the BCA fauna study that apply to the centralized subregional WWTPs.

No resident indigenous birds were observed at any of the sites except Dillingham Airfield, but the U'koa Marsh habitat is suitable for Pueo, the Hawaiian Owl (*Asio flammeus sandwichensis*) and Black-crowned Night heron (*Nycticorax nycticorax hoactli*). American coot (*Filica americana alai*), the Black-crowned Night Heron (*Nycticorax nycticorax hoactli*), and the Black-necked stilt (*Himantopus mexicanus knudseni*) were observed at Dillingham

Airfield site, and the Common Moorhen (*Gallinola chloropus sandvicensis*) and the Hawaiian Duck (*Anas wyvilliana*) may also be present. Migratory birds were also absent from Dillingham Airfield at the time of the survey; however, migratory birds such as the Pacific Golden Plover (*Pluvialis fulva*), the Wandering Tattler (*Heteroscelus incanus*), the Ruddy Turnstone (*Arenaria interpres*), and the Sanderling (*Calidris alba*) may use the area.

Mongoose were abundant at all of the sites. Feral dog and cat tracks were also noted, and various species of rodents are undoubtedly present. The native Hoary Bat (*Lasiurus cinereus*) has reportedly been sighted on O'ahu, but no specimen records have been reported from the Waialua-Hale'iwa area, and the type of habitat present at the WWTP sites makes it extremely unlikely that any are present there.

4.7.2 Probable Impacts

Local bird populations are not likely to be altered by construction of a centralized subregional wastewater treatment plants, especially since they are located in sugar fields. Construction of the 1 acre rapid infiltration disposal fields, at the Dillingham Airport, may have some short term affects on birds that utilize this area. However, after the fields are constructed the native vegetation will return and thus will the birds.

The mammal situation will also change slightly as development proceeds. As the groundcover is removed, the number of mongoose, cats, and dogs immediately around the facilities will decline somewhat.

4.8 IMPACTS ON ARCHAEOLOGICAL AND HISTORICAL RESOURCES

The selected alternative for the rural area requires no extensive construction or excavation that might adversely affect historical or archaeological sites. Consequently, the following analysis focuses on the centralized subregional wastewater treatment system alternative.

4.8.1 Survey Methodology and Findings

The BCA 1987 Facility Plan studied the Kawailoa and Mokule'ia wastewater treatment plant sites Hommon (May 1982) and an archaeological reconnaissance survey of the Dillingham Airfield site was undertaken by Archaeological Consultants of Hawai'i in 1986. Because they are located almost entirely in already developed areas, the collection and disposal system elements were not studied. Previous archaeological studies and the records of the Historic Sites Section of the State Department of Land & Natural Resources were reviewed. Following this preliminary research, the sites were inspected on foot.

No additional archaeological studies were done as part of the Supplemental Facility Plan. However, both the Waialua-Hale'iwa sites are located in areas of intensive agricultural activities; therefore, it is highly improbable that antiquities would be discovered at these sites.

The 1986 survey of the area around Dillingham Airfield found a dense concentration of sites beginning inland of the runway midpoint and running east towards Ka'ena Point. Specific field studies might be required at the rapid infiltration sites as specific areas are identified in the design phase of the project.

4.8.2 Potential Impacts and Mitigation Measures

The proposed location for the rapid infiltration disposal field is at the west end of the Dillingham Airfield runway, away from the known archeological sites. However, during construction of the infiltration fields if any antiquities or human skeletal material is found, construction activities will be halted and appropriate measures taken. It is also possible that excavation for the wastewater pump station, the sewer mains, reclamation line, or the WWTP sites could uncover cultural remains, including human skeletal material, not now known. If this occurs, construction activities in the vicinity of the discovery will be halted until such time as the Historic Sites Section of the Department of Land and Natural Resources determines the appropriate course of action.

4.9 ENERGY USE

4.9.1 Centralized Subregional System Alternative-Urban Area

If a centralized subregional wastewater treatment alternative is implemented, energy use in the year 2015 would amount to about 1728 MBtu per year. In general, larger plants use less energy per gallon of wastewater treated than smaller ones; and energy use increases as the number of pump stations rise.

Hawaiian Electric Company was contacted in the course of the BCA study to determine if their generating, transmission, and distribution facilities were capable of handling the demands of the various wastewater facilities alternatives. These facilities would have to be installed in conjunction with the commencement of construction activities.

4.9.2 Optimal Operation of Existing Systems Alternative-Rural Area

Current energy use for sewage treatment and disposal in the rural areas is estimated at 500 million British thermal units (MBtu) per year. The energy use consists of fossil fuel energy used by the trucks which pump cesspools and deliver the septage to the Wahiawa WWTP for treatment and disposal.

4.10 TRAFFIC IMPACTS

4.10.1 Centralized Subregional System Alternative-Urban Area

4.10.1.1 Traffic Impacts of Operation

If a centralized subregional system is installed, virtually all cesspools in the urban area will be closed out by filling them in with native material. Only the rural fringe areas will continue to require cesspool pumping service, and this will involve only 10 to 15 one-way truck trips per week. Finally, vehicles carrying employees and other persons traveling to and from the facility (i.e., maintenance vehicles) will make about 150 trips per week. Average daily project-related traffic, then, will be about 25 one-way trips per day. This number is insignificant in comparison to existing traffic and will not substantially affect the service level on the area's roadways.

4.10.1.2 Traffic Impacts of Construction and Proposed Mitigation Measures

Construction of the WWTPs and WWPSs will generate additional vehicular traffic over a two to three year period, but the changes will not be significant. A much more significant concern is the traffic disruption that could result from construction of the collection system and reclamation lines beneath most roads in the urban area. In most cases it will be necessary to close one land while the construction crews are laying the sewer mains. Flagmen will be used to control traffic, and short delays are inevitable.

The adverse effects of the activity will be minimized with small working segments, maintaining two lanes of flow during busy traffic hours, and insuring that trained flagmen are assigned to traffic control duties. It will also be possible to route the majority of the traffic onto alternate routes around construction areas. The fire department shall be notified in advance of all roadside construction activities that may impact their response routes.

4.10.2 Optimal Operation of Existing Systems Alternative-Rural Area

Under this alternative, the rural area would continue to rely on the existing cesspools, and septic tank/subsurface disposal systems for new dwellings, for wastewater disposal. The number of pumping and chemical treatments would increase both due to a small increase in the number of cesspools and an increase in the cesspool failure rate as these units age. This would result in an increased number of trips by cesspool treatment or pumping trucks on the roads of the Waialua District. The number of pumpings and chemical treatments in the rural area in the year 2015 per year would be about 400. Since each cesspool pumping or chemical treatment requires two trips (to the cesspool from Wahiawa and back), this amounts to 800 one-way trips per year on roads just to handle wastewater disposal. Septic tanks in the rural area would need to be pumped approximately once every 5 years.

4.11 VISUAL IMPACTS

4.11.1 Centralized Subregional System Alternative-Urban Area

4.11.1.1 Construction Period Impacts

Grubbing, grading, and building construction on the wastewater treatment plant sites will result in a very disordered appearance for the two to three years that they are underway. Means of reducing these impacts are discussed in Section 4.11.2.3, below.

Construction of WWPSs requires approximately 18 months. Their location close to roads gives them greater visibility than the WWTPs, but this is more than offset by their smaller size (0.25 acres versus 30 acres). In any event, construction work on them will not generate significant visual impacts.

4.11.1.2 Long-Term Impacts

Much of a WWPSs equipment is underground. Hence, all that is visible to the public is a rectangular concrete block building (about 20 feet by 30 feet) having a flat roof, a few ventilation openings with louvers, and a door. These pump station buildings will stand about ten feet above grade, except where they are located in a flood zone. In those instances the roof will be approximately ten feet above the 100-year flood elevation.

Unlike the WWPSs, all the wastewater treatment plant sites under consideration are located away from main roads. Some of the facilities will be set into the ground, but the headworks building, the oxidation ponds, wetlands, slow sand filters, ultra-violet disinfection,

and odor control equipment may stand higher than 6 feet. Buildings will be constructed of concrete or concrete block.

4.11.1.3 Mitigation Measures

The City's design standards require that plans for WWPSs be prepared by a registered architect so that they are in harmony with surrounding development. They also state that the sites shall be suitably landscaped so that they blend with the surrounding environment and render a pleasing overall appearance. Automatic irrigation systems are required to facilitate landscape maintenance. Adhering to these design standards should insure that the pump stations are compatible with the area's existing development.

Mitigating measures (i.e., planting of trees and hedges) will be provided to minimize the visual impact of the WWTPs. This matter will be assessed in more detail during the design phase of the project. Also, landscaping and/or structural provisions will be included (as necessary) to provide an aesthetically pleasing facility that is compatible with the surrounding area.

4.11.2 Optimal Operation of Existing Systems Alternative-Rural Area

Since this scenario involves virtually no new above-ground construction, it would have almost no visual impacts.

4.12 SOCIAL IMPACTS

The centralized subregional alternative would not result in significant adverse social impacts. It would accommodate only the very limited amount of additional growth that is called for in the North Shore Development Plan.

The centralized subregional treatment plant alternative will improve the quality of wastewater treatment in the area. This, in turn, will reduce the potential for water quality-related health problems. This will also drastically reduce the number of homes suffering the inconvenience of frequent cesspool failures (i.e., eliminating nuisance and public health conditions such as odors and cesspool overflows, potential infectious diseases, as well as the inconvenience of waiting for the cesspool truck).

4.13 ECONOMIC IMPACTS

The economic impacts of implementing the Waialua-Hale'iwa Wastewater Facility Plan can be viewed from several perspectives: (1) the O'ahu economy in general, (2) the individual landowner in the collection area, and (3) the various levels of government -- Federal, State, and Local. These three viewpoints are discussed below; the centralized subregional wastewater treatment system alternative is discussed first, followed by the "No-Action" alternative.

4.13.1 Centralized Subregional System Alternative-Urban Area

4.13.1.1 General Economic Impacts

This discussion of the impacts on the O'ahu economy of establishing a centralized subregional wastewater treatment system for the Waialua-Hale'iwa area is presented in two parts: (1) the construction of the treatment plant and collection grid and (2) the operation and maintenance of the system. The analysis of impacts is based on an input-output (inter-

industry) model of the Hawai'i economy prepared by the State of Hawai'i Department of Planning and Economic Development (1982). Multipliers derived from the model are applied to the direct impacts to estimate the indirect and induced effects.

Construction Period

The direct economic activity generated by the centralized subregional alternative (i.e., by building the two WWTPs and the six wastewater pump stations, buying and laying the force mains and sewer lines, constructing the reclamation line, connecting the service laterals, backfilling the existing cesspools, etc.) is estimated at approximately $89 million (construction cost 1995 dollars). This figure is used to calculate the economic impacts described below.

Ratios of labor income to construction output and of construction employment to the dollar value of construction output were calculated from the 1985 State of Hawai'i Data Book (Hawai'i, State of, Department of Planning & Economic Development: pp 334* & 528**). The labor income factor is 33% of construction output. Applying this factor to the $100 million construction cost figure suggests labor incomes directly generated by the project would be $33 million. The ratio of construction employment to million dollars of construction output was 12.7 to 1 in 1984. This implies approximately 1,270 person-years of construction labor would be generated by a $100 million project (spanning a 10 year period). These estimates and those that follow refer to the entire project. They can be annualized once the length and scheduling of the job is known with more certainty.

Besides the direct employment and income effects noted above, output would be stimulated in several industries which supply inputs to the construction sector, such as ready-mix concrete, concrete products, lumber, trucking, wholesale trade, and professional services. This is called the indirect impact of the project. It can be estimated using the Type I income coefficient for "Other Construction". This multiplier is 0.46, meaning a direct and indirect income of 46 cents for every construction dollar or $46 million for a $100 million project. Subtracting out the direct construction income, the indirect income effect is about $13 million. If an average annual wage of $38,000 is assumed for these associated industries, this would imply approximately 342 additional person-years of construction employment.

The spending and re-spending of the project-generated income on consumer goods also creates additional economic activity. This is called the induced effect and can be estimated using the Type II income coefficient (0.73 for "Other Construction"). The total direct, indirect and induced effects would be $70 million or an induced effect of about $24 million ($70 - $46 = $24). Assuming an annual average wage of $38,000, about 631 more jobs would be supported in the production, transportation, and marketing sectors.

The total direct, indirect, and induced effects total about $70 million in income and 2,243 person-years of employment. If construction takes place during a hypothetical ten-year period, the total annual income generated should amount to about two-tenths of a percent of the State's labor income.

It should be pointed out as an aid to interpreting these estimates that if State and local government and individual funds are used in this project, which would otherwise have been available for alternative investment, the results should not be viewed as expansionary. To the extent that it is paid for with otherwise unavailable Federal grants, it might be seen as an exogenous addition to the economy, but we might also assume that the affect is balanced off by Hawai'i taxes financing similar construction elsewhere.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Operation and Maintenance

The operation and maintenance (O&M) of a centralized subregional wastewater treatment system would have a much smaller impact on the economy than its construction. The yearly O&M costs for the two subregional WWTPs is estimated at about $412,700; wastewater pump station and sewer line annual O&M costs are expected to be about $312,708. Combining these gives a total of about $725,408 per year. Using the input-output model figures for the "Water and Sanitary Services" sector, a direct income effect of $238,750 is projected; this implies a direct labor effect of 6.25 jobs. Applying the Type II multiplier (0.72 for this sector) to the $725,408 industry output, a total income effect of $522,298 is estimated.

This estimate of annual O&M costs is roughly half the combined current annual cost of private treatment plant O&M plus cesspool pumping and treatment in the urban area. Considering the increased costs of maintaining the existing system as cesspool failures increase over the next twenty years.

4.13.1.2 Economic Impacts on Individuals

From the point of view of the majority of individual property owners in the urban core, upgrading the system may make wastewater disposal more costly than it is at present although for some, the cost would be reduced. Present wastewater disposal costs are quite low for a large share of the households in the area. Studies made by the Department of Health showed that almost 40% of the cesspools in the Waialua-Hale'iwa District have never had to be pumped. Thirty percent had been pumped one or more times in the last 10 years and, of these, about half had to be pumped four or more times per year. Individuals have a choice of paying the City and County monthly Wastewater System User Fee of $33.65/mo., or a subsidized charge of $23.90 per month, or $80.76 per pumping if the service is provided by the City and County (1994). Private contractors usually charge approximately $125 to $150 to empty and haul 2000 gallons of cesspool liquids. Often the private haulers respond to a request for service faster than the City and County trucks.

Replacement of a cesspool is a major expense compared to other costs of maintaining a home, but it is an expense rarely incurred. A cesspool in good soil can function almost indefinitely, although it may need pumping and chemical treatment every 15 to 20 years. Cesspools located on poor soils exhibit a different situation. Owners of these cesspools are usually unwilling to pay for a new cesspool which may clog within a few years. Because it is much less costly, they are often willing to put up with the inconvenience of frequent pumpings, especially if they choose the option of paying the City and County's Wastewater System User Fee. Thus, current expenses for wastewater disposal are low for most residents.

If a centralized subregional treatment facility is built, affected property owners will be faced with three types of charges: an improvement district assessment, the on-site costs for connecting the dwelling or business to the collection system and for backfilling any existing cesspools, and a monthly wastewater system user charge. For residential- and apartment-zoned land the assessment is made on the basis of the number of square feet of "specially benefited" land in the parcel. Typically, this will be 5,000 square feet per house on R-5 zoned parcels like those found in most of the residential neighborhoods of the Waialua District. Since the assessment is $0.16 per square foot (s.f.), R-5 residential lot owners could expect to pay $800. If a lots square footage is such that it can legally be subdivided, the assessment would be based on the possible number of subdivided parcels. Apartment parcels pay a higher assessment rate ($0.24 per s.f.), but the charge can be spread over a greater number of units;; hence, the per-unit cost is normally less. Homeowners in the Pa'ala'a Kai subdivision would be exempt from this assessment, since their collection system is in place and its expense

included in the overall home cost. Commercial and industrial users would be assessed based on a $0.20 per s.f. rate.

On-site costs will also be the responsibility of the landowner. The cost of making the house connection will be about $500 to $4,000 for a residential or apartment parcel (depending on the size of the lot) if the work is done by a contractor; backfilling each cesspool will cost about $500.00.

The wastewater system user fee that the single-family unit would be charged is currently $8.00 per month, while apartment units now pay $7.20 per month. Non-residential users pay $0.95 per 1,000 gallons of metered wastewater discharge. If there is no meter on the wastewater stream, the charge is based on metered water use ($0.76 per 1,000 gallons). A small commercial establishment which discharges 400 gallons per day would incur a charge of about $11.30 per month. The minimum monthly charge is the same as the single-family residential unit charge. Wastewater system user charges are based on the average per user cost of operating and maintaining all municipal wastewater facilities on O'ahu.

This combination of assessments, on-site costs, and monthly charges is expected to raise wastewater disposal costs for the majority of residents in the sewered area. Those residents whose cesspools now require frequent pumping and who use private pumping services may have heir costs lowered. This is because they are already paying the monthly Wastewater System User charge for municipal cesspool pumping services (or more if they utilize private pumpers). The benefits to the residents of the district would consist of both improved reliability and the public health advantages of discontinuing use of failing cesspools. Owners of failing cesspools will be relieved of the inconvenience of pumping. In addition, they and their neighbors would not longer be subject to odors emanating from failed cesspools. Some properties may appreciate in value with the improved service a centralized subregional system would provide. The impact of the project on the appreciation of properties with currently satisfactory cesspools is uncertain. A very limited number of currently undeveloped residential parcels have all the land use designations needed for residential use, but are situated in areas where Board of Water Supply policy prevents on-site disposal of effluent. These would be available for development if served by the system, and, thus, their owners would benefit financially from construction of a centralized subregional system.

4.13.1.3 Economic Impacts on Government

All three levels of government will be involved in funding the public portion of the project: the Federal Environmental Protection Agency, the State Department of Health, and finally the City and County of Honolulu Department of Wastewater Management. As an example of the possible magnitude of costs, the previous $100 million construction cost estimate will be used.

The portion to be paid by the City and County (including land acquisition costs for treatment and disposal) would be approximately $100 million. This figure will increase to the extent that any other costs are judged ineligible. It is also expected that land acquisition will be funded by the City and County. Land costs would be approximately $5.4 million ($17.7 million if the 164 acres of irrigation land needs to be purchased).

4.13.2 Optimal Operation of Existing Systems Alternative-Rural Area

This alternative involves very little construction activity. What work is involved is spread over the 20-year planning period rather than concentrated in the early years as is the case with the centralized subregional WWTP alternative. Because of this, a simple comparison of its required capital expenditures with those of the other alternatives is not meaningful.

Continued operation and maintenance of the existing systems will become increasingly costly as the cesspools age and require more frequent pumping and, in some instances, replacement. The direct economic impacts of this alternative on the majority of individual residents would be less than those of any of the centralized subregional wastewater system alternative. The only exceptions are those homeowners who would have to replace their cesspools under this alternative. The cost of this (about $16,000 for a septic tank/subsurface disposal system) is higher than the combination of assessment, on-site costs, and monthly charges for the typical residential lot.

4.14 IMPACTS ON WATER SYSTEM

4.14.1 Centralized Subregional System Alternative-Urban Area

The proposed centralized subregional wastewater management system is intended to basically provide service to existing homes in the urban portion of the study area (with the inclusion of only a limited amount of additional growth - as indicated on present official planning documents). No additional improvements to the existing water system within this area is therefore anticipated as a direct result of the construction of this system.

It is noted however, that at the present time, the Board of Water Supply has no water mains in the vicinity of the proposed WWTP sites. The construction of a new water main, installation of fire hydrants for fire protection, and the payment of appropriate water system facilities charges will be required for construction of the WWTP to proceed.

4.14.2 Optimal Operation of Existing Systems Alternative-Rural Area

The present General Plan and North Shore Development Plan indicate only a very small amount of growth for this area. This alternative will therefore result in only a small increase in water demand over the coming years. It is anticipated that no additional improvements to the existing water system will be required.

CHAPTER V

ADVERSE IMPACTS OF THE PROPOSED PROJECT WHICH CANNOT BE AVOIDED

5.1 CONSTRUCTION IMPACTS

5.1.1 Optimal Operation of Existing Systems Alternative - Rural Area

This alternative involves very little construction. Individual property owners would construct or replace some individual treatment units, but the number of locations involved is small, the sites are dispersed over a wide area, the work required is extremely limited, and the construction would be spread over a long period of time.

5.1.2 Centralized Subregional System Alternatives - Urban Area

Centralized subregional wastewater collection, treatment, and disposal facilities will require much more extensive construction activities and a correspondingly greater possibility of construction impacts. Noise, dust and other air pollutants, as well as temporary traffic disruptions, will cause inconvenience to nearby residents and to motorists. The collection system and reclamation line would be constructed over a longer period of time than the WWTPs. Because the collection system is the largest component of these alternatives, involves extensive excavation, and would traverse most of the area's main roads, it has the potential for creating the most serious construction effects. The duration at any one location would be relatively short minimizing the inconvenience for any one urban neighborhood. The potentially degraded condition of the roads after trenching for the collection lines would affect residents and motorists for a longer period, since road resurfacing would only be done incrementally. Most of the equipment uses will be heavy earth moving equipment. This type of equipment produces noise similar to that produced by cane harvesting equipment presently traversing the area.

The proposed wastewater treatment plant's sites are relatively isolated from developed areas. Construction activities are not expected to affect residents significantly. No known rare or endangered species is present at the site. Construction of the WWTP would displace approximately 70 acres of Waialua Sugar Company land and Bishop Estate land leased to Waialua Sugar Company. Excavation for the collection pipes, reclamation lines, and WWPSs could uncover cultural material and/or human remains. If this occurs, appropriate action will be taken to insure their protection, archaeological interpretation, and proper handling for documentation and storage.

5.2 OPERATIONAL IMPACTS

5.2.1 Optimal Operation of Existing Systems Alternative-Rural Area

Continued reliance on existing wastewater treatment facilities will result in a number of potentially adverse impacts. First, most human wastes will continue to be disposed of via cesspools; consequently, contamination of groundwater, streams, surface drainage, and coastal waters will become a greater possibility with time. Homes in areas with soils poorly suited for cesspools will continue to have cesspool failures. This is both inconvenient and an aesthetic problem. More important it is a source of potential health problems. As the use of the cesspools increase the number of cesspools requiring pumping each year will rise. The resulting increase in pumping costs will have to be paid not only by individual property

owners, but also by the City. This is because residents whose cesspools are pumped by the City are charged only a fraction of the actual costs; the remainder is absorbed (i.e., subsidized) by the City's sewer charge revenues.

5.2.2 Centralized Subregional System Alternatives - Urban Area

5.2.2.1 Physiographic and Geologic Impacts

Construction of a centralized subregional wastewater treatment system will cause no significant effects on physiographic or geologic features or resources.

5.2.2.2 Hydrologic Impacts

There will be little change in the volume of storm runoff. The WWTPs will lie outside flood hazard areas. Pump stations in areas susceptible to flooding will be flood proofed. The collection system will be designed to minimize infiltration, and the WWTPs will be designed to accommodate whatever water does infiltrate without disrupting operations. The effluent disposal system also will be designed to accommodate peak flow conditions.

5.2.2.3 Impacts on Soils and Agricultural Productivity

Because of the relatively level terrain and the nature of the facilities themselves, no long-term effect on soil erosion is expected. However, construction of the proposed WWTPs would preclude agricultural operations from approximately 70 acres of "prime" agricultural land (on which sugarcane is now cultivated). The loss of this land will not reduce the viability of any existing agricultural operation.

5.2.2.4 Air Quality Impacts

The primary air quality concern with respect to the centralized subregional wastewater treatment alternatives is the possibility of odors. So long as the system is operating at optimal efficiency, these should be well controlled. However, the long transit times that are involved in bringing raw wastewater from the extremes of the system to the treatment facilities can provide an opportunity for anaerobic conditions to develop. This, in turn, can result in the generation of odors, particularly hydrogen sulfide. Odors will be controlled by using appropriate odor control technology as are found necessary. No aerosols will be produced at either treatment plant.

5.2.2.5 Noise Impacts

Due to the relative isolation of the proposed WWTPs from existing development, no adverse impacts from overall operating noise levels is anticipated. However, individual pieces of equipment could produce unacceptability high noise levels in certain octave bands if not controlled. Present plans call for special noise reduction measures to prevent this. These measures include directing building openings away from residential areas and using intake silencers and acoustic mufflers.

Wastewater pump stations are situated closer to noise-sensitive land uses than are the WWTP sites. Moreover, interior noise levels in them can be moderately high. Proper design of the WWPSs buildings and acoustical treatment of ventilation openings can prevent significant adverse impacts.

5.2.2.6 Impacts on Vegetation

No known endangered plant species have been located at the proposed WWTP sites. Development of WWTP sites would have no significant adverse effect on vegetation communities. The construction of the wetlands at the two sites will afford approximately 7 acres of aquatic macrophytes at each site. This would increase the amount of wetland vegetation by 100% on the North Shore of O'ahu.

5.2.2.7 Impacts on Fauna

None of the areas that might be directly affected by the construction of the two centralized subregional wastewater treatment systems are habitats for rare or endangered species. The proposed changes will not significantly affect the region's fauna. Species which thrive in dense cover may decrease slightly and those which prefer more open habitat might increase as a result of facility construction. The oxidation ponds and constructed wetlands will serve as habitat for certain species of birds and their supporting aquatic fauna food supply.

5.2.2.8 Impacts on Archaeological and Historic Resources

No known archaeological or historical sites are located on the proposed WWTP sites. The proposed location for the Waialua WWTP rapid infiltration field is at the Dillingham Airfield. A known archeological site exists in this area; however infiltration field is west of this site. Field studies might be required at the RI sites during the design phase of the project. Also, since the proposed collection system sewer lines will be laid along the roads in the urban area, this proposed action would not adversely impact any known archaeological sites. However, should construction activities unearth any archaeological features, construction would be halted, and the proper State authorities would be contacted and appropriate mitigative measures taken.

5.2.2.9 Energy Use

Evaluation of projected energy usage indicates that servicing of the existing population with a centralized subregional wastewater system would require approximately 864 MBtu per year. However, in the year 2015, it is estimated that use of the proposed centralized subregional system alternative will utilize approximately 1,728 MBtu of energy per year.

5.2.2.10 Traffic Impacts

There will be a significant disruption to vehicular circulation patterns during construction of the collection system. Roads will be torn up and delays experienced. However, once the system is in operation the overall volume of truck traffic in the region will decrease slightly. A very small increase in vehicular traffic will occur on the highway segments immediately adjacent to the WWTP sites, but this would not affect service levels significantly.

5.2.2.11 Visual Impacts

The WWPSs will be visible from adjoining roadways and/or parcels. The WWPSs will be architecturally designed to fit into an urban setting. This indicates an appropriate landscaping of the site. However, none will block important views or alter the basic visual character of the area. The WWTPs will be located away from existing development. Landscaping and terrascaping will be used as necessary to screen the WWTPs from high access visual corridors.

5.2.2.12 Social Impacts

No significant adverse social impacts are expected.

5.2.2.13 Economic Impacts

Individual property owners within the area serviced by a centralized subregional wastewater treatment system will be required to connect their units to the collection system; they will also have to pay a one-time improvement district assessment. All properties connected to the system will be charged a wastewater system user fee (currently about $18.00 per month for a single-family residence). This may increase costs to owners whose cesspools are already working satisfactorily and who do not currently pay this user fee. The monthly costs to owners who already pay the wastewater system user fee in return for City cesspool pumping service will remain unchanged, but the quality of the service provided will be improved. Owners who now pay for frequent private cesspool pumping services or for the operation and maintenance of a private wastewater treatment plant will pay less if a centralized subregional wastewater system is constructed.

Total capital cost for the centralized subregional system is about $98 million ($89 million if the irrigation land is not purchased). The $98 million will need to be financed by the City/County and paid for by the users in property assessments and user fees. It is estimated that individual landowners will pay about $14.5 million for construction of service laterals and backfilling of cesspools.

Table 5.1 shows a summary of the costs of the project over a 20 year design life. For purposes of this analysis, it was assumed that the project was financed at 7% for 20 years. If the total construction and operational costs were distributed over the average user household in the project area the annual cost would be $3,487 or about $291 per month. The cost of operations for the system would be about $133 per user unit per year or about $11.08 per month. If the construction costs for the wastewater collection, treatment and disposal system were distributed over the entire City and County service area, the cost would be $44.70 per year or about $3.73/month.

Table 5.1 Summary of centralized subregional WWTP management costs.

	Construction	Annual Cost	Cost Per User Unit/Yr.[1]	Cost Per User Unit/Yr.[2]
Collection System	$70,016,000	$6,608,810	$2,377	$30.46
WWTPs	15,261,000	1,440,490	518	6.64
Irrigation disposal	13,531,000	1,277,191	459	5.89
SubTotal	$98,308,000	$9,326,490	$3,354	$42.99
Operational	NA	371,000	133	1.71
TOTAL	NA	$9,697,490	$3,487	$44.70

1 Assumes all construction and operational cost borne by project beneficiaries, 2780 homes.
2 Assumes all construction and operational cost borne by all City and County water and sewage users (estimated 216,970 municipal wastewater services).

CHAPTER VI

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

6.1 CENTRALIZED SUBREGIONAL ALTERNATIVE - URBAN AREA

The construction phase for the proposed centralized subregional wastewater treatment system would involve activities which generate noise and air pollutants, disrupt vehicular traffic in limited areas, and require substantial amounts of public money. Some of these actions have the ability to cause significant short-term declines in environmental quality. The construction phase of the collection and treatment system will be spread out over 10 years.

On the positive side, the establishment of a centralized subregional wastewater treatment system will result in improved surface and groundwater water quality. This improvement would endure so long as the facilities remain in operation. It would eliminate a potential health threat without significantly narrowing the range of possible future actions. The system will accommodate moderate increases in North Shore population while insuring that the wastewater is treated to a tertiary level prior to reclamation by irrigation.

6.2 OPTIMAL OPERATION OF EXISTING SYSTEMS ALTERNATIVE-RURAL AREA

Few short-term losses would result from this alternative. Over the long term, additional residents would face the costs of constructing new septic tank/subsurface disposal systems. Residents with existing systems would face the odors and inconveniences of failing cesspools. It is noted, however, that this alternative may pose a long-term risk to health as increasing numbers of cesspools fail and overflow.

CHAPTER VII

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

7.1. CENTRALIZED SUBREGIONAL ALTERNATIVE - URBAN AREA

Implementation of the proposed centralized subregional treatment system alternative will involve the commitment of human and natural resources. The most obvious is the land that will be required for the facilities, the raw materials (concrete, metals, aggregate, etc.) used in the construction, and the labor. But other resource commitments are also involved.

The land commitment consists of about 35 acres at each of the two sites that are needed for the wastewater treatment plants. The wastewater pump stations will take about 1.5 acres of land. The rapid infiltration sites will take about 1 acre of land at two separate sites. Easements would be required for the collection system and effluent reuse lines, however, these lines are buried and situated in areas where their creation would not preclude other likely uses. The WWTP sites are located on prime agricultural land.

The collection system would contain about 25 miles of pipe of various sizes. The larger sewer mains would be made locally of reinforced concrete pipe; the smaller ones would be imported vitrified clay or plastic pipes. The reclaimed water line would consist of approximately 10 miles of pipe. Substantial amounts of aggregate would be required, both for making concrete and for select fill in the collection system trenches.

The project would involve a substantial construction work force over a multi-year period. Once completed, operation and maintenance would occupy more than five workers on a fulltime basis.

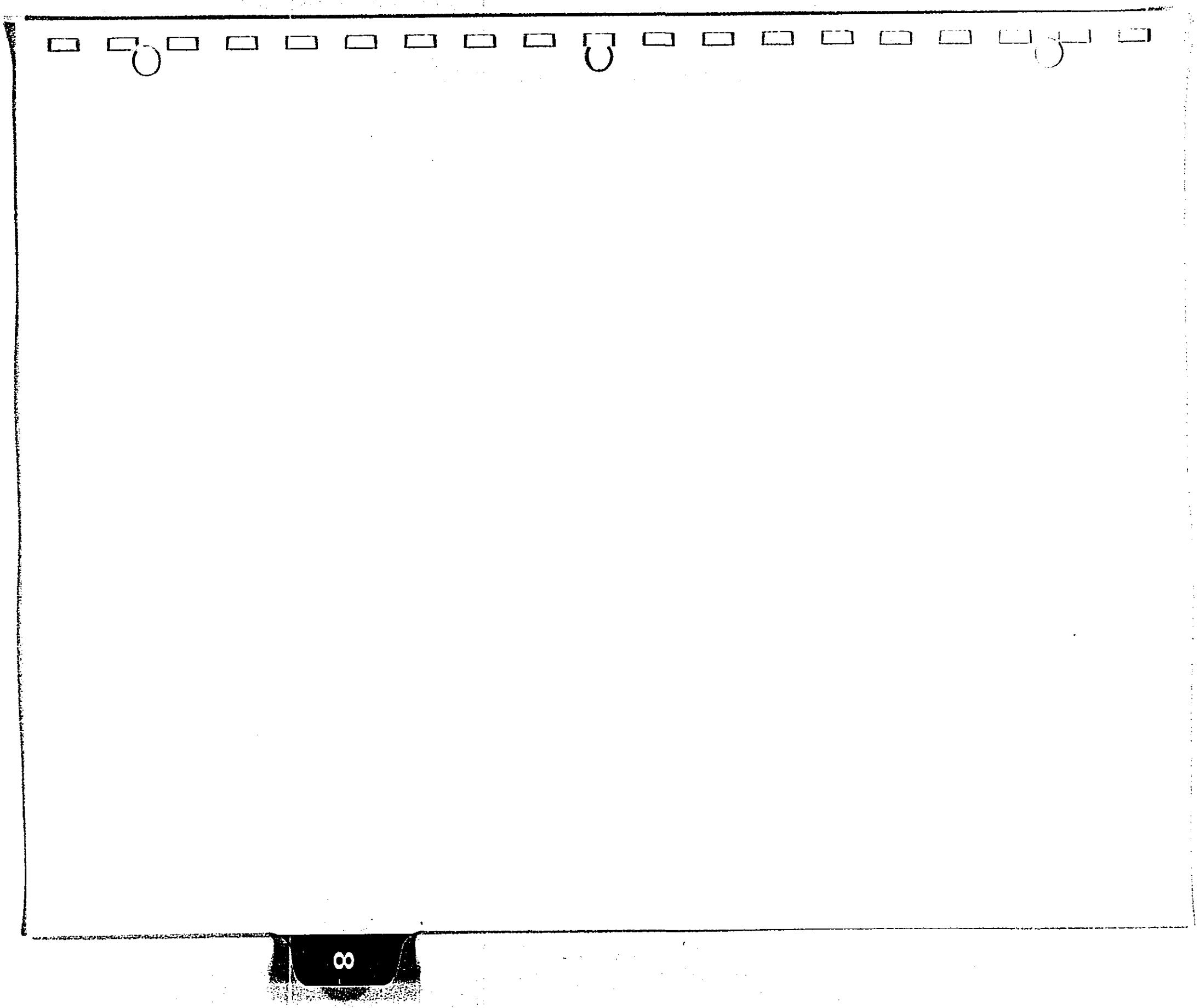
The energy requirements of the centralized subregional system plus the individual treatment units needed to serve the rural areas are estimated to be on the order of 1728 British thermal units (Btu) per year. Most of this would be in the form of electricity obtained from the Hawaiian Electric Company.

The decision to implement the centralized subregional alternative implies a willingness on the part of the public to finance the construction cost and the cost of operating and maintaining the facility. This, in turn, means that taxes and user charges will be needed.

7.2 OPTIMAL OPERATION OF EXISTING SYSTEMS ALTERNATIVE RURAL AREA

In general, this alternative involves relatively little in the way of construction materials. Most of the energy required is in the form of gasoline and/or diesel fuel consumed by trucks transporting cesspool and septic tank pumpings to the WWTPs. No additional land would need to be acquired, but private landowners would need to keep areas overlying underground units free of structures.

If present policies are continued, pumping of these cesspools would involve a substantial subsidy in favor of the owners of cesspools requiring pumping. Private landowners would have to continue to maintain their own units.



CHAPTER VIII

WATER QUALITY GOALS AND OBJECTIVES

All human settlements generate wastewater that contains potentially harmful pollutants. The disposal problem is greatest in areas where urban densities are high and where industry contributes toxic chemicals, heavy metals, or large amounts of organic waste. But all wastewater, even from largely residential areas such as Waialua-Hale'iwa, have the potential to contaminate groundwater, streams, or coastal waters. This can cause eutrophication, produce undesirable changes in aquatic communities, and/or lead to outbreaks of waterborne diseases. Some of the diseases are quite minor and cause little more than skin irritations. Others, such as cholera, typhoid, hepatitis, and numerous parasite-borne diseases, can be life-threatening.

In recent years, modern sanitation methods and the controls placed on wastewater disposal by the U.S. Environmental Protection Agency, the State Department of Health, and other government agencies have resulted in improved water quality and have prevented any large-scale incidence of such diseases in Hawai'i. However, as noted in the Water Quality Management Plan (WQMP) for the City and County of Honolulu (December 1980), the growing population of unsewered coastal communities such as Waialua and Hale'iwa increases the possibility that wastewater related deterioration in water quality and public health problems could arise. It is for this reason that the WQMP recommended (on page 10-4) that: "Dense cesspool communities with extensive cesspool failures, such as Ewa Beach, Kahalu'u, Waialua [emphasis added], Waimanalo, and Waianae, should be given high priority for sewer construction." This statement, together with the policies expressed in Chapters 342, and 344, Hawai'i Revised Statutes, the State Plan, the O'ahu General Plan, and the State Public Health Regulations indicate a strong desire to maintain the highest level of water quality practical. Implementation of the actions under consideration (i.e., any of the alternatives discussed in this report except "No-Action") would help in the achievement of this objective. This benefit is believed to outweigh any adverse impacts that they might entail.

CHAPTER IX

LIST OF NECESSARY APPROVALS AND UNRESOLVED ISSUES

9.1 LIST OF NECESSARY APPROVALS

The following is a general list of approvals needed to implement one or more of the wastewater treatment alternatives under consideration. None of the permits listed have been applied for yet. Permit applications will be prepared only at such time as an alternative has been selected and a decision made to proceed with the project. Further engineering and environmental studies will be undertaken in the process of finalizing a design and preparing construction drawings as required.

Approving Agency or Body	Permit/Approval Needed
I. City and County	
Dept. of Land Utilization (Pre-design)	Special Management Area Use Permit
Dept. of Land Utilization (Pre-design)	National Flood Insurance Program Conformance
Dept. of Land Utilization (Pre-design)	Shoreline Setback Variance
Dept. of Public Works	Grading Permit
Dept. of Public Works	Drainage Plan Approval
Dept. of Public Works	Effluent Discharge/Storm Drain Connecting
Dept. of Public Works	Accordance with City Construction Standards and ADA
Board of Water Supply	Water Connection Approval
Board of Water Supply	Fire Hydrant Installation Plan Approval
Building Department	Building Permit
Dept. of General Planning (Pre-design)	Development Plan Public Facilities Map Designation
II. State	
Dept. of Health	Conditional Use Permit for Construction Activities
Dept. of Health (Pre-design)	National Pollutant Discharge Elimination System
Dept. of Health (Pre-design)	Section 401 Water Quality Certif.

Dept. of Land & Natural Res. (Pre-design)	Historic Sites Review
Dept. of Land & Natural Res. (Pre-design)	Conservation District Use Permit
Dept. of Land & Natural Res. (Pre-design)	Leasing
Dept. of Transportation	Permit to Perform Work Within State Highways
Dept. of Transportation	Permit for Work in Shore Waters of the State of Hawai'i
Office of State Planning	Hawai'i Coastal Zone Mgmt Program, Consistency Determination
State Surveyor, Land Court (Pre-design)	Approval for Subdivision of Land

III. Federal

United States Corps of Engr. (Pre-design)	Section 404 Permit - for stream crossings and wetlands
Federal Aviation Administration (Pre-design)	

IV. Utilities

Hawaiian Electric Company	Electrical Connection Approval
Hawaiian Telephone Company	Telephone Connection Approval
PRI Gas Co.	Gas Connection Approval
Cable TV Company	

9.2 UNRESOLVED ISSUES

The only unresolved issue is written confirmation of interested parties in utilizing reclaimed wastewater for irrigation. Currently, a few land owners, with small 5 to 20 acre parcels (total 60 to 80 acres) have shown interest in using reclaimed wastewater.

This is only about 40 percent of the required 164 acres needed for irrigation purposes. However, there is also about 125 acres of City/County Parks that could be irrigated with the reclaimed wastewater. Another option may be for the City/County to purchase the required 164 acres of land needed for irrigation.

CHAPTER X

ORGANIZATIONS AND PERSONS CONSULTED AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THIS EIS

10.1 CONSULTED PARTIES

The notice of availability of the EIS Preparation Notice (EISPN) for the Waialua-Hale'iwa Wastewater Facility Plan will be published in the EQC Bulletin The agencies and organizations below will be sent copies of the EISPN and Draft EIS and will be asked to comment on the project. Everyone who we believed might have an interest in the project or who requested consulted party status was included. Most of these organization were asked to respond to the pre-assessment consultation request.

Federal Agencies

U.S. Department of Agriculture
U.S. Department of Commerce, National Marine Fisheries Service
U.S. Department of Defense
- -Air Force
- -Army
- -Navy
- -Coast Guard

U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
- -Fish and Wildlife Service
- -Geological Survey, Water Resources Division

U.S. Department of Transportation
- -Federal Aviation Administration
- -Federal Highway Administration

U.S. Environmental Protection Agency

State Agencies

Department of Accounting and General Services
Department of Agriculture
Department of Budget and Finance
Department of Defense
Department of Education
Department of Hawaiian Home Lands
Department of Health
Department of Land and Natural Resources
- -Division of Fish and Game
- -Division of Forestry
- -Division of State Parks, Outdoor Recreation and Historic Sites

Department of Planning and Economic Development
Department of Social Services and Housing
Department of Transportation
Office of Environmental Quality Control

University of Hawai'i

Environmental Center
Marine Programs
Water Resources Research Center

City and County Agencies

Board of Water Supply
Building Department
Department of the Budget
Department of General Planning
Department of Housing and Community Development
Department of Land Utilization
Department of Parks and Recreation
Department of Transportation Services
Fire Department
O'ahu Civil Defense Agency
Police Department

Community Associations

Hale'iwa Community Association
North Shore Neighborhood Board
Waialua Community Association
North Shore Environmental Coalition

Public Interest Groups

American Lung Association
Common Cause/Hawai'i
League of Women Voters
Life of the Land
O'ahu Development Conference
O'ahu Metropolitan Planning Organization
Outdoor Circle
Sierra Club

Public Utilities

Hawaiian Electric Company
Hawaiian Telephone Company
PRI - Gasco, Inc.

Others

Councilman Toraki Matsumoto
Hale'iwa Surf Owners' Association
Hanahoa Computers
Mokule'ia Land Company
North Shore Community Review
Office of Hawaiian Affairs
Waialua Sugar Company

10.2 ORGANIZATIONS AND INDIVIDUALS WHO ASSISTED IN THE PREPARATION OF THIS SUPPLEMENTAL EIS

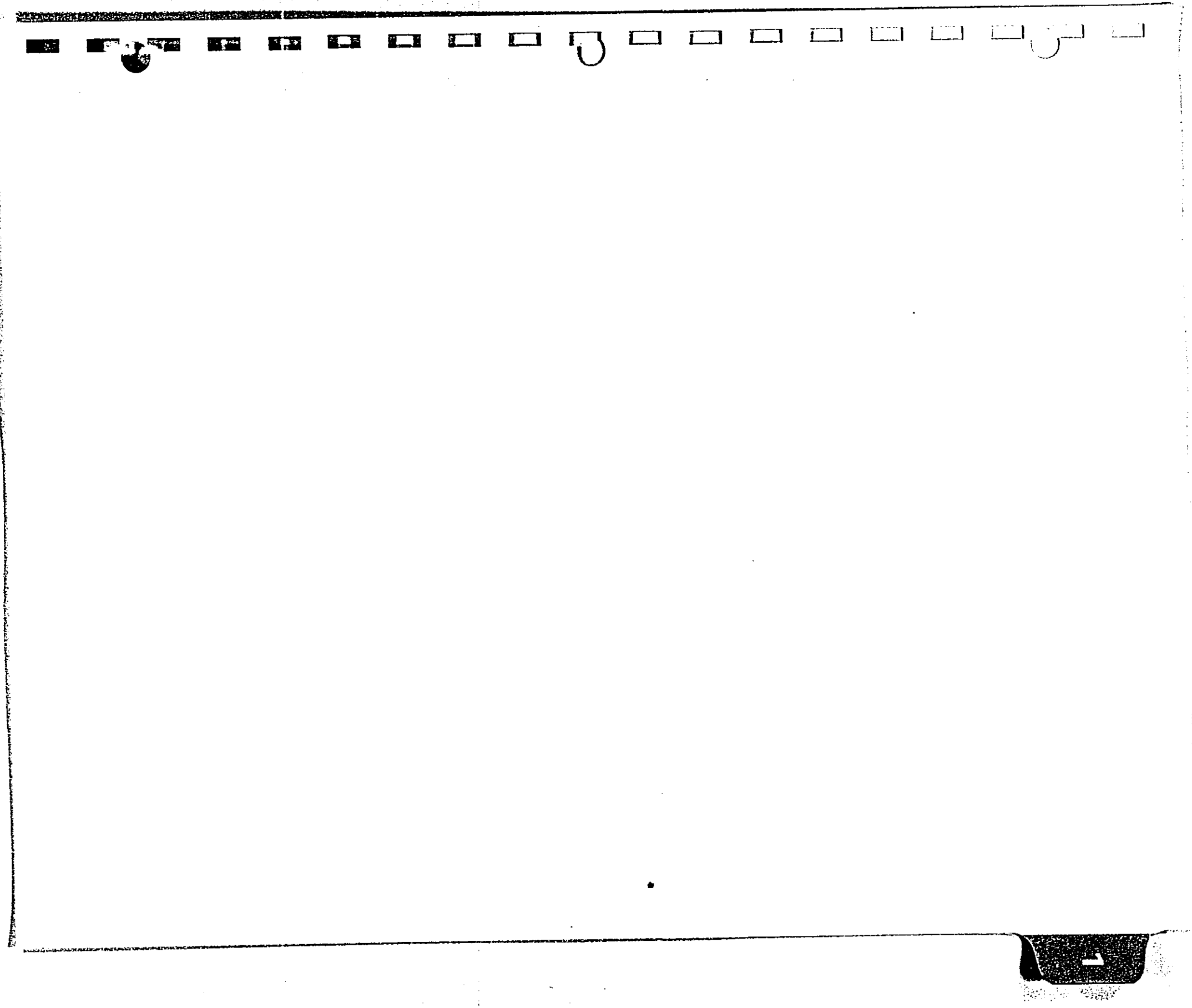
The Supplemental Environmental Impact Statement was prepared for the Department of Wastewater Management, City and County of Honolulu by Hydro Resources International. The following individuals were involved:

Hydro Resources International

R.A. Gearheart - Project Manager
Brad Finney - Principal Engineer
Jeffrey K. Anderson - Senior Engineer
Barbara Smith - Contributor, Editor, Production Coordinator
Gordon Smith - Environmental Science Coordinator

Sub-Consultants/Sub-Contractors

Rick Ginther - AECOS



CHAPTER X1

COMMENTS AND RESPONSES DURING THE CONSULTATION PERIOD

Letters of notification were sent to the parties listed in the previous chapter. Comments were subsequently received from the following agencies and interested parties:

Party Commenting	Comments Received EISPN	DRAFT EIS
State Agencies		
Office of Hawaiin Affairs		X
Office of Environmental Quality Control		X
Department of Accounting & General Services	X	X
Department of Agriculture		X
Department of Budget and Finance		X
Department of Business & Economic Development	X	X
Department of Defense		X
Department of Education		X
Department of Health	X	X
Department of Land & Natural Resources (DLNR)Chair	X	X
Forestry and Wildlife		X
State Historic Preservation		X
Department of Social Services & Housing		X
Department of Transportation	X	X
University of Hawai'i		
Water Resources Research Center	X	
Sea Grant Extension Service	X	X
Environmental Center		
Federal Agencies		
U.S. Dept. of Agriculture, Soil Conservation Service		X
U.S. Army Corps of Engineers		X
U.S. Dept. of Commerce, National Marine Fisheries Service		
U.S. Dept. of Defense		
Air Force, 15th Air Base Wing/DEE		
Army		X
Navy		
U.S. Dept. of Housing & Urban Development		
U.S. of Interior		
Fish & Wildlife Service		X
U.S. Geological Survey, Water Resources Division		
U.S. Dept. of Transportation, Federal Highway Admin.		
Honolulu City and County Agencies		
Building Department	X	X
Board of Water Supply	X	X
General Planning	X	X
Housing & Community Development		X
Land Utilization	X	X
Parks and Recreation	X	X
Transportation Services	X	X

Honolulu Fire Dept.	X
O'ahu Civil Defense Agency	X
Others	
Hanahou Computers	X
Hawaiian Electric Company	
Honolulu Gas Company	
Kenneth A. Martyn, Attorney	X
Mokule'ia Management, Inc.	
North Shore Community Boards No. 27	X
Waialua Community Association	X
Meryl Anderson	X
Hale'iwa Main Street Program	X
Dole Food Co., Hawaii	X
CHsM-Hill/Bisohp Estates	X
Pacific Land Services	X


LETTERS
RESPONSES

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Lloyd O'Sullivan
68-040 Laau Paina Place
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. O'Sullivan:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that you support the wetland alternative and deem it environmentally sound. The ocean outfall alternative has now been suppleplanted by this supplemental Facility Plan and draft EIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

96-973

68-040 Laau Paina Place
Waialua, HI 96791
April 20, 1996,

RECEIVED
96 APR 23 P3:41
DEPT OF WASTEWATER MGMT
DIVISION OF WATER QUALITY

Mr. Felix B. Limtiaco, Directpr
Department of Wastewater Management
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, HI 96813

Dear Mr. Limtiaco,

Thank you for sending me your notification of the Public Hearing on April 30, 1996 on the MOKULEIA WASTEWATER STUDY and a related amendment to add a wetlands wastewater treatment alternative to the *1987 Waialua-Haleiwa Facilities Plan* for the Waialua and Haleiwa area. This area is exposed to strong winter storms with a history of heavy downpours of rain.

The reported track record of existing wastewater treatment plants on Oahu shows untreated wastewater will bypass the treatment plant because of the plant's susceptibility to power outages and/or because of the plant's inability to handle overcapacity surges. Given this experience, I strongly support the wetlands alternative as a significant technical improvement that is also environmentally sound. I also recommend that the ocean outfall (for the proposed wastewater treatment plant to be located in Mokuleia) be deleted from the *Waialua--Haleiwa Facilities Plan.*

I appreciate your keeping me on the mailing list regarding any proposed actions for the North Shore, especially the Waialua community. I look forward to receiving additional correspondence from you on other proposed amendments to the wastewater treatment facilities for this area.

Sincerely,

Lloyd O'Sullivan

Lloyd O'Sullivan

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Schuyler Lucky Cole
Secretary
North Shore Neighborhood Board No. 27
P.O. Box 607
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMK#: 6-2: 6-6 to 6-9

Dear Mr. Cole:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the North Shore Neighborhood Board No. 27 supports the proposed wetland waste treatment system with on-going cohsideration of cost-effective enhancements. The Board also calls special attention to the proposed pump station near Anahulu Bridge, the avoidance of mature trees, and stricter enforcement of cesspools and septic tank regulations in the rural areas.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

96-0400

NORTH SHORE NEIGHBORHOOD BOARD NO. 27
P.O. BOX 607 • HALEIWA, HAWAII 96712

February 6, 1996

Felix B. Limtiaco, Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Sent via facsimile to 527-6675

re: Draft supplemental Waialua-Halciwa Wastewater Facility Plan

RECEIVED
96 FEB -9 A10:37
DEPT OF WASTEWATER MGT.
DIVISION OF WATER QUALITY

Dear Mr. Limtiaco:

The North Shore Neighborhood Board #27 in a special meeting held February 5, 1996 with 10 of the 15 members present unanimously passed the following motion:

The North Shore Neighborhood Board supports the proposed wetlands waste treatment system with 1) on-going consideration of cost-effective enhancements, 2) attention to the proposed pump station near the Anahulu Bridge, 3) avoidance of destruction of mature trees to the extent possible and 4) stricter enforcement of cesspools and septic tanks in rural areas.

If you or your staff have any questions, please feel free to call me at 638-7289 or 637-3507 and I will try to contact the appropriate member of the Board.

Sincerely,

Schuyler E. Lucky Cole, Secretary

cc: Ken Newfield, Chairman 638-0101 facsimile
cc: Jake Ng, Vice-Chairman 586-8499 facsimile

Oahu's Neighborhood Board System-Established 1973

TEAM REAL ESTATE, INC.
Schuyler E. (Lucky) Cole
President/R-O
Res. (808) 638-7289
Fax (808) 638-8736
1-800-678-5263
Bus. (808) 637-3507
Fax (808) 637-8881
1-800-982-8602
Team Real Estate, Inc.
66-134 Kamehameha Hwy
Haleiwa, Hawaii 96712

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 - ARCATA, CALIFORNIA, U.S.A. 95521
(787)822-6674

May 22, 1996

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

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Lopez:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

I have noted that access for fire apparatus, water supply and building construction shall be in conformance to existing codes and standards.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

HONOLULU HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ANTHONY J. LOPEZ, JR.
FIRE CHIEF

ATTILIO K. LEONARDI
FIRE DEPUTY CHIEF

January 5, 1996

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: ANTHONY J. LOPEZ, JR., FIRE CHIEF

SUBJECT: WAIALUA - HALEIWA WASTEWATER FACILTILIES
OAHU, WAIALUA
TMK: 6-9, 6-8, 6-7, 6-6, 6-2

We have reviewed the subject material provided and foresee no adverse impact in Fire Department facilities or services.

Access for fire apparatus, water supply and building construction shall be in conformance to existing codes and standards.

Should you have any questions, please call Assistant Chief Arthur Ugalde of our Administrative Services Bureau at 831-7774.

ANTHONY J. LOPEZ, JR.
Fire Chief

AJL/SKA:ny

Copy to: Dept. of Wastewater Management (Jared Lum)
Hydro Resources International (Dr. Robert A. Gearheart)
OEQC w/EIS report

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Paul Mizue
Acting Chief, Planning
and Operations Division
Dept. of the Army
Pacific Ocean Division, Corps of Engrs.
Fort Shafter, HI 96858-5440

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Mizue:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that you had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

96-137

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

January 10, 1996

Planning and Operations Division

RECEIVED
96 JAN 10 P3:41
DEPT OF WASTEWATER MGT
DIVISION OF WATER QUALITY

Mr. Jared Lum
City and County of Honolulu
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

9

Dear Mr. Lum:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Waialua-Haleiwa Wastewater Facilities Plan, Oahu (TMK 6-2, 6-6 to 6-9). We do not have any additional comments to offer beyond those provided in our previous letter dated June 1, 1995 (NP95-075).

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning
and Operations Division

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

William A. Bonnet
Manager
Environmental Department
Hawaiian Electric Company

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu,
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Bonnet:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

William A. Bonnet
Manager
Environmental Department

RECEIVED
'96 JAN 17 . A7 :31
DEPT OF WASTEWATER MGT.
DIVISION OF WATER QUALITY

January 12, 1996

Department of Wastewater Management
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Mr. Jared Lum:

Subject: Waialua - Haleiewa Wastewater Facilities

Thank you for the opportunity to comment on your November 1995 Draft Environmental Impact Statement report for the Waialui - Haleiewa Wastewater Facilities project, as proposed by the Department of Wastewater Management City and County of Honolulu. We have reviewed the subject document and have identified the location of HECO's Waialua substation and proposed Waialua-Kuilima 46KV underground line (to be energized in 1998). 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,

Enclosure

An HEI Company

17/45-2671

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Maurice H. Kaya
Energy, Resources, & Technology
Program Administrator
Dept. of Business
Economic Development & Tourism
335 Merchant St., Room 110
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Kaya:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that you had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
Governor
ESAU F. KAYA
Director
RICK EGGED
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

ENERGY DIVISION, 335 MERCHANT ST., RM. 110, HONOLULU, HAWAII 96813 PHONE: (808) 587-3800 FAX: (808) 587-3820

RECEIVED
'95 DEC 29 PM 3
DBEDT HONOLULU

December 28, 1995

Planning Department
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: Waialua - Haleiwa Wastewater Facilities

We wish to inform you that we have no comments regarding Waialua - Haleiwa Wastewater Facilities Draft Environmental Impact Statement.

Thank you for the opportunity to submit any comments or recommendations.

Sincerely,

Maurice H. Kaya
Energy, Resources, and Technology
Program Administrator

MHK:aw

c: Jared Lum, Dept of Wastewater Management
Dr. Robert A. Gearheart, Hydro Resources International
Gary Gill, OEQC w/ enclosure

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Michael S. Nakamura
Chief of Police
Police Department
City and County of Honolulu
801 So. Beretania Street
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Nakamura:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that you had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

JEREMY HARRIS
MAYOR

MICHAEL S. NAKAMURA
CHIEF

HAROLD M. KAWASAKI
LEE DONOHUE
DEPUTY CHIEFS

OUR REFERENCE BS-DL

January 3, 1996

RECEIVED
'96 JAN 4 PM 3:02
C&C HONOLULU

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: MICHAEL S. NAKAMURA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
WAIALUA - HALEIWA WASTEWATER FACILITIES
TAX MAP KEY 6-9, 6-8, 6-7, 6-6, 6-2

This is in response to your request for comments on a draft environmental impact statement for the Haleiwa Wastewater Facilities.

This project should have no significant impact on the operations of the Honolulu Police Department.

Thank you for the opportunity to comment.

MICHAEL S. NAKAMURA
Chief of Police

By Eugene Uemura
EUGENE UEMURA, Assistant Chief
Administrative Bureau

cc: Mr. Jared Lum
Dept. of Wastewater Management

Dr. Robert A. Gearheart
Hydro Resources International (California)

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Michael Dailey
Mokuleia Community Assoc.
68-411 Farrington Highway
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Dailey:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

We recognize MCA's support of the WWTP and reuse/disposal alternative development in the supplemental Facility Plan/DEIS. It is also recognized that MCA recommends that Hale'iwa Town have the first opportunity in terms of implementation of the project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

MOKULEIA COMMUNITY ASSOCIATION
68-411 Farrington Highway
Waialua, HI 96791

February 1, 1996

Planning Department
650 South King St., 8th. Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement, Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-9, 6-8, 6-7, 6-6, 6-2

Dear Planning Department:

The Mokuleia Community Association (MCA) participated in the preparation of subject document and has a long-standing history of being in the forefront of North Shore community organizations working actively to solve the North Shore's challenging wastewater problems. As a point of historical interest, MCA members, in conjunction with members of the North Shore Environmental Coalition, funded – out of their own pockets – the initial visit to the North Shore of Dr. Robert Gearheart to assess existing and potential North Shore wastewater problems and the means to deal with them. During that visit, Dr. Gearheart presented to the North Shore Neighborhood Board his concept of using wetlands and oxidation ponds as a better alternative for handling effluent than constructing a wastewater ocean outfall on the North Shore.

The Draft Environmental Impact Statement builds upon Gearheart's earlier presentation and its specific details and extensive data make a persuasive and compelling case as to why the wetlands/oxidation ponds alternative is far preferable to any other wastewater alternatives considered. The MCA believes that the DEIS' conceptual facility plan is environmentally sound, is well suited to the North Shore's topography, lifestyle and quality of life and is both practical and cost competitive. The MCA strongly recommends approval and adoption of the DEIS as the wastewater facility plan for the areas of Waialua and Hale'iwa.

Considering funding limitations, we recommend that implementation of the facility plan be undertaken incrementally, beginning with those areas that have the most severe wastewater problems. For that reason, even though it could delay providing wastewater services to Waialua and parts of Mokuleia, we recommend that Hale'iwa town have priority of implementation.

Michael Dailey
President

Copy To:

State of Hawaii, Office of Environmental Quality Control
City & County of Honolulu, Department of Wastewater Management
Dr. Robert A. Gearheart

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Carole Parker Collins
Vice Chair
North Shore Environmental Coalition
68-411 Farrington Highway
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Ms. Collins:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

We recognize that the North Shore Environmental Coalition supports the alternative developed in the supplemental Facility Plan/DEIS. It is also noted that the NSEC suggests phased implementation of the project focusing on the worst water quality problems first.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

February 1, 1996

Planning Department
650 South King St., 8th. Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement, Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-9, 6-8, 6-7, 6-6, 6-2

Dear Planning Department:

Since its inception, the North Shore Environmental Coalition (NSEC) has had significant concerns about Waialua's and Hale'iwa's wastewater problems and has had a deep and abiding interest in the formulation of environmentally-sensitive means to deal with those problems. In addition, as a participant in the preparation of the Draft EIS, the NSEC's Chair was provided a copy of the DEIS for NSEC review. Subsequently, NSEC board members reviewed the DEIS with great interest and in considerable detail. The purpose of this letter is to forward to you, and to the "copy to" addressees requested by the Office of Environmental Quality Control, the comments of the NSEC on the DEIS (which includes the explanatory comments and responses received during the consultation period).

By conscious decision, we choose to speak to the broad, general aspects of the DEIS, not to individual, specific details which will likely be explicated, resolved or modified through the further planning process.

We unequivocally support, in the strongest possible terms, the conceptual approach of the DEIS, as described on pages 49 and 50 of the DEIS, as the best means to deal with the North Shore's wastewater problems. That approach is the most environmentally-sensitive, -safe and -caring of any other wastewater alternatives considered and, in particular, is several orders of magnitude preferable to previous facility plans to use an ocean outfall on the North Shore for discharging wastewater effluent.

Given extant budget difficulties and Oahu's island-wide wastewater problems, we accept that early implementation of the DEIS' recommended system is not possible. However, we recommend and urge that the City and County of Honolulu and the State of Hawaii make a decision now, in advance of the availability of funding, to adopt the system proposed in the DEIS to solve Waialua's and Hale'iwa's wastewater problems. We further believe, and so recommend, that as funding does become available, the system should be implemented incrementally, so that the areas with the worst wastewater problems, such as over-flowing cesspools, be the first to receive the new system.

Carole Parker Collins

Carole Parker Collins
Vice Chair

Copy to:

State of Hawaii, Office of Environmental Quality Control
City & County of Honolulu, Department of Wastewater Management
Dr. Robert A. Gearheart

1/12-0010

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

RECEIVED
96 JAN 3 AM 7:53
Dept. of Gen. Plan. C&C HONOLULU

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI
DIRECTOR AND BUILDING SUPERINTENDENT
ISIDRO M. BAQUILAR
DEPUTY DIRECTOR AND BUILDING SUPERINTENDENT

PB 96-3

January 2, 1996

MEMO TO: CHERYL SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: RANDALL K. FUJIKI
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: WAIALUA-HALEIWA WASTEWATER FACILITIES
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

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

for RANDALL K. FUJIKI
Director and Building Superintendent

cc: G. Tamashiro
Wastewater Management Dept.
(Attn: Jared Lum)
Hydro Resources International
(Attn: Dr. Robert A. Gearheart)
Office of Environmental Quality Control

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Randall K. Fujiki
Director & Bldg. Superintendent
Building Dept.
City and County of Honolulu
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Fujiki:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that you had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Gordon Matsouka
State Public Works Engineer
Dept. of Accounting & General Services
P.O. Box 119
Honolulu, HI 96810

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Matsouka:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the State Department of Accounting and General Services had no comments. A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
GOVERNOR

SAM CALLEJO
COMPTROLLER

MARY PATRICIA WATERHOUSE
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1007.6

JAN 5 1996

Planning Department
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Gentlemen:

Subject: Supplemental Waialua-Haleiwa Wastewater Facility Plan, Oahu, Hawaii
Draft EIS

Thank you for the opportunity to review the subject document. The proposed project will have no impact on our facilities. Therefore, we have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

RY:jk
cc: Department of Wastewater Management
Hydro Resources International
OEQC

RECEIVED
'96 JAN 8 AM 10:39
C&C HONOLULU

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

William Meyer
District Chief
US Department of the Interior
U.S.G.S
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Meyer:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that USGS had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

February 20, 1996

City and County of Honolulu
Planning Department
650 South King St., 8th Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement
Supplemental Waialua-Hale'iwa Wastewater Facilty Plan

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 DEIS. We are returning it for your future use.

Sincerely,

William Meyer
District Chief

Enc.

cc: Jared Lum, Department of Wastewater Management
Dr. Robert A. Gearheart, Hydro Resources International

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Charles O. Swanson, Director
City and County of Honolulu
Dept. of Transportation Services
711 Kapiolani Blvd., Suite 1200
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Swanson:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Construction plans including a traffic control plan, will be submitted for your comments and approval at the appropriate time.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

PACIFIC PARK PLAZA
711 KAPIOLANI BOULEVARD SUITE 1200
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

CHARLES O. SWANSON
DIRECTOR

TSP96-00095

February 7, 1996

MEMORANDUM

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: CHARLES O. SWANSON, DIRECTOR

SUBJECT: SUPPLEMENTAL WAIALUA-HALEIWA WASTEWATER FACILITY PLAN

We have reviewed the draft environmental impact statement for the subject plan and would like to reiterate our earlier comments. Construction plans for all work within the City's right-of-way should be submitted to this department for review and approval. A traffic control plan should be included with these plans.

Should you have any questions regarding these comments, please contact Faith Hiyamoto of the Transportation Systems Planning Division at Local 6976.

for CHARLES O. SWANSON

cc: Jared Lum - DWWM
Dr. Robert A. Gearheart,
Hydro Resources International

46-0571

HALEIWA MAIN STREET
P.O. Box 878 • Haleiwa, Hawaii 96712

February 1, 1996

Mr. Jared Lum
City & County of Honolulu
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: Draft EIS for the Waialua-Hale'iwa Wastewater Facility Plan

The Board of Directors of Hale'iwa Main Street, a non-profit economic revitalization and historic preservation program, continues to have significant concerns about the proposed Waialua-Hale'iwa Wastewater Facility Plan and the impacts it could have on Hale'iwa Town.

While I appreciated Dr. Gearheart's brief response to our letter of June 26, 1995, regarding the Wastewater Pump System (WWPS), I would like to have more detailed information on several aspects of the plan. The following attachment lists Hale'iwa Main Street's areas of concerns and includes specific questions to which I would like in-depth answers.

Thank you for your time and efforts to provide the information requested. I look forward to a detailed response to Hale'iwa Main Street's concerns and questions.

Sincerely,

Nalani V. Choy

Nalani V. Choy, President
Hale'iwa Main Street Program

Attachment

Waialua-Hale'iwa Wastewater Facility Plan
Draft Environmental Impact Statement

Areas of Concern, Request for Information

1. Pump station makai of Kamehameha Hwy. near Surf-N-Sea (WWPS 5):
   - More information needed on flood/tsunami proofing.
   - More information needed on odor control and amelioration measures should odors adversely affect businesses in the area.
   - More information needed on visual impact, elevation, affect on viewplane, sketch with proximity of pumping station to adjacent structures, explore alternative of "better" location.
   - What accommodations will be made to blend in with the architecture of Hale'iwa and comply with the Hale'iwa Special District regulations?

2. Dedicated acres for agricultural use of reclaimed water:
   - The 30 to 80 acre range given is unacceptable. The plan needs to specify 30+ acres at each site. The land mauka of Ukoa Pond is not rich. How realistic is it to assume this land would be used for agriculture?
   - What accommodations are being made to "land bank" or acquire appropriate amounts of land when and/or if there is a future need to expand?
   - If there are not enough agricultural reuses provided, what are the percolation consequences at the rapid filtration sites on adjacent ocean and shoreline areas?
   - What is the depth of the ground water table at these two sites and what is the maximum capacity of these two sites under adverse conditions (i.e. rainy, saturated soils)? Is there a possibility of surface water run off?

3. Sewer line adverse effects:
   - When a sewer line trench comes close to large beautiful landscape trees, what happens? Will it weaken the trees due to damaged roots so that:
     1. It must be removed so as not to be a hazard from blowing over?
     2. It will go down hill and ultimately die or need to be removed due to dead branches in 3 to 6 years?
   - Alternatives: Can sewer lines be realigned to accommodate mature and/or scenic growth? Can large trees that are damaged be replanted? By whom? When? Will it be in the contract budget?
   - Why cannot the sewer line go all the way to Waimea Bay where that beach park services over 1,200,000 guests each year and hook up with Waimea Falls Park, servicing approximately 500,000 guests each year? In assessing the numbers of people served relative to cost, were these guest numbers included in the study/calculations?
   - In discussing the efficacy of this treatment system versus others, what is the projected expense in cost/mg comparatively? Please project into the future realizing the cost of ultra violet may go up. These numbers should not reflect the net or income relative to sale of effluent, only the operational expense for comparison with other projects.
   - The alternative of hooking up the Turtle Bay/Kuilima Plant with the rest of the North Shore community should be revisited and explored for the Kawailoa end of the project.

HYDRO RESOURCES INCORPORATED
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4469 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Nalani V. Choy, President
Hale'iwa Main Street Program
P.O. Box 878
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Choy :

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Pump station makai of Kam Highway (WWPSS)

Specific design details on the placement, construction, operation, and access to the pump station will be forthcoming in the pre-design phase of the project. City and County of Honolulu standard and guidelines for redundancy, odor control, and noise abatement will be followed. Architectural style, landscaping, and other aesthetic factors will also be addressed in the pre-design and design phase of the project. It is important that the Wastewater Management Division be aware of your district regulations and suggestions at that time. Location of pump stations are based upon several factors some of which are flexible and some of which are constraints.

Dedicated acres for agricultural use of reclaimed water

There are several factors that still need to be determined before reclamation acreages can be specified. This particular plan allows for the maximum flexibility in this regard. The concept is to make "available" a high quality water supply produced from reclaimed water to be used by agricultural activities, public facilities, and individual homeowners.

Dole Food Hawaii, for example, has already experienced an interest in supplying this water to their leasee in the Waialua area. Based upon our experience in similar setups, users will request this water supply based upon its availability, its costs, and its safety. The quality of the water from the proposed wastewater treatment will meet DOH's highest reuse guidelines (R-1) which allows for irrigation of vegetables, public parks, etc..

Even if all of the reclaimed water could be dedicated at this time, the DOH requires a backup disposal system capable of handling 100% of the design flow. The fact that reclaimed water users are not committed at this time does not change the size and rapid infiltration (RI) site (1 acre) for each system.

RI sites. Specific design and operational constraints are in place to insure that no runoff occurs.

Sewer line adverse effects

Specific concerns about tree damage due to sewer line trenching should be highlighted during the pre-design phase. It is important, though, to make the City/County aware of your concerns at this time. Specific details concerning damages to trees also needs to be addressed at the next phase of the project. It would be important, though, for your organization to identify the trees and the area of interest for further reference.

This particular project did not include the Waimea Bay area. At the present time a private package treatment plant services that area.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Kamuela Price, President
Price Goodrich Eco Systems
P. O. Box 459
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Price:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The function of a facility plan is to select the most cost effective and environmentally sound wastewater alternative. This process has selected the most economically feasible alternative. Commitment of 72 acres out of 14,000 acres to public service which will produce 1.4 MGD reusable water at full design is a resource of serious magnitude while protecting the nearshore marine waters. Digesters are a unit process in wastewater treatment dealing only with the solids. Solids handling normally requires one of the largest capital commitments and is the number one issue in operation and maintenance. The proposed system will minimize the need for solids handling and eliminate the need for solids disposal. The cost of a wastewater treatment system in Germany are significantly higher than the average cost in the United States.

The author of the letter must not be familiar with wastewater treatment technology in the United States and other areas of the world. Oxidation ponds have proven themselves to be effective and economic treatment processes requiring no external power, no chemicals, and minimum operation and maintenance.

Sunset Beach is not in the proposed service area of the Waialua/Hale'iwa wastewater facility. The author could be confusing this project with the Lihi-Lani project. Sorry about the size of print. It is difficult to include all the information required for an EIS as the various review steps are made. We can certainly supply the author full page letters and responses upon request.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

President
Price, Goodrich Eco Systems
PO Box 459
Haleiwa, Hawaii, 96712

Telephone 808-638-7841
Fax 808-638-7435

February 1, 1996

RECEIVED
'96 FEB -2 P1:11
DEPT OF WASTEWATER MGMT
DIVISION OF WATER QUALITY

City and County of Honolulu
Dept. of Waste Water Management
650 South King St.
Honolulu, Hi. 96816

ATTENTION: Jared Lum

SUBJECT: WAILUA / HALEIWA WASTE WATER FACILITY
E. I. S. COMMENTARY

Waste water disposal plans, should and must not be a disguised form of population control. Infrastructure planing by its very nature, must be long range and flexible enough to accommodate inevitable growth and not pander to one's "druthers".

With sugar cane being phased out , and diversified farming being a localized limited market to ensure, economic stability and employment opportunities, infrastructure planning must include the possibility of future development. Point in hand, Castle and Cooke's land located directly behind Wai'alua most certainly, in time will be made available for development. Consider further, the cost of constructing and maintaining artificial OXIDATION ponds for every small community is a fiscally irresponsible waste of taxpayers money, and there invaluable land resource. Waste Water disposal plants to be economically feasible should be comprehensive in nature.

This is particularly true in lieu of the fact, Europe has developed Digester Tertiary techniques, serving much larger populations, while utilizing only one tenth of the land proposed in this project. Their digester's have proven to be highly efficient, at low cost, with an added dimension of providing the populace with drinkable water.

Should the powers that be, elect to go ahead with this very costly, and highly risky experimental waste water disposal project, at the very least, they could consider not allowing a private developer to build an untested plant, endangering Sunset Beach's invaluable shoreline, prior to evaluating this project's operational efficiency. Keep in mind, were artificial OXIDATION ponds, a pragmatic solution to waste water disposal, California's Mojave dessert would be a fertile farmbelt!

One last observation. Like the main body of the EIS, the size of the print in publishing letters from interested parties, should be large enough for easy reading, otherwise, one gets the distinct impression that the EIS supplement, is little more than a highly professionally written Public Relations package.

Kamuela Price
President, Price Goodrich Eco Systems

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Mr. Roy C. Price, Sr.
Vice Director of Civil Defense
Dept. of Defense
3949 Diamond Head Road
Honolulu, HI 96816-4495

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Price:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that construction standards to meet potential terrian amplification of tropical cyclone hurricanes needs to be considered for any structure at the WWTP and WPS. This type of consideration will be included in the design phase of the project. It is also noted that the Island of Oahu has been re-classified as a Seismic Zone 2a. Transportation routing and roadway access issues will be dealt with in detail in the design phase of this project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

February 13. 1996

TO: Planning Department
City & County of Honolulu
650 South King Street. 8th Floor
Honolulu. Hawaii 96813

FROM: Mr. Roy C. Price. Sr.
Vice Director of Civil Defense

SUBJECT: SUPPLEMENTAL WAIALUA-HALE'IWA WASTEWATER FACILITY PLAN - DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

Thank you for this opportunity to comment on the Supplemental Waialua-Hale'iwa Wastewater Facility Plan DEIS submitted by Hydro Resources International on behalf of the City & County of Honolulu. Department of Wastewater Management. for two equally sized wastewater treatment plants (WWTPs) in the District of Waialua. City and County of Honolulu. Island of Oahu. Hawaii: Tax Map Key (TMK) 6-9. 6-8. 6-7. 6-6. 6-2.

State Civil Defense does not have any negative comments specifically directed at this DEIS. However. CHAPTER III. "DESCRIPTION OF AFFECTED ENVIRONMENT." paragraph 3.2. "PHYSICAL CONDITIONS." subparagraph 3.2.1. "Physiography/ Geology." addresses the general topography of the district. There is no specific elevation data for the WWTP sites nor are slope and elevation for each proposed site addressed. Figure 1.4 and 1.5 depict the locations of the Waialua and Hale'iwa WTTPs site respectively. Both proposed sites appear to be somewhere between the 100- and 150- foot contour lines. The impact of terrain amplification of tropical cyclone/hurricane force winds on both proposed sites need to be addressed. Structures within the proposed project areas must be sited. designed and constructed to withstand the potentially destructive winds that may impact the WWTPs. These structures could then be evaluated for use as potential shelters for operators and maintainers of both plants. Additionally. the final paragraph of this subparagraph (3.2.1) states that "The island of O'ahu is designated as [Seismic] Zone 1. the next to lowest rating . . . ." This should be corrected. The December 1993 local amendment to the 1991 Uniform Building Code (UBC) designates O'ahu as Seismic Zone 2a. Subparagraph 3.2.2 and subsubparagraph 3.2.2.1 address "Hydrology" and "Flooding" respectively. The WWTPs appear to be outside areas subject to riverine flooding. There are other aspects associated with the widespread

rains that accompany the movement of large-scale frontal systems during the winter that should be addressed in the site selection of the WWTPs. These are mud and landslides and how they impact personnel and property safety and accessibility to the sites during these rains. Transportation and roadways providing access to the proposed sites--existing and future needs should be addressed in terms of the socioeconomic characteristics of the area. The access roads to the sites need to be evaluated. designed and constructed for use as ingress/egress for emergency vehicles and as potential evacuation routes.

Our State Civil Defense planners and technicians are available to discuss this further if there is a requirement. Please have your staff call Mr. Mel Nishihara of my staff at 733-4300.

c: Oahu Civil Defense Agency

Department of Wastewater Management Attn: Mr. Jared Lum
650 South King Street. Third Floor
Honolulu. Hawaii 96813

Hydro Resources International Attn: Dr. Robert A. Gearheart
613 Park Avenue
Arcata. CA 95521

Noise Concerns

The Wastewater Plant Stations are of primary concern due to its proximity to residences. Plant Stations contain motorized equipment that should be designed and acoustically treated in order to comply with the provisions of Chapter 11-43, Hawaii Administrative Rules, "Community Noise Control for Oahu." Possible mitigative measures are listed below:

1. Use a super-critical exhaust muffler for emergency generators. If possible, locate the open end of the exhaust away from the nearest property line.

2. Walls should be constructed of dense concrete or solid-grouted Concrete Masonry Unit (CMU). Also, all roof openings should be filled-in with dense concrete.

3. Insulation panels should be placed on the walls and ceiling.

4. Use sound-rated doors.

Should you have any questions on this matter, please contact Mr. Jerry Hamuno of the Noise, Radiation & Indoor Air Quality Branch (NR&IAQB) at 586-4701.

Sincerely,

LAWRENCE MIIKE
Director of Health

c: Department of Wastewater Management
Hydro Resources International
CAB
NR&IAQB
WWB

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Lawrence Miike
Director of Health
Dept. of Health
P. O. Box 3378
Honolulu, HI 96801

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Miike:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that DOH supports the centralized subregional alternative developed in the supplemental Facility Plan/DEIS. It is also noted that all wastewater treatment plans must conform to applicable provisions of the DOH Administration Rules, Chapter 11-62 "Wastewater Systems". Concerns of potential air quality impacts from seeptage hauling vehicles and pump stations are issues to be handled in the design phase and the O&M considerations of the system. Dust control measures during all phases of the project must meet Chapter 11-60-1, Section 11-60.1-3.3 of Hawaii Administration Rules. It is also noted that all pump stations will have to comply with Chapter 11-43 Hawaii Administration Rules, "Community Noise Control for Hawaii". The list of possible mitigation measures for dust and odor are noted.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

March 14, 1996

93-097B/epo

Ms. Cheryl D. Soon
Chief Planning Officer
Planning Department
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Draft Environmental Impact Statement
Supplemental Waialua--Haleiwa Wastewater Facility Plan
Oahu
TMK: 6-8, 6-9, 6-7, 6-6, 6-2

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer:

Wastewater

This project would provide for the needs of the Waialua--Haleiwa areas by constructing improved wastewater collection, treatment, and disposal facilities. The supplemental facilities plan proposes a centralized subregional wastewater treatment system comprising a collection and conveyance system; a treatment plant; and the disposal of the effluent by means of irrigation and rapid infiltration.

We have no objections to the proposed project to construct a wastewater collection, treatment, and disposal system which will serve the Waialua--Haleiwa area. It is our goal to see that some day the entire State of Hawaii is completely sewered, leaving cesspools and septic tank systems as part of the past.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems."

Should you have any questions on this matter, please contact Mr. Dennis Tulang, Chief of the Wastewater Branch (WWB) at 586-4294.

Air Pollution Concerns

The plan should address the possible sources of nuisance odor emissions from the trucks transporting the sewage sludge from existing cesspools and from storage problems occurring during equipment breakdown. Provisions should be made for alternative methods should problems arise.

In addition, the plan would require the construction of gravity sewers, force mains, and wastewater pump stations. There is a significant potential for fugitive dust to be generated during the excavation, grading, and construction activities for this project.

The close proximity to existing homes and business establishments may compound dust problems. Implementation of adequate dust control measures during all phases of construction is warranted. Construction activities must comply with the provisions of Chapter 11-60.1, Hawaii Administrative Rules, Section §11-60.1-33 on Fugitive Dust.

The contractor should provide adequate means to control dust from road areas and during the various phases of construction activities. These means include, but are not limited to:

1. planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing material transfer points and onsite vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

2. providing an adequate water source at site prior to startup of construction activities;

3. landscaping and rapid covering of bare areas, starting from the initial grading phase;

4. control of dust from shoulders, project entrances, and access roads; and

5. providing adequate dust control measures during weekends, after hours, and prior to daily startup of construction activities.

If you should have any questions on this matter, please call Mr. Timothy Carvalho of the Clean Air Branch (CAB) at 586-4200.

HYDRO RESOURCES INTERNATIONAL
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(707)822-6674

May 22, 1996

Esther Ueda
Executive Officer
Dept. of Business, Economic
Development & Tourism
Land Use Commission
Room 104, Old Federal Bldg.
335 Merchant St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Ms. Ueda:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The State land-use law discussion will be revised to reflect new rules. Figures in the Facility Plan will be revised to reflect State Land Use District boundaries.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
GOVERNOR

EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

January 5, 1996

Ms. Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Draft Environmental Impact Statement:
Supplemental Waialua-Hale'iwa Wastewater Facility Plan

The Department of Business, Economic Development & Tourism has forwarded the subject Draft Environmental Impact Statement (DEIS) to our office for review and comment.

We have reviewed the subject DEIS prepared by Hydro Resources International, and have the following comments to offer:

1) We confirm that the sites proposed for the Waialua Wastewater Treatment Plant and Hale'iwa Wastewater Treatment Plant, as shown in Figures 1.2, 1.3, 1.4, and 1.5, are within the State Land Use Agricultural District.

2) The proposed site for the Rapid Infiltration Site 1 (east of Dillingham Airfield), as shown in Figure 1, is within the State Land Use Agricultural District.

The proposed site for the Rapid Infiltration Site 2 (in Hale'iwa), as shown in Figure 1, is within the State Land Use Urban District.

3) We understand that each of the proposed wastewater treatment plants will require approximately 35 acres of land, as noted on page 12 and as shown in Figure 1.7.

Furthermore, because the proposed wastewater treatment plants will be located within the State Land Use Agricultural District, and §205-4.5(a)(7), Hawaii Revised Statutes ("HRS"), does not permit treatment plants within the Agricultural District, a Special Permit, pursuant to HRS §205-6, may be required.

4) Because a Special Permit may be needed for the proposed wastewater treatment plants, the listing of Necessary Permits and Approvals on page 6, and page 163, should be amended to reflect such permit.

5) Also in regards to the listings of Necessary Permits and Approvals, we note that the Hawai'i Coastal Zone Management Program, Consistency Determination is performed by the Office of State Planning, and not the Department of Business, Economic Development & Tourism.

6) In regards to Section 3.3.3.1 of the DEIS (page 112), we reiterate our comments made in our May 18, 1995 letter to the Department of Wastewater Management.

The citation to the Land Use Commission Regulations refers to a set of regulations that were repealed in 1986 and replaced with administrative rules that were adopted by the Commission (Chapter 15-15, Hawai'i Administrative Rules ("HAR")).

Therefore, the intention of the regulations now read as follows:

"This chapter governs the practice and procedure before the land use commission, and shall be construed to secure the just and efficient determination of every proceeding. This chapter shall be liberally construed to preserve, protect, and encourage the development and preservation of lands in the State for those uses to which they are best suited in the interest of public health and welfare of the people of the State of Hawaii." (HAR §15-15-01, October 27, 1986)

Additionally, the general standards for establishing district boundaries are clearly defined in HAR §§15-15-18 through 15-15-21. Subchapter 6 (HAR §15-15-46, et seq.) provides the procedures for amending a district boundary.

We note that a copy of the current Commission rules was sent to the Department of Wastewater Management.

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on the subject DEIS.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: DBEDT (Director's Referral No. 95-206-T)
OEQC
Mr. Jared Lum
Dr. Robert A. Gearheart

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Kazu Hayashida
Director of Transportation
State of Hawaii
869 Punchbowl St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Hayashida:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Plans for any construction work with the State highway right-of-way will be submitted for your review and approval during the design phase of the project. It is noted that the wastewater treatment plants will not impact state highways. It is noted that the Department of Transportation no longer issues the Permits for Work in Shore Waters of the State of Hawaii and that the Department of Land and Natural Resources is now the approving agency.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

IN REPLY REFER TO:
STP 8.7158

January 4, 1996

Ms. Cheryl Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Waialua - Haleiwa Wastewater Facilities
Draft Environmental Impact Statement (DEIS)
Supplemental Waialua-Haleiwa Wasterwater Facility
Plan, Oahu TMK: 6-9, 6-8, 6-7, 6-6, 6-2

Thank you for your transmittal requesting our comments.

Our comments are as follows:

1. The proposed development is not anticipated to have a significant impact on our State highway transportation facilities.

2. Plans for any construction work within the State highway right-of-way must be submitted for our review and approval.

3. Pages 7 and 163, Item II, Department of Transportation no longer issues the Permit for Work in Shore Waters of the State of Hawaii. The Department of Land and Natural Resources is now the approving agency.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

bc: Dr. Robert A. Gearheart, Hydro Resources International

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Cheryl D. Soon, Chief Planning Officer
City/County of Honolulu
Planning Department
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Ms. Soon:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Northshore Development Plan Public Facilities map for the Waialua WWTP will be amended to show all rapid infiltration disposal fields, wastewater treatment sites, pump stations, and sewer mains.

Wetlands do have the potential to attract endangered Hawaiian aquatic fowl. The impact will be viewed as positive in that the wetland habitat afforded by the wastewater treatment system will be an addition to the wetland inventory in the state. Experience has shown no negative impact to wildlife associated with constructed wetlands used to polish secondary effluent from an oxidation pond. Normal water quality tests, dissolved oxygen, temperature, and pH, are used to monitor the status of wetlands. The Facility Plan has operating results from a system similar to the proposed alternative of choice.

Population data is used in the Facility Plan to generate sewage flows (page 126 of the Facility Plan). No sewage sludge will be generated with this alternative. Life-cycle sludge removal from the oxidation pond will on a 30 to 40 year basis.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely yours,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

CHERYL D. SOON
CHIEF PLANNING OFFICER

CAROLL TAKAHASHI
DEPUTY CHIEF PLANNING OFFICER

ET 12/95-2642

February 8, 1996

MEMORANDUM

TO: FELIX LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR
WAIALUA-HALEIWA WASTEWATER FACILITIES PLAN

Thank you for giving us the opportunity to review the Draft Environmental Impact Statement (DEIS) for the proposed Waialua-Haleiwa Wastewater Facilities Plan. We have reviewed the subject document and offer the following comments:

- Section 3.3.3.4 of the DEIS should be expanded to provide discussion on applicable City and County of Honolulu General Plan Objectives and Policies.

- Page 83 of the DEIS states that the Wahiawa Wastewater Treatment Plant (WWTP) is discharging approximately 1.6 mgd of sewage effluent into Wahiawa Reservoir. It is our understanding that the Wahiawa WWTP is operating near its designed capacity of 2.5 mgd, the Final Environmental Impact Statement should clarify this discrepancy.

- References to the Department of General Planning in the DEIS should be changed to Planning Department.

Enclosed for your review are the comments received from the following agencies: Building Department; Honolulu Fire Department; Honolulu Police Department; Department of Public Works; Board of Water Supply; Department of Accounting and General Services; Department of Business, Economic Development, and Tourism; Housing Finance and Development Corporation; State Department of Transportation; State Land Use Commission; and Office of Environmental Quality Control. Please send us a copy of any additional comment you may have received.

Should you have any questions, please contact Eugene Takahashi of our staff at 527-6022.

Cheryl D. Soon

CHERYL D. SOON
Chief Planning Officer

CDS:lh

cc: ✓Hydro Resources International
OEQC

Enclosures

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

James J. Nakatani
Chairperson, Board of Agriculture
1428 So. King St.
Honolulu, HI 96814

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Nakatani:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that there are other possible reclaimed water pricing structure which could make the reclaimed water more attrative to farmers. The Facility Plan only developed the scenario of pricing reclaimed water using the existing Board of Water Supply agricultural rate as an example of possible cost recovery. The effluent water quality from the proposed system will meet the Department of Health's R-1 Reuse guideline designation. R-1 is the highestt reuse of water quality. It allows for a wide range of agricultural crops as well as for public access horticultural watering. Many of the suggestions in your letter are excellent and need to be considered as the plan proceeds toward implementation.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

LEATRICE N. UYEHARA
Deputy to the Chairperson

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

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

FAX: (808) 973-9613

February 8, 1996

Ms. Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Draft Environmental Impact Statement
Supplemental Waialua-Haliewa Wastewater
Facility Plan
TMK: 6-2; 6-6 to 6-9

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

We favorably note that the document makes no mention of "selling" the reclaimed effluent to contracted farms and other users of the effluent in order to partially subsidize the operation and maintenance costs of the two proposed facilities. Instead, the operation and maintenance costs of the two facility systems are to be shared among wastewater system users by a combination of assessments, on-site costs, and monthly charges. As a further incentive for landowners adjacent to the delivery reclamation lines to enter into agricultural and horticultural use contracts, the City should offer the reclaimed effluent at no cost and provide to-the-lot lateral service complete with meter. These combined actions by the City would be highly supportive of agricultural diversification in the north shore of Oahu.

Should you have any questions, please call me at 973-9551, or Earl Yamamoto of the Planning and Development Office at 973-9466. Thank you for the opportunity to comment.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

c: City Department of Wastewater Management (attention: Mr. Jared Lum)
Dr. Robert A. Gearhart, Hydro Resources International
PDO
ARMD

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Dona L. Hanaike, Director
City and County of Honolulu
Dept of Parks and Recreation
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Dona Hanaike:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS. Details of the rapid infiltration fields can be found in both the DEIS and the Facility Plan. The rapid infiltration field will have no impact on Kaiaka Beach Park as proposed in the Facility Plan. Tertiary effluent (R-1) can be used to irrigate public access areas.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

JEREMY HARRIS
MAYOR

DONA L. HANAIKE
DIRECTOR

ALVIN K.C. AU
DEPUTY DIRECTOR

February 13, 1996

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: DONA L. HANAIKE, DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
SUPPLEMENTAL WAIALUA-HALEIWA WASTEWATER
FACILITY PLAN

This responds to the DEIS supplemental preparation document for the subject project.

We have reviewed the DEIS and are offering the following comments.

The Department of Parks and Recreation would be willing to consider the usage of tertiary effluent for park irrigation provided that:

1. A comprehensive study of the use of reclaimed wastewater effluent for park irrigation indicates no adverse effects.

2. Off-site and on-site installation and subsequent maintenance of a secondary nonpotable water system for park use be economically justified.

3. Plans for implementing the proposed reuse of treated wastewater effluent for park use be approved by the department.

Thank you for the opportunity to comment on the subject document.

We Add Quality to Life

Should you have any questions on the matter, please contact Brian Suzuki of our Advance Planning Branch at extension 6316.

For DONA L. HANAIKE
Director

DLH:ei

cc: Office of Environmental Quality Control
Department of Wastewater Management (Jared Lum)
✓Hydro Resources International (Dr. Robert A. Gearheart)

United States Department of Agriculture

Natural Resources Conservation Service

P. O. Box 50004
Honolulu, HI
96850-0001

March 11, 1996

Ms. Cheryl Soon, Chief Planning Officer
Planning Department
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, HI 96813

Dear Ms. Soon:

Subject: Draft EIS - Supplemental Waialua-Haleiwa Wastewater Facility Plan, Oahu, Hawaii

Thank you for allowing us extra time to comment on the above-mentioned document and giving us your copy of the above-mentioned EIS as our copy was misplaced. Our previous letter dated February 6, 1996, did not provide comments that we felt are pertinent to this project. We feel that alternative waste management strategies are badly needed. In that spirit, would like to submit the following additional comments:

Pages 2-3 and 88

Proposed rapid infiltration disposal sites are located quite near the shoreline. Predominant soils in the two areas have sandy subsoils and infiltration is rapid to the groundwater. Revised data show Jaucas (JaC) and Mokuleia (Mt) soils as having a severe rating for septic tank filter fields due to "poor filter". In that these soils do not offer any filtering ability, will the near-shore water quality be negatively affected? The Waialua-Kaiaka Bay area was designated by the Department of Health as a Water Quality Limited Segment.

With regard to the statement "20 to 80 acres of potential users" for the reclaimed water, what assurance is there that there will be long term users?

Page 5

Reference is made to use of Wahiawa's effluent for irrigation with "no negative impact". What type of monitoring was done to ensure this conclusion? What evidence exists that there will be "no ocean discharge"?

Page 13

The text states that total inorganic nitrogen levels will be less than 5 milligrams per liter. What is the total (organic and inorganic) nitrogen concentration?

Page 14

We look forward to reviewing the Preliminary Engineering Report (including an irrigation management plan). We hope that this report will also plan for the land application of biosolids.

Page 75

We note that "It is proposed that by the year 2000, more than 96 percent of the basin will be under an adequate conservation program". What is the reference for this information? How will "adequate" be determined? Plans may be written by then but implementation may be lower than this level.

Page 135

What is the actual number of prime agricultural land acres that will be consumed? Given that land and water are high value resources, we encourage investigating systems that reuse effluent for agricultural purposes which would then increase productivity per acre rather than reducing the amount of available agricultural land by creating wetlands. Expanding agricultural production using effluent as irrigation water would help sustain employment in the agricultural sector and decrease Oahu's dependence on imported food. Monitoring of surface and aquifer waters would be needed to ensure that there are no negative effects from the surface application of effluent.

Again, I would like to thank you for the opportunity in allowing us to comment on this document.

Sincerely,

Christopher W. Smith M.D., State Soil Scientist for

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. Jared Lum, Department of Wastewater Management, Water Quality Division, City and County of Honolulu, 650 S. King Street, Honolulu, HI 96813
Dr. Robert A. Gearheart, Hydro Resources International, 613 Park Avenue, Arcata, California 95521
The Honorable Rene Mansho, Councilmember/Chair, Wahiawa Wastewater Task Force, Honolulu Hale, Honolulu, Hawaii 96813

HYDRO RESOURCES INTERNATIONAL
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(707)822-6674

May 22, 1996

Kenneth M. Kaneshiro
U.S. Dept. of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96850-0001

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan,
TMKs: 6-2:6-6 to 6-9

Dear Mr. Kaneshiro:

The following is in response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

One criteria for rapid infiltration sites is that the soil is well drained since disposal via groundwater recharge is the objective. This, of course is different than siting an adsorption field for a septic tank where treatment and disposal are objectives. The effluent from the treatment plant will meet the R-1 reuse guidelines established by the State of Hawaii's Department of Health. The R-1 status would allow direct reuse of the effluent for a wide variety of agricultural uses as well as for public access horticultural uses, such as parks and school grounds. The rapid infiltration system is designed to be a disposal method, not a treatment method. All standards for R-1 will be met prior to discharge to the rapid infiltration site. The rapid infiltration site does afford treatment and redundancy, though, which is not required by the DOH. The mounded recharge water co-mingles with the groundwater and enters the interface with the nearshore water highly diluted. Total inorganic nitrogen levels (ammonia, nitrite, and nitrate) will be less than 5 mg/l as nitrogen in the undiluted effluent. The sandy soils will allow for phosphorus adsorption to occur, even though this is not presently required. The filtrate from the rapid infiltration site will be less than 1 mg/l of PO_4-P.

The system does not require contractual arrangements for long term use of the reclaimed water. Recent history suggests that pricing of reclaimed water along with ease of availability will make this an attractive alternative to irrigators in the region.

The reference to no impact from Wahiawa effluent used for irrigation was based upon a review of existing City and County planning documents and DOH's stream water quality reports. No ocean discharge refers to the fact that this alternative does not require an ocean outfall.

This particular plan will produce a minimum of biosolids compared to the SBR treatment alternative. Oxidation ponds produce a minimum of solids over the long run. Experience has shown that oxidation ponds reach a steady state solids level which is dependent upon solids loading, minimum water temperature and length of day. In a temperate zone this would produce a 6-9 inch average steady state solids level.

The actual area of prime agricultural land used for this system would be approximately 70 acres at two 35 acre sites. The pond and wetland system could be envisioned as hydraulic structures for irrigation. This system will produce a high quality dependable water supply which can support irrigation for approximately 164 acres for a wide range of agricultural activities.

The monitoring program for this particular project will be developed by the DOH. An opportunity will exist in that process to review and comment on the proposed standards and monitoring program. The R-1 reclaimed water guidelines have intensive and specific effluent monitoring requirements.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jaren Lum
Dept. of Wastewater Management

February 1, 1996

Ms. Cheryl Soon, Director
Dept of Planning
650 So. King Street 8th Floor
Honolulu, Hawaii 96813

Dear Ms. Soon,

Subject: Waialua Haleiwa Wastewater Facilities
Tax Map Key: 6-9, 6-8, 6-7, 6-6, 6-2

I am Meryl Andersen, living at 66-008 B Kamehameha Highway, Haleiwa.

I am very concern about the location of the Sewage Pump Station #5 in Haleiwa as shown in the EIS draft in figure 2.3 Centralize System Alternative: SBR/ Ocean discharge Haleiwa area. It is in the 100 year flood zone (figure 3.7 Flood zone in the Haleiwa Area) so the building will be much higher then 10 feet above the ground & will obstruct views.

I am not convenice that there will be enough odor control and those of us living nearby will be affect by the odor.

This area is used by a local Canoe Club and the Bay is used for swimming, snorkeling, kayaking and other water sports. If there is a mal-function it would contaminate this area making it unsafe for recreational uses.

I firmly suggest that this location is the poorest site for this facility (SPS) and surely there must be a more feasible/ pratical location.

Sincerely,

Meryl M. Andersen

Meryl M. Andersen
66-008 B Kamehameha Hway
Haleiwa, Hawaii 96712

CC: Robert A. Gearheart
Jared Lum
Gary Gill
Senator Bunda
Representative Santiago
Councilmember Rene Mansho

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May 22, 1996

Meryl M. Andersen
66-008B Kamehameha Hwy.
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu,
TMKs: 6-2: 6-6 to 6-9

Dear Ms. Andersen:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Sites for pump stations and wastewater treatment plants have been identified in the facility plan and EIS. Figure 1.3 in the Facility Plan shows the location of the pump stations and treatment plant for the Waialua area. Figure 1.4 shows the sites for pump stations and the treatment plant for the Hale'iwa area. The maps available for the Supplemental EIS are the same maps used in the original EIS prepared by Belt Collins. The purpose of the maps is to show location of sites in relationship to infrastructures such as major roads.

Architectural design of pump stations and the wastewater treatment plants are usually available at the pre-design stage of a project. The City and County of Honolulu has considerable experience designing pump stations which minimizes space requirements and fit into the surrounding natural and architectural setting. One wastewater treatment facility will have a single building which will house the laboratory, operational controls, and a maintenance area. The other facility will have a single building housing these functions for operations and storage of routine maintenance equipment and material.

The cost of the proposed collection and wastewater reclamation system can be found on page 241 of the Facility Plan. Based upon the assumption stated in the EIS the proposed cost for construction of the collection and treatment system is estimated to be $108,749,200 in 1995 dollars. The annual operation and maintenance cost is estimated to be $412,700 in 1995 dollars.

Pump stations should have adequate buffer area for vehicle parking for operational and maintenance vehicles and possible area odor control system. Specific site locations will dictate the exact location and area required for the pump station. The building itself will be less than 10,000 square feet.

Specific details on pump station siting, construction material, landscaping, architectural style, redundancy requirements, etc. will all be handled at the next phase of the proposed project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 12, 1996

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: RAYMOND H. SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF DECEMBER 28, 1995 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE PROPOSED WAIALUA-HALEIWA WASTEWATER PROJECT

Thank you for the opportunity to review and comment on the supplemental DEIS for the subject project.

Our comments of January 26, 1995 on the Environmental Impact Statement Preparation Notice are still applicable and are included in Chapter XI of the supplemental DEIS.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Mr. Jared Lum, Department of Wastewater Management
Dr. Robert A. Gearhart, Hydro Resources International
Office of Environmental Quality Control

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May 22, 1996

Raymond H. Sato, Manager & Chief Engineer
City/County of Honolulu
Board of Water Supply
630 So. Beretania St.
Honolulu, HI 96843

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Sato:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Supplemental Facility Plan and DEIS include maps showing the rapid infiltration sites (RIS) in relationship to the BWS no-pass line and the caprock aquifer protection UIC line. Cross-sections of the sub-geology in the regions of the proposed RI sites are shown in the Supplemental Facility Plan and DEIS.

It is so noted that the BWS formulated pass/no-pass line and the State Department of Health administraters the underground injection control line and the pass/no-pass lines. The wastewater treatment plants will be lines since they are mauka of the no-pass and UIC lines. The potential impact to groundwater contamination will be included in the FEIS.

Full design features of the wetlands and oxidation ponds will be include in the next phase of the project. Conceptual plans are included in the Supplemental Facility Plan showing liners under the oxidation ponds and the wetlands. Costs for these components are included in the detailed construction cost estimates in the Supplemental Facility Plan.

The siting of the plants at the 120-140 ft. contour is based upon an attempt to optimize the cost of pumping. Since wastewater flows continuous and the need for reclaimed wastewater is demand driven the raw wastewater should be pumped while the reclaiined wastewater should be gravity flow. Reclaimed water line installation and construction have a thorough set of conditions to minimize the potential for cross-connections and accidental consumption. UV disinfection technology is highly effective in denaturing Polio Type II virus and the other viruses typically found in wastewater. A discussion of UV efficacy on cysts will be included in the report.
It is assumed pathogenic bacteria and viruses are present prior to UV disinfection. The Uniform Plumbing Code requirements are noted as stated in your letter.

The treatment system is designed to handle rainfall conditions in several ways. The long detention time in pond/wetland volume allows for effluent flows to be modulated. The freeboard on the oxidation ponds allows for up to 3 weeks of no discharge at peak flows or 20 inches of rain in one day with 1 1/2' of freeboard left.

This Supplemental Facility Plan was not tasked to evaluate improvements in the water infrastructure.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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May 22, 1996

es K. Ikeda
ng Deputy Director of
ıvironmental Health
: Department of Health
Box 3376
olulu, HI 96801

ect: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan/EIS
Waialua, Oahu, TMK:6-2:6-6 to 6-9

Mr. Ikeda:

he following letter is a response to your comments on the Draft Facility Plan/EIS for the
lua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS. It
ted that the R-1 water reclamation guidelines are:

) "mean reclaimed water that is at all times oxidized, then filtered, and exposed,
afater the filtration process to a disinfection process that limits the
concentration to the following."

a. median numbers of fetal coliform values shall not exceed per/100ml as determined from the bacteriological results of the last seven days.

b. any one sample shall not exceed a fecal coliform value of 4/100 ml.

Engineering reports and submittals for reclamation treatment facility shall conform with the provisions of Chapter 11 of the DOH Guidelines for the Treatment and Use of Reclaimed Water dated November 24, 1993.

ıe treatment alternative as described in the Facility Plan will meet R-1 guidelines.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

ren Lum
ept. of Wastewater Management

WAIHEE
GOVERNOR OF HAWAII

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

RECEIVED
'95 FEB 14 P3:35
DEPT. OF WASTEWATER MANAGEMENT

PETER A. SYBINSKY, PH.D
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/

953100

February 1, 1995

Mr. Felix B. Limtiaco
Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Attn: Jared Lum

Dear Mr. Limtiaco:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii
TMK Nos. 6-2, 6-6 to 6-9

The following documents were submitted to the Department for review and comment:

A. Letter, dated December 23, 1994; and

B. Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities.

The Wastewater Branch staff reviewed and evaluated the above-mentioned documents on their conformance to Chapter 11-62 Of the Hawaii Administrative Rules and the Guidelines for Use of Reclaimed Water dated November 22, 1993. The following are the Departments comments.

1. Page 14. Effluent Disposal. The following are the requirements for R-1 Water:

"R-1 Water (Significant reduction in viral and bacterial pathogens)" means reclaimed water that is at all times oxidized, then filtered, and exposed, after the filtration process, to a disinfection process that limits the concentration to the following criteria:

A. The median number of fecal coliform values shall not exceed 1 per 100 milliliters as determined from the bacteriological results of the last seven days for which analysqs have been completed; and

B. Any one sample shall not exceed a fecal coliform value of 4 per 100 milliliters.

2. Page 15. Implementation Schedule. Engineering reports and submittals for Reclamation Treatment Facility shall conform with the provisions of Chapter VI of the DOH Guidelines for the Treatment and Use of Reclaimed Water dated November 22, 1993.

If you need additional information or clarification, please call Tomas See at 586-4298.

Sincerely,

JAMES K. IKEDA
Acting Deputy Director for
Environmental Health

TS:erm

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May 22, 1996

Michael Wilson
Chairperson
Board of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Wilson:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Division of Aquatic Resources has no objections to the project. The Historic Preservation Division records show no known historic sites at the proposed WWTP but historic sites at the rapid infiltration sites is very possible. It is noted that HPP will be contacted immediately upon unearthing of any human burial sites during construction. All Federal, County, and State permits will be requested at the appropriate time.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
Governor of Hawaii

95-13
W

Chairperson
MICHAEL D. WILSON
Board of Land and Natural Resources

Deputy Director
GILBERT COLOMA-AGARAN

Aquaculture Development
Aquatic Resources
Boating and Ocean Recreation
Bureau of Conveyances
Conservation and Environmental Affairs
Conservation and Resources Enforcement
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

REF:OCEA:DKP

FILE NO.: 95-332
DOC. ID.: 5302

Rec'd 1-30-95
95-C-62

The Honorable Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Ms. Soon:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN): Waialua-Haleiwa Wastewater Facilities Plan, Facility, North Shore, Oahu, TMKs: 6-2; 6-6; 6-7; 6-8; 6-9

We have reviewed the EISPN information for the subject project transmitted by the Department of Wastewater Management's letter dated December 23, 1994, and provide the following:

Historic Preservation Division

The Historic Preservation Division's (HPD) comments, which were previously forwarded directly to the Department of Wastewater Management, are reiterated below:

> "The proposed wastewater Treatment Plants (WWTP) are both located in old sugar cane lands where it is unlikely that historic sites will be found. Therefore, we believe that construction of the WWTPs at these locations will have "no effect" on historic sites. The proposed Rapid Infiltration Sites (RIS) are both located on sandy soils, where the probability of finding historic sites, including human burials, is relatively great. In order to ensure that the RISs and other infrastructure needed to support this project, such as pipelines, do not have an "adverse effect" on historic sites, these facilities will require historic preservation review during the planning process. In the case of the RISs in particular, planning should be sufficiently flexible that these facilities can be moved if the proposed location proves to be burial grounds or other historic sites that are significant for multiple criteria."

Division of Aquatic Resources

The Division of Aquatic Resources (DAR) comments that given the tertiary treatment level, this appears to be a needed project that should have positive environmental outcomes. DAR has no objections from an aquatic biological resources standpoint.

Ms. C. Soon - 2 - File No. 95-332

Office of Conservation and Environmental Affairs

The Office of Conservation and Environmental Affairs (OCEA) notes that the EISPN indicates (Section H, p.8) that a Conservation District Use Permit is necessary for this project, however, it does not appear that any Conservation District lands are involved. OCEA recommends that the State Land Use Commission be consulted on the current Land Use Districts in this area. The Draft EIS should include a figure which illustrates the project's location relative to the State Land Use District Boundaries.

We will forward any Forestry and Wildlife or Land Management Divisions' comments as they become available.

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

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

Very truly yours,

MICHAEL D. WILSON

c: DNM, City and County of Honolulu
Dr. Robert Gearheart, Hydro Resources International

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(707)822-6674

May 22, 1996

Patrick T. Onishi, Director
City and County of Honolulu
Dept. of Land Utilization
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Onishi:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that conditional use permits Type 1, Type B, and state special use will be required. A Special Management Area permit will be required for the rapid infiltration sites. The project will not encroach within 55 feet of the shoreline. All abbreviations are included in a glossary in the DEIS. Drawings of the proposed rapid infiltration system are in the DEIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

95-13 WE

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

RECEIVED
95 JAN 31 P3:23
95-0143

JEREMY HARRIS
MAYOR

DEPT OF WASTEW.

Patrick T. Onishi
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

94-09125(JT)

January 25, 1995

MEMORANDUM

TO: FELIX B. LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: PATRICK T. ONISHI, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
WAIALUA-HALEIWA WASTEWATER PROJECT

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

1. The proposed wastewater treatment plants will require Conditional Use Permits, Type 1 for Utility Installations, Type B and State Special Use Permits.

2. The proposed rapid infiltration sites are located in the Special Management Area (SMA). We concur with the EISPN (page 8) that Special Management Area Use Permits will be required.

3. Portions of the reclaimed water lines installed along existing corridors (roadways) will be located within the SMA, but are not defined as "development" and is therefore exempt (Section 25-1.3 [2][M], Chapter 25, Revised Ordinances of Honolulu) from SMA regulations.

4. We concur with the EISPN (page 8) that the project must conform with the National Flood Insurance Program.

5. The EISPN notes on page 8 that the project will require a Shoreline Setback Variance (SV). Based on the information provided in the EISPN, we are unable to verify this statement. The Draft Environmental Impact Statement (DEIS) should identify whether the project will encroach within the 40-foot shoreline setback. If so, an SV will be required. In addition, if any work is proposed within 55 feet of the shoreline, a certified shoreline survey should also be included.

FELIX B. LIMTIACO, DIRECTOR
Page 2
January 25, 1995

6. The DEIS should define all abbreviations and explain their significance. For example, SS and NTU appear in the document on page 40, but are not defined.

7. The description of the rapid infiltration fields should include conceptual drawings, including sections, to illustrate their operation.

Thank you for the opportunity to comment on this project. Should you have any questions, please contact Joan Takano of our staff at 527-5038.

Patrick T. Onishi

PATRICK T. ONISHI
Director of Land Utilization

PTO:am
g:\w-haleiwa.ltr

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(787)822-6674

May 22, 1996

Roger S. Fujioka, Director
Water Resources Research Center
University of Hawaii at Manoa
Honolulu, HI 96822

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Fujioka:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Groundwater aquifers underlying the proposed rapid infiltration (RI) sites are identified in the DEIS. The proposed effluent quality from the treatment site and from the RI sites have been predicted in the Facility Plan and the DEIS. Studies performed on similar soils have shown a high adsorption of phosphorus through shallow soil columns. A prediction will be made of the nutrient levels in the nearshore waters as the effluent commingles with the shallow groundwater flow moving to the ocean.

A facility plan includes factors of treatment process performance and maintenance in evaluating criteria for application. This level of analysis does not include the O/M factors for all the processes included in the evaluation.

Technical data from a wide range of UV installation is included in the Facility Plan and the DEIS. UV pilot study data has also been included in the FAC Plan for an oxidation pond/wetland type system. UV disinfection efficacy data will be included in the FEIS. DOH reuse guidelines have established UV as a process that meets reuse disinfection standards. The effluent from this system will meet DOH R1 reuse guidelines. The oxidation ponds and wetland will be fenced to the public as prescribed by City/County standards.

R1 reuse irrigation techniques specify that the reuse installation and all operational requirements are monitored to insure protection to City and County operational staff, agricultural workers, park employees and the public in general.

Odor control for the pump stations, treatment plant influent, and oxidation ponds are covered in the Facility Plan and DEIS. Siting of the treatment plant took into consideration the wind direction and wind speeds as identified by the wind rose found in the DEIS.

Integrated pest management will be employed at the oxidation ponds and wetlands. IPM includes hydraulic control, predatory fish, dragonfly and damselfly habitat, bat habitat, parasitic fungi (BTI), targeted life stage larvicides (methoprene), adultcides (ABATE), etc. Experience has shown than a healthy marsh and open oxidation ponds supports sufficient ecological control for containing nuisance insects. An IPM program will include a wide range of intervention necessary to control targeted insects.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

95.0062

University of Hawaii at Manoa

Water Resources Research Center

MEMORANDUM

3 January 1995

TO: Mr. Felix B. Limtiaco
Acting Director
Department of Wastewater Management
City and County of Honolulu

FROM: Roger S. Fujioka
Director, WRRC

SUBJECT: Comment on EISPN for Waialua-Haleiwa Wastewater Facilities

The proposed plan to build two WWTP plants and to use oxidation ponds, constructed wetlands, slow sand filters, UV disinfection with final disposal of effluent by irrigation and rapid infiltration will be a definite improvement over the existing situation which relies on cesspools. The proposed plan supports existing plans to phase out cesspools and to re-use wastewater. The questions to be addressed in the EIS to be prepared should include:

1) Information on type of aquifer underlying the rapid infiltration field, the possible discharge sites into the ocean and predicted impact on quality of receiving coastal water.

2) Potential problems and solutions related to performance and maintenance of sand filter and rapid infiltration fields.

3) Assurance that effluent will consistently result in expected quality and assurance of less than 1 coliform/100 ml after UV treatment.

4) Some assessment on expected disinfection efficiency of pathogens by UV treatment especially of viruses and protozoa which are known to be more resistant to UV disinfection than indicator bacteria.

5) Assurance that oxidation ponds and especially wetlands are not open to public use since there will be a health risk of pathogens in these waters.

6) Assessment of crops which are suitable for irrigation with reclaimed water as well as means of irrigation to protect health of people and workers.

7) Specific plans for odor control such as size and type of emergency surface aerators, use of odor masking chemicals and wind rose patterns for plant sites.

8) Control plans for use of oxidation ponds and wetlands by insects (flies, mosquitoes) for breeding.

RSF:jmn

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May 22, 1996

Frederick C. Gross
67-421 Waialua Beach Rd.
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Gross:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Mitigation measures for all identified impacts are discussed in the DEIS. The boundary lines for the urban and rural regions of the study area were done in the original Facility Plan and EIS performed by Belt Collins in 1987. This study was not tasked to re-evaluate urban/rural designations and not asked to replan the collection systems. This supplement to the original Facility Plan was asked to compare a land based/reuse option to the SBR/ocean discharge alternative.

Odor controls for existing septic tank systems are not covered in either the Facility Plan or the DEIS. Septic tanks or cesspools must follow DOH guidelines for maintenance and replacement. Design and operational features for controlling odors are included in the Facility Plan and DEIS.

WWPS details are included in the Facility Plan. Details on exact siting, design features, and operational redundancy will all be covered at the design level.

The collection system for the proposed system will be a gravity type system with pump stations and force mains to transport the wastewater to the treatment plants. The treated wastewater gravity flows from the treatment plant to all potential reuse sites below 100 ft elevation. The Belt Collin collection system is the same system as presented in the HRI Facility Plan except for the addition of one new pump station and force mains to the two treatment plants.

Maps in the final Facility Plan and EIS will show Kawailoa.

The size of WWPS is dictated by City/County standards. Size includes sufficient space for odor control and operational equipment. Specific site constraints coupled with design modifications can reduce the land requirements for WWPS.

A glossary will be included in the Facility Plan and the FEIS.

The irrigation water used by Waialua Sugar from Waihiawa Reservoir is of considerably poorly quality then the tertiary treated effluent from the system proposed in the Supplemental Facility Plan. The proposed system will produce a R-1 reclaimed water, which is the highest quality specified in the DOH's reclaimed water guidelines.

The collection system has expansion capacity built into the pipe sizes and the pump capacity. Since pipes must be designed to handle the peak flows these pipes could handle the increased flow for a greater proportion of time.

The possibility of legal action by concerned citizens will be discussed as it relates to implementability of certain alternatives.

Energy requirements for the proposed alternatives have been made based upon assumptions developed in the Supplemental Facility Plan and DEIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

95-195

67-421 Waialua Beach Road
Waialua, HI 96791
January,2, 1995

RECEIVED
95 JAN -4 P2:13
DEPT OF WASTEWATER MGT

Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Felix B. Limtiaco,
Acting Director, and Mr. Jared Lum

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii.
TMKs 6-2, 6-6 to 6-9

Gentlemen:

In response to your letter WPW 94-1257 dated December 23, 1994, the following comments are submitted:

Pg. 6 Proposed Mitigation Measures should apply to WWPS as well as treating facilities.

Pg. 11 The Proposed Action. Rural area and urban area are not well-defined. What are the criteria for ending collection lines at any particular place?

Pg. 13 Odor control for septage exiting areas should be included here as well as on Page 47, No. 8.

What are the details of the WWPS?

Pg. 14 Effluent disposal. Is all disposal by gravity only? Are take offs to supply effluent for irrigation to be along gravity line and then pumped to the site of use?

Pgs. 23-24. Maps show sewer lines proposed in the Belt Collins's proposal. It is assumed the locations are still valid. However, sizes are not to be the same because of two treatment plants and different direction of collection and disposal.

Pg. 27 Fig. 2.1. The names Kawaihapai and Kawailoa are used in the text (see Pg. 26 Par. 2.1 - No Action) but are not located on the map. Residents are keenly interested. See comments above re pg. 11. Where is Kawailoa II?

Pg. 33 2.2.2.1 Size of the proposed pump stations, i.e., 10,000 sq.ft. appears to be much too large. Let's be reasonable.

In paragraph 3 the term SER is used. I cannot find this definition. For convenience, let's include a glossary.

Pg. 38 The first paragraph discusses odor of pumping stations. Odor will not be acceptable. Odor control is not a new problem. It can and must be handled properly - not minimized. You would not permit a "minimized" pump station to be installed up wind of the Mayor's residence.

Attention: Mr. Felix B. Limtiaco, Acting Director
and Mr. Jared Lum

Pg. 39 The last paragraph on the page says: "Effluent irrigation . . . : . . . the clogging of the irrigation lines is a potential problem." Years ago Waialua Sugar Company had to install sand filters to remove material in the water supply it received from the Wahiawa Reservoir. It is not a new problem.

Pg. 42 The capital cost chart provides for two systems of .7 mgd each. Are the collector trunks sized for expansion?

Pg. 43 Paragraph 2.3.1.5. Monetary. The "No Action" alternative does not discuss legal action by residents for failing to provide adequate "Action." "No Action" might be very expensive, in fact, the most expensive, since it would lead to legal suits followed by actions done in haste to provide a corrective solution.

Pg. 46 Table 2.8. It is believed that No. 8, the energy requirements for WWPS are incorrect. The longer pumping lines for centralized WWTP should cost more. Please review and rethink what you have here. Also, WWTP are all at the same elevation.

Thank you for the opportunity to present these comments. My telephone number is 637-4056, if you wish to discuss these.

Very truly yours,

Frederick C. Cross

Frederick C. Cross

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Nestley K.C. Chun, Ph.D., P.E.
Chief Environmental Engineer
CH2M-Hill, Inc.
1585 Kapiolani Blvd., Suite 1420
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Chun:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

1. Our design approach for the wetland system is well document and has been used at several sites to produce the level of treatment proposed in the FAC Plan. It is our opinion that the CH2M-Hill approach represents an over design and is not justified on a kinetic basis, an organic loading basis, and/or a hydraulic loading basis. The North American Data Base approach, suggested by CH2M-Hill, is highly variable in terms of predicting effluent quality and estimating land requirements. This data base uses data from different size facilities, different length to width ratios, different influent quality, different emergent areas vs total area, different climatological regions, detrital accumulation/-effect, etc. None of the factors mentioned above, except for temperature, are considered in that approach. We feel much more confident comparing the exact type of secondary effluent in a design equation which considers the length to width ratio, short circuiting, open water, and detrital background contribution. The same design criteria we used for this project was also used by CH2M-Hill for sizing and costing a pond/wetland system in a facility plan for La'ie (March 1995).

2. Our cost estimates are based on 10 different pond/wetland systems in which we have developed the cost estimates Three of these systems are on Oahu. We feel quite comfortable with our estimates and the increase costs associated with transportation cost, local labor cost, and equipment cost. We feel that the $100,000/acre cost for constructing ponds is justified (see comment above concerning La'ie).

3. The facility plan is quite clear in stating that the wetlands will be designed to have open water and close water (emergent vegetation) sections. Our design proposes that the system have 25-50% open water. We are not sure what the Bishop Estates representative is referring to the public meeting concerning a wetland with no habitat. We used an overhead transparency of a typical section of a constructed wetland at the public meeting to describe the proposed alternative treatment units. Figure 6.13 on page 175 of the FAC plan shows this typical arrangement. This typical design is complete with islands that can be used as refugia by waterbirds. The lack of freshwater wetlands and the impact of predators are two of the major limitations on the recovery of waterbird populations on Oahu. The use of small 3-7 acre ponds and wetlands by waterbirds can best be seen on the windward part of Oahu where listed and endangered waterbirds utilize existing prawn aquacultural units and surrounding wetlands (see USFWS Waterbird Recovery Plan).

4. Wetlands designed and operated as delineated in this facility plan will not produce odors commonly associated with wastewater treatment plants. The nature of these system minimizes the potential for odor production; long detention time, raw sewage entering lagoon well below the water surface, and the conditions for biological oxidation of hydrogen sulfide to sulfates. In many cases in California, pond/wetland systems are viewed as amenities by developers (i.e., Santa Rosa and Arcata). We would encourageBishop Estate representatives to visit Arcata and other sites on the West Coast to see for themselves these types of system. It is quite justified to be concerned with these issues based upon the limited types of wastewater treatment systems in Hawaii.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Engineers
Planners
CH2MHILL Economists
Scientists

April 4, 1995

OPW340.CS.16

Mr. Sydney Kelīpule'ole
Kamehameha Schools Bishop Estate
567 South King Street, Suite 200
Honolulu, Hawaii 96813

Dear Sydney:

Subject: Supplemental Waialua-Haleiwa Wastewater Facility Plan

Dr. Robert Knight made a cursory review of the draft Supplemental Waialua-Haleiwa Wastewater Facility Plan and EIS Preparation Notice. His review was not in detail and focused primarily on the wetlands portion of the plan.

Based on this review, we have the following comments on the draft Supplemental Waialua-Haleiwa Wastewater Facility Plan and EIS Preparation Notice:

- Treatment wetlands are described in Section 6, beginning on page 145 and continuing through page 155. This information is generally factual and accurate, but does not provide a specific quantitative basis for designing or sizing the proposed facilities at Waialua-Haleiwa.

- Section 8 provides the preliminary design of the recommended combination oxidation pond/wetlands/filter treatment system. Table 8.3 estimates the expected water quality from the individual processes assuming an average flow of 0.7 mgd, and Table 8.7 summarizes the design criteria for the wetland part of the proposed system. As mentioned earlier, there is no quantitative derivation of the estimates in Table 8.3 or the criteria in Table 8.7.

- Using a quantitative (area-based, first-order performance) model recently developed by Drs. Robert Knight and Robert Kadlec with data from the North American Wetland Treatment System Database, an independent estimate of system performance was generated and summarized in the table below. Estimates provided by Hydro Resources International (HRI) are also presented in this table as a basis of comparison.

Projected Wetland Treatment Performance.

	BOD5 (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L	Fecal col. (col/100 mL)
Oxidation Pond Effluent (HRI est.)	50	50	25	8	10,000
Wetland Effluent (HRI est.)	2-5	2-5	5	6	100
Kadlec & Knight (in press) est.	22	13	13	5.6	1200
Est. Area (ac) Needed to Meet HRI Goals	>25	>25	>40	7	>25

- Table 8.3 does not mention what the reporting frequency is for HRI's estimates. Maximum monthly outflow concentrations are likely to be 1.5 to 2.5 times higher than the estimates given in the above table. Also, the estimates of the quality leaving the oxidation pond may be too low for BOD5 and TSS, thereby further underestimating the wetland outflow concentrations.

- The facilities plan may lead the reader to expect some wildlife habitat/public use values from the proposed wetland systems at Waialua and Haleiwa. Based on the undersizing of facilities described above, the resulting high loading rates to the wetlands and their location in a fenced compound, the proposed wetlands will likely not provide any significant habitat for wildlife or humans.

- The construction cost estimate for the wetlands provided in Table 8.10 may be low. The estimate given is within the range of observed costs for these systems in the mainland U.S. Average costs are about $20,000 to $30,000 per acre. Smaller systems cost more per acre, and systems constructed on difficult sites (variable topography) cost even more.

We hope these comments will be of help to you. Please contact me at 943-7135, ext. 221 or Bob Chuck at ext. 226 should you have any questions or need additional information.

Sincerely,

CH2M HILL, INC.

Wesley K.C. Chun

Wesley K.C. Chun, Ph.D., P.E.
Chief Environmental Engineer

c: Bob Chuck/CH2M HILL/HNL
Ross Kaneko/CH2M HILL/HNL
Bob Knight/CH2M HILL/GNV
Michelle Girts/CH2M HILL/PDX

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Dante K. Carpenter
Administrator
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813-5249

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Carpenter:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Office of Hawaiian Affairs has no objection to the proposed facility. The Facility Plan and DEIS has complete soil mapping and physical characteristics of the soils. More complete geotechnical data normally is gathered at the design phase of the project when exact sites have been determined.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED
'95 JUN 19 A10:00
DEPT OF WASTEWATER MGT.

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU HAWAII 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

RECEIVED
'95 JUN 19 A7:07
DEPT. OF WASTEWATER MGT.

June 15, 1995

Mr. Felix B. Limtiaco
Department of Waterwater Management
City and County of Honolulu
650 South King St.
Honolulu, HI 96813

Dear Mr. Limtiaco:

Thank you for the opportunity to review the Draft Facility Plan for the Waialua-Haleiwa Wastewater Facilities, Island of Oahu.

In its present stage, we find the information contained in the plan sufficient and have no objections to the proposed wastewater facility. But we question the rationale of the preparers in not including soils information for the proposed area (p. 181). As you are aware, the feasibility of building a wastewater facility strongly depends upon land qualities determining suitability for wastewater management. These qualities include soil permeability, soil depth, water retention capacity, aeration, presence of chemical and/or physical impendances in the soil profile, organic matter content, and other soil properties as well. Lack of information on the subject matter precludes us from ascertaining whether the chosen area is indeed suitable for wastewater management. Please contact me, or Luis Manrique at the Land and Natural Resources Division (594-1935), should you have any questions on this matter.

Sincerely yours,

Dante K. Carpenter
Administrator

LM:lm
cc BOT

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Kimo Steinwascher
Pacific Land Services, Inc.
810 Richards St., Suite 200
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Kimo Steinwascher:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted to include Pacific Land Services on a mailing list concerning this project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Pacific Land

RECEIVED
95 JAN 19 P4:18

DEPT OF WASTEWATER MGT

1/21/95 ltr ec

January 18, 1995

Department of Public Works
Wastewater Management Division
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813
Attn: Jared Lum

Re: Waialua/Haleiwa Wastewater Facilities EIS

Dear Mr. Lum:

Our company is the development manager for Mokuleia Land Company, the owner of approximately 3,000 acres of land on the north shore. We would like to participate in and provide input in the preparation of the Environmental Impact Statement for the proposed Waialua/Haleiwa Wastewater Facility. On behalf of Mokuleia Land Company we have been working with community groups and individuals in preparing long range development plans for the property and will be pleased to share these with you at a convenient time.

We would like to be placed on any mailing list regarding this EIS. Please send any information to our offices at 810 Richards Street, Suite 200, Honolulu, Hawaii 96813. If you have any questions please feel free to contact me at (808) 528-3699.

Best regards,

Kimo Steinwascher

KS:tmk

cc: Mr. Bong Shik Kang, Mokuleia Land Company

PACIFIC LAND SERVICES, INC. 810 RICHARDS ST., SUITE 200 HONOLULU, HI 96813 PHONE: (808) 528-3699 FAX: (808) 526-4194

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Richard Brock, Researcher
University of Hawaii
Sea Grant Extension Service
1000 Pope Rd.
Room 226
Honolulu, HI 96822

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Brock:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Sea Grant Extension Service believes the alternative of choice is ecologically sensible and cost-effective.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED

UNIVERSITY OF HAWAII '23 AM 8:43

Sea Grant Extension Service
School of Ocean and Earth Science and Technology
DEPT OF WASTEWATER MGT

DATE: 18 January 1995

TO: Mr. Jared Lum
Department of Wastewater Management
City and County of Honolulu

FROM: Dr. Richard Brock, Researcher
Sea Grant Program, University of Hawaii

SUBJECT: Review of EISPN for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii

The above document was passed on to me for review. I can only comment on the document with respect to ecological impacts. I believe the suggested alternative of the development of a passive wastewater treatment system with water reclamation via irrigation is an ecologically sensible and cost-effective way to deal with wastewater in the Haleiwa-Waialua area. The long term benefit of eliminating most of the cesspool operations in the area by the development of the proposed system is ample reason for its moving forward.

The alternative of using an ocean outfall has the potential for litigation as has been encountered elsewhere.

We appreciate the opportunity to review this document.

Community Outreach and Technology Transfer for the Sea Grant College Program
1000 Pope Road • Room 226 • Honolulu, Hawai'i 96822
Telephone: (808) 956-8191 • Facsimile: (808) 956-2858 • Cable Address: UNIHAW

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Mr. Ray H. Jyo, P.E.
Director of Engineering
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Jyo:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that a DA permit will not be required for the project and that the flood hazard information is correct.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

REPLY TO ATTENTION OF

January 12, 1995

Planning Division

95.0C97

RECEIVED
'95 JAN 23 AM 8:23
DEPT OF WASTEWATER MGT

Mr. Felix B. Limtiaco, Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Limtiaco:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities, Oahu (TMKs 6-2, 6-6 to 6-9). We do not have any comments to offer at this time. However, we will need to review future documents as detailed plans are developed to determine Department of the Army permit requirements as well as flood hazard determinations as required by the Federal Emergency Management Agency.

Sincerely,

Ray H. Jyo, P.E.
Director of Engineering

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Rick Egged
Interim Director
State of Hawaii
Dept. of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Egged:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the sites for the two WWTPs, rapid infiltration site 1, wastewater pump station 1, 2, and 6, and various gravity sewers/force mains are in a designated agricultural district. It is also noted that rapid infiltration site 2, wastewater pump station 3, 4, and 5, and various gravity sewers/force mains are in a designated urban district. A map will be provided to show these areas. A special use permit will have to be approved from the State Land Use Commission for the two WWP sites.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED 95-110

BENJAMIN J. CAYETANO
GOVERNOR
ELSIE H. HAYA
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

'95 JAN 24 P1:22

DIRECTOR'S OFFICE
Central Pacific Plaza, 220 South King Street, 11th floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

DEPT OF WASTEWATER MG.

Telephone: (808) 586-2355
Fax: (808) 586-2377

January 10, 1995

JAN 13 9:2 [illegible]

LAND USE COMMISSION
STATE OF HAWAII

Mr. Felix B. Limtiaco, Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Limtiaco:

The Department of Business, Economic Development and Tourism is pleased to submit the enclosed comments on the Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii, TMK Nos.: 6-2, 6-6 to 6-9.

The comments were provided by the Land Use Commission. Questions regarding these comments may be directed to Esther Ueda, LUC Executive Officer at 587-3826.

Thank you for the opportunity to comment.

Sincerely,

Rick Egged
Interim Director

Enclosure

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Don Hibbard, Administrator
State Historic Preservation Division
Dept. of Land & Natural Resources
33 So. King St., 6th Floor
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Hibbard:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Recognizing that the rapid infiltration sites (RIS) are highly probable historic sites, a historic preservation review will occur during the planning process. Historic preservation review will occur at the same time hydrogeological data is acquired at the proposed sites. The siting for the RIS is flexible and will allow for moving to alternative sites if significant historic/culture impacts are identified.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE 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

January 6, 1995

Jared Lum
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

LOG NO: 13588
DOC NO: 9501TD03

Dear Mr. Lum:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities
Kawailoa, Pa'ala'a, Kamananui, Mokule'ia, 'Auku'u, Kikahi, Kawaihapai, Kealia, and Ka'ena, Waialua, O'ahu
TMK: 6-2, 6-6 to 6-9

Thank you for the opportunity to review this EISPN. The proposed Wastewater Treatment Plants (WWTP) are both located in old sugar cane lands where it is unlikely that historic sites will be found. Therefore, we believe that construction of the WWTPs at these locations will have "no effect" on historic sites.

The proposed Rapid Infiltration Sites (RIS) are both located on sandy soils, where the probability of finding historic sites, including human burials, is relatively great. In order to ensure that the RISs and other infrastructure needed to support this project, such as pipelines, do not have an "adverse effect" on historic sites these facilities will require historic preservation review during the planning process, with the first step in that review being an archaeological inventory survey of proposed project areas. In the case of the RISs in particular, planning should be sufficiently flexible that these facilities can be moved if the proposed locations prove to be burial grounds or other historic sites that are significant for multiple criteria.

If you have any questions please call Tom Dye at 587-0014.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

TD:jk

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Michael G. Buck, Administrator
Dept. of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Buck:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The proposed project will not affect any existing wetland sites, including the Ukoa pond. The Ukoa wetland is not impacted by any of the construction requirements associated with this project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED
'95 JAN -3 P3:03
DEPT OF WASTEWATER MGT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 28, 1994

Mr. Felix B. Limtiaco
Acting Director
City & County of Honolulu
Department of Wastewater Management
650 S. King Street
Honolulu, HI 96813

ATTN: Mr. Jared Lum

SUBJECT: Environment Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii, TMKs: 6-2, 6-6 to 6-9, File No. WPW 94-1257

We have received your request for comments for the above subject and have the following comments:

1) The proposed project will not affect the Division of Forestry and Wildlife's programs or projects in the area.

2) Our main concern is the affect of the project on existing wetlands in the area (Ukoa pond, the hasu/taro fields, etc.). The U.S. Fish and Wildlife Service should be consulted in this matter.

Thank you for the opportunity to comment.

Very truly yours,

Michael G. Buck
Administrator

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

REF:OCEA:DKP

P.O. Box 621
Honolulu, Hawaii 96809

FILE NO.: 95-232
DOC. ID.: 5302

MICHAEL D. WILSON
Board of Land and Natural Resources

Deputy Director
GILBERT COLOMA AGARAN

Aquaculture Development
Aquatic Resources
Boating and Ocean Recreation
Bureau of Conveyances
Conservation and Environmental Affairs
Conservation and Resources Enforcement
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

Mail 1-30-95
95.010.62

The Honorable Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Ms. Soon:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN): Waialua-Haleiwa Wastewater Facilities Plan, Facility, North Shore, Oahu, TMKs: 6-2; 6-6; 6-7; 6-8; 6-9

We have reviewed the EISPN information for the subject project transmitted by the Department of Wastewater Management's letter dated December 23, 1994, and provide the following:

Historic Preservation Division

The Historic Preservation Division's (HPD) comments, which were previously forwarded directly to the Department of Wastewater Management, are reiterated below:

> "The proposed Wastewater Treatment Plants (WWTP) are both located in old sugar cane lands where it is unlikely that historic sites will be found. Therefore, we believe that construction of the WWTPs at these locations will have "no effect" on historic sites. The proposed Rapid Infiltration Sites (RIS) are both located on sandy soils, where the probability of finding historic sites, including human burials, is relatively great. In order to ensure that the RISs and other infrastructure needed to support this project, such as pipelines, do not have an "adverse effect" on historic sites, these facilities will require historic preservation review during the planning process. In the case of the RISs in particular, planning should be sufficiently flexible that these facilities can be moved if the proposed location proves to be burial grounds or other historic sites that are significant for multiple criteria."

Division of Aquatic Resources

The Division of Aquatic Resources (DAR) comments that given the tertiary treatment level, this appears to be a needed project that should have positive environmental outcomes. DAR has no objections from an aquatic biological resources standpoint.

Office of Conservation and Environmental Affairs

The Office of Conservation and Environmental Affairs (OCEA) notes that the EISPN indicates (Section H, p.8) that a Conservation District Use Permit is necessary for this project, however, it does not appear that any Conservation District lands are involved. OCEA recommends that the State Land Use Commission be consulted on the current Land Use Districts in this area. The Draft EIS should include a figure which illustrates the project's location relative to the State Land Use District Boundaries.

We will forward any Forestry and Wildlife or Land Management Divisions' comments as they become available.

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

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

Very truly yours,

MICHAEL D. WILSON

cc: DWM, City and County of Honolulu
Hydro Resources International

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Michael Wilson
Chairperson
Board of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Wilson:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Division of Aquatic Resources has no objections to the project. The Historic Preservation Division records show no known historic sites at the proposed WWTP and rapid infiltration sites. It is noted that HPD will be contacted immediately upon discovery of any historic sites during construction. We have requested comments from the State Department of Transportation. All Federal, County, and State permits will be requested at the appropriate time.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

'95 JAN 13 P4:13

DEPT OF WASTEWATER MGT

Dept. of Wastewater Management
650 So. King St., 8th Floor
Honolulu, Hawaii 96813

Gentlemen:

Subject: EISPN for the Waialua Haleiwa Wastewater Facilities,
Oahu , Hawaii
Tmk: 6-2,6-6 to 6-9

I have read the EISPN. At the hearing held by Rene Mansho Dec. 6 no mention was made of specific sites for Pump Stations or Waste Water Treatment Plant. The maps enclosed are not up to date maps of the area, indeed, they are of poor quality making it difficult to determine sites. Also, no mention of cost to each homeowner.

At this time I suggest your department to have another hearing/ meeting so the residence/community may get a better idea where these sites will actually be, also what they may look like--especially the pumping stations as to size, heights, etc--and cost to homeowners.

Sincerely,

Meryl M. Andersen

Meryl M. Andersen
66-008 B Kamehameha Highway
Haleiwa, Hawaii 96712

cc Rene Mansho

June 23, 1995

Mr. Jared Lum
City & County of Honolulu
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan

I am Mrs. Andersen, a long-time Haleiwa resident and a member of the Neighborhood Board #27.

I have reviewed the DSWWFP and would like to compliment you on a well written document.

However, I do have some significant concerns. The Wastewater Pump System (WWPS) for the Hale'iwa area on page 180 under section 8.2, Collection System, mentions three components - wet well, dry well and superstructure - but doesn't provide specifications as to height or width, or even a diagram, of the proposed WWPS. Also, on page 183, a map of the area seems to indicate that the WWPS site is on the Kahuku side of the bend in the Anahulu Stream, across from the Chart House, but I believe that more specific details regarding the location are necessary.

Without more information regarding the size, appearance or the exact location of the proposed WWPS for the Hale'iwa area, I object to siting it in the area indicated. If the WWPS is a high building, it would obstruct the view of the ocean from both directions along Kamehameha Highway. The proposed site for the WWPS appears to be within the tsunami/flood area, indicating a strong possibility of malfunction when such phenomena occur. If a sewage spill or similar malfunction occurred at this location it would have a tremendously negative impact on the residents and businesses in the immediate area.

I look forward to a detailed response to this letter and the identification of an alternate WWPS site for the Hale'iwa area if the above concerns cannot be adequately addressed.

Sincerely,

[redacted]
66-008 Kamehameha Hwy.

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Meryl M. Andersen
66-008B Kamehameha Hwy.
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Ms. Andersen:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Sites for pump stations and wastewater treatment plants have been identified in the facility plan and EIS. Figure 2.3 shows the location of the pump stations and treatment plant for the Waialua area. Figure 2.5 shows the sites for pump stations and the treatment plant for the Hale'iwa area. The maps available for the Draft Supplemental EIS are the same maps used in the original EIS prepared by Belt Collins. The purpose of the maps is to show location of sites in relationship to infrastructures such as major roads. In some cases GID data will be used to generate new maps. Other maps from BCA will be copied in 11 1/2 by 17 format to enhance readability.

Architectural design of pump stations and the wastewater treatment plants are usually available at the detailed-design stage of a project. The City and County of Honolulu has considerable experience designing pump stations which minimizes space requirements and fit into the surrounding natural and architectural setting. One wastewater treatment facility will have a single building which will house the laboratory, operational controls, and a maintenance area. The other facility will have a single building housing these functions for operations and storage of routine maintenance equipment and material.

The cost of the proposed collection and wastewater reclamation system can be found on page 207 of the Facility Plan. Based upon the assumption stated in the EIS the proposed cost for construction of the collection and treatment system is estimated to be $98,308,000 in 1994 dollars. The annual operation and maintenance cost is estimated to be $371,000 in 1994 dollars.

Architectural design measures will be taken to minimize view obstructions along Kamehameha Highway. Also, engineering design measures will be taken to minimize the potential for spills and flood problems. these mitigative measures will be developed during the detailed design phase of the project.

Pump stations should have adequate buffer area for vehicle parking for operational and maintenance vehicles and possible area odor control system. Specific site locations will dictate the exact location and area required for the pump station. The building itself will be less than 10,000 square feet.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Engineers
Planners
Economists
Scientists

April 4, 1995

OPW340.CS.16

Mr. Sydney Keli'ipule'ole
Kamehameha Schools Bishop Estate
567 South King Street, Suite 200
Honolulu, Hawaii 96813

Dear Sydney:

Subject: Supplemental Waialua-Haleiwa Wastewater Facility Plan

Dr. Robert Knight made a cursory review of the draft Supplemental Waialua-Haleiwa Wastewater Facility Plan and EIS Preparation Notice. His review was not in detail and focused primarily on the wetlands portion of the plan.

Based on this review, we have the following comments on the draft Supplemental Waialua-Haleiwa Wastewater Facility Plan and EIS Preparation Notice:

- Treatment wetlands are described in Section 6, beginning on page 145 and continuing through page 155. This information is generally factual and accurate, but does not provide a specific quantitative basis for designing or sizing the proposed facilities at Waialua-Haleiwa.

- Section 8 provides the preliminary design of the recommended combination oxidation pond/wetlands/filter treatment system. Table 8.3 estimates the expected water quality from the individual processes assuming an average flow of 0.7 mgd, and Table 8.7 summarizes the design criteria for the wetland part of the proposed system. As mentioned earlier, there is no quantitative derivation of the estimates in Table 8.3 or the criteria in Table 8.7.

- Using a quantitative (area-based, first-order performance) model recently developed by Drs. Robert Knight and Robert Kadlec with data from the North American Wetland Treatment System Database, an independent estimate of system performance was generated and summarized in the table below. Estimates provided by Hydro Resources International (HRI) are also presented in this table as a basis of comparison.

Projected Wetland Treatment Performance

	BOD5 (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L	Fecal col. (col/100 mL)
Oxidation Pond Effluent (HRI est.)	50	50	25	8	10,000
Wetland Effluent (HRI est.)	2-5	2-5	5	6	100
Kadlec & Knight (in press) est.	22	13	13	5.6	1200
Est. Area (ac) Needed to Meet HRI Goals	> 25	>25	>40	7	>25

- Table 8.3 does not mention what the reporting frequency is for HRI's estimates. Maximum monthly outflow concentrations are likely to be 1.5 to 2.5 times higher than the estimates given in the above table. Also, the estimates of the quality leaving the oxidation pond may be too low for BOD5 and TSS, thereby further underestimating the wetland outflow concentrations.

- The facilities plan may lead the reader to expect some wildlife habitat/public use values from the proposed wetland systems at Waialua and Haleiwa. Based on the undersizing of facilities described above, the resulting high loading rates to the wetlands and their location in a fenced compound, the proposed wetlands will likely not provide any significant habitat for wildlife or humans.

- The construction cost estimate for the wetlands provided in Table 8.10 may be low. The estimate given is within the range of observed costs for these systems in the mainland U.S. Average costs are about $20,000 to $30,000 per acre. Smaller systems cost more per acre, and systems constructed on difficult sites (variable topography) cost even more.

We hope these comments will be of help to you. Please contact me at 943-7135, ext. 221 or Bob Chuck at ext 226 should you have any questions or need additional information.

Sincerely,

CH2M HILL, INC.

Westley K.C. Chun, Ph.D., P.E.
Chief Environmental Engineer

c: Bob Chuck/CH2M HILL/HNL
Ross Kaneko/CH2M HILL/HNL
Bob Knight/CH2M HILL/GNV
Michelle Girts/CH2M HILL/PDX

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4469 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Westley K.C. Chun, Ph.D., P.E.
Chief Environmental Engineer
CH2M-Hill, Inc.
1585 Kapiolani Blvd., Suite 1420
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu. TMKs: 6-2: 6-6 to 6-9

Dear Mr. Chun:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

1. Our design approach for the wetland system is well document and has been used at several sites to produce the level of treatment proposed in the FAC Plan. It is our opinion that the CH2M-Hill approach represents an over design and is not justified on a kinetic basis, an organic loading basis, and/or a hydraulic loading basis. The North American Data Base approach, suggested by CH2M-Hill, is highly variable in terms of predicting effluent quality and estimating land requirements. This data base has uses data from different sizes, different length to width ratios, different influent quality, different emergent areas vs total area, different climatological regions, detrital accumulation/-effect, etc. None of the factors mentioned above, except for temperature, are considered it that approach. We feel much more confident comparing the exact type of secondary effluent in a design equation which considers the length to width ratios, short circuiting, open water, and detrital background contribution. The same design criteria we used for this project was also used by CH2M-Hill for sizing and costing a pond/wetland system in a facility plan for La'ie (March 1995).

2. Our cost estimates are based upon cost estimates we have made on 10 different pond/wetland systems in which we have developed the cost estimates. Three of these systems are on Oahu. We feel quite comfortable with our estimates and the increase costs associated with transportation cost, local labor cost, and equipment cost. We feel that the $100,000/acre cost for constructing ponds is justified, see comment above concerning La'ie.

3. The facility plan is quite clear in stating that the wetlands will be designed to have open water and close water (emergent vegetation) sections. Our design proposes that the system have 25-50% open water. We are not sure what the Bishop Estates representative is referring to from the public meeting concerning a wetland with no habitat. We used an overhead transparency of a typical section of a constructed wetland at the public meeting to describe the proposed alternative treatment units. Figure 6.13 on page 149 of the FAC plan shows this typical arrangement. This typical design is complete with islands that can be used as refugia by waterbirds. The lack of freshwater wetlands and the impact of predators are two of the major limitations on the recovery of waterbird populations on Oahu. The use of small 3-7 acre ponds and wetlands by waterbirds can best be seen on the windward part of Oahu where listed and endangered waterbirds utilize existing prawn aquacultural units and surrounding wetlands, see USFWS Waterbird Recovery Plan.

4. Wetland designed and operated as delineated in this facility plan will not produce odors commonly associated with wastewater treatment plants. The nature of these system minimizes the potential for odor production; long detention time, raw sewage entering lagoon well below water the water surface, and the conditions for biological oxidation of hydrogen sulfide to sulfates make. In many case in California pond/wetland systems are viewed as amenities by developers i.e., Santa Rosa and Arcata. We would like invite Bishop Estate representatives to visit Arcata and other sites on the West Coast to see for themselves these types of system. It is quite justified to be concerned with these issues based upon the limited types of wastewater treatment systems in Hawaii.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

U.S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

January 12, 1995

Planning Division

RECEIVED
'95 JAN 23 A8:23
DEPT OF WASTEWATER MGT.

Mr. Felix B. Limtiaco, Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Limtiaco:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities, Oahu (TMKs 6-2, 6-6 to 6-9). We do not have any comments to offer at this time. However, we will need to review future documents as detailed plans are developed to determine Department of the Army permit requirements as well as flood hazard determinations as required by the Federal Emergency Management Agency.

Sincerely,

Ray H. Jyo, P.E.
Director of Engineering

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

RECEIVED
'95 JUN -2 P4:09
DEPT OF WASTEWATER MGT.

REPLY TO ATTENTION OF

June 1, 1995

Planning Division

Mr. Jared Lum
City and County of Honolulu
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the Draft Facility Plan for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii (6-2, 6-6 to 6-9). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on page 38 of the environmental assessment is correct.

Sincerely,

Ray H. Jyo, P.E.
Director of Engineering

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Mr. Ray H. Jyo, P.E.
Director of Engineering
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Jyo:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that a DA permit will not be required for the project and that the flood hazard information is correct.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

May 18, 1995

. Felix B. Limtiaco, Director
partment of Wastewater Management
ty and County of Honolulu
0 South King Street
nolulu, Hawaii 96813

ar Mr. Limtiaco:

Subject: Draft Facility Plan for the Waialua-Haleiva Wastewater Facilities, Oahu, Hawaii; TMKs: 6-2, 6-6 to 6-9

The Director's Office of the Department of Business, conomic Development & Tourism has forwarded the subject document o our office for review and comment.

We have reviewed the subject document and have the following omments to offer:

1) Section 4.3.3.1 of the subject document (pages 80-81) discusses the State Land Use Law. We wish to note that the citation used on page 81 in regards to Land Use District Regulations is outdated.

The citation used is in reference to regulation that were repealed in 1986 and replaced by administrative rules that were adopted by the Land Use Commission [Chapter 15-15, Hawaii Administrative Rules ("HAR")].

General standards for establishing district boundaries are now defined in Subchapter 2 [HAR §§ 15-15-17 to 15-15-22]. Procedures by which district boundaries may be amended are outlined in Subchapters 5 through 9 [HAR §§ 15-15-34 to 15-15-64]

We have enclosed a copy of the current administrative rules for your information.

3) Figures 4.21, 4.22, and 4.23 (pages 82-84) are zoning maps for the Mokuleia, Waialua, and Haleiva subareas respectively. They do not depict State Land Use District Boundaries established by the Land Use Commission as represented on page 81 of the subject document.

For your information, we have enclosed portions of official Land Use District Boundaries Maps maintained by our office, for the Mokuleia, Waialua, and Haleiva subareas.

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on the draft document.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

:ith

cc: /DBEDT (Di· [redacted]5-058-0) (w/o enclosures)

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Esther Ueda
Executive Officer
Dept. of Business, Economic
Development & Tourism
Land Use Commission
Room 104, Old Federal Bldg.
335 Merchant St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Ms. Ueda:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The State land-use law discussion will be revised to reflect new rules. Figures in the Facility Plan will be revised to reflect State Land Use District boundaries.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED

'95 JUN 19 A10:00

STATE OF HAWAI'I DEPT OF WASTEWATER MGT.

OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

RECEIVED
'95 JUN 19 A7:07
DEPT OF WASTEWATER MANAGEMENT

June 15, 1995

Mr. Felix B. Limtiaco
Department of Waterwater Management
City ard County of Honolulu
650 South King St.
Honolulu, HI 96813

Dear Mr. Limtiaco:

Thank you for the opportunity to review the Draft Facility Plan for the Waialua-Haleiwa Wastewater Facilities, Island of Oahu.

In its present stage, we find the information contained in the plan sufficient and have no objections to the proposed wastewater facility. But we question the rationale of the preparers in not including soils information for the proposed area (p. 1-1). As you are aware, the feasibility of building a wastewater facility strongly depends upon land qualities determining suitability for wastewater management. These qualities include soil permeability, soil depth, water retention capacity, aeration, presence of chemical and/or physical impendances in the soil profile, organic matter content, and other soil properties as well. Lack of information on the subject matter precludes us from ascertaining whether the chosen area is indeed suitable for wastewater management. Please contact me, or Luis Manrique at the Land and Natural Resources Division (594-1935), should you have any questions on this matter.

Sincerely yours,

Dante K. Carpenter
Administrator

LM:lm
cc BOT

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Dante K. Carpenter
Administrator
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813-5249

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Carpenter:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Office of Hawaiian Affairs has no objection to the proposed facility. The Facility Plan and DEIS has complete soil mapping and physical characteristics of the soils. More complete geotechnical data normally is gathered at the design phase of the project when exact sites have been determined.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

HALEIWA MAIN STREET

P.O. Box 878 • Haleiwa, Hawaii 96712
(808) 637-4338

RECEIVED

'95 JUN 28 P4:42

DEPT OF WASTEWATER MGT.

June 26, 1995

Mr. Jared Lum
City & County of Honolulu
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan

The Board of Directors of Hale'iwa Main Street, a non-profit economic revitalization and historic preservation program, has significant concerns regarding the Wastewater Pump System (WWPS) for Hale'iwa as described in the DSWWFP.

The WWPSs described on page 180 under section 8.2, Collection System, are said to be comprised of three major components - wet well, dry well and above ground superstructure - but no specifications are provided as to the precise height, width, or architectural design of the structures. This description also states that the floor of the superstructure will be located above the 100-year flood elevation in order to prevent flooding of crucial pump station components.

The map on page 183 indicates that the WWPS 5 site is on the Kahuku side of the Anahulu Stream, in between the ocean and Kamehameha Highway. With both the stream and ocean in such close proximity, it seems that the 100-year flood elevation would be quite high in this area, thus necessitating the WWPS 5 superstructure to be very tall. If the WWPS 5 is a tall building, it would obstruct the view of the ocean from both directions along Kamehameha Highway and the historic Anahulu Stream Bridge. From aesthetic, historic preservation and commercial perspectives this would be very undesirable for the residents and businesses of Haleiwa.

More information is needed about the impact of flooding on the WWPSs. If the superstructure of WWPS 5 were inundated by flood or tsunami how much damage would result? Would the pump station components be ruined? How much would it cost to repair or replace these components? Wouldn't untreated sewage flowing into the stream or ocean cause a public health hazard and environmental damage? How would the DWWM respond to such an event?

Hale'iwa Main Street's Board of Directors is very concerned with the potential negative impacts that the proposed WWPS 5 could have on the aesthetic, historic, environmental, tourist, commercial and social welfare of Hale'iwa Town. Without more information regarding the precise size, height, appearance, and location as well as the normal and abnormal operations of the proposed WWPS 5, the Board of Directors must object to siting it in the area indicated in the DSWWFP.

I look forward to a detailed response to this letter and the identification of an alternate WWPS 5 site if the above concerns cannot be adequately addressed.

Sincerely,

for Pamela L. Harlow, Program Manager
Malani V. Choy, President
Hale'iwa Main Street Program

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Malani V. Choy, President
Hale'iwa Main Street Program
P.O. Box 878
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Choy :

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Exact location, size, and architectural rendering of pump stations will occur at the next phase of this project. It is important for the designers to have your comments and concerns early in the process. The City and County will incorporate all concerns and requests into the siting and design of the pump stations. The pump stations will be sited and designed to prevent flooding problems. Auxillary power is required at all pump stations.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Pacific Land

RECEIVED
95 JAN 19 P4:10

DEPT OF WASTEWATER MGT

uary 18, 1995

partment of Public Works
istewater Management Division
y and County of Honolulu
) S. King Street
nolulu, Hawaii 96813
tn: Jared Lum

:: Waialua/Haleiwa Wastewater Facilities EIS

ar Mr. Lum:

ur company is the development manager for Mokuleia Land Company, the owner of pproximately 3,000 acres of land on the north shore. We would like to participate in and ovide input in the preparation of the Environmental Impact Statement for the proposed aialua/Haleiwa Wastewater Facility. On behalf of Mokuleia Land Company we have been orking with community groups and individuals in preparing long range development plans r the property and will be pleased to share these with you at a convenient time.

'e would like to be placed on any mailing list regarding this EIS. Please send any formation to our offices at 810 Richards Street, Suite 200, Honolulu, Hawaii 96813. If you ave any questions please feel free to contact me at (808) 528-3699.

est regards,

imo Steinwascher

S:tmk

c: Mr. Bong Shik Kang, Mokuleia Land Company

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Kimo Steinwascher
Pacific Land Services, Inc.
810 Richards St., Suite 200
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Kimo Steinwascher:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted to include Pacific Land Services on a mailing list concerning this project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

June 28, 1995

Chairperson, Board of Agriculture

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96823-2159

FAX: (808) 973-9613

Mr. Felix B. Limtiaco
Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Jared Lum

Fax-it brand fax transmittal memo 7671 | # of pages > 2

To Felix Limtiaco	From Earl Yamamoto
Wastewater Mgt	Dept. of Ag
Water Quality	Phone 973-9466
Fax 527-6214	Fax 973-9467

Dear Mr. Limtiaco:

Subject: Draft Feasibility Plan for the Waialua-Haleiwa Wastewater Facilities
Oahu
TMKs: 6-2; 6-6 to 7-8

The Department of Agriculture has reviewed the subject plan and offers the following comment.

Project Summary

The proposed wastewater treatment plants in Waialua (near Mount Kaala Road) and Haleiwa (near Kawailoa Road and mauka of Ukoa Pond) will be on former sugarcane land and require 35 acres each. The design flow for each facility will be approximately 700,000 gallons per day. The wastewater will be treated to a tertiary (R-1) level and be disposed on agricultural, recreational, and horticultural lands on contract to accept the wastewater. We understand that the State Department of Health allows irrigation of food crops with R-1 reclaimed effluent on a case-by case basis.

The users of the treated wastewater will be serviced by two delivery reclamation lines constructed along Kamehameha Highway and Haleiwa Road, and along Farrington Highway, towards Dillingham Airfield. About 164 acres of contracted users are to be sought. The application rate of the net reclaimed effluent is about 3,400 gallons per acre/day. To date, about 20 to 80 acres of individual property owners have given written interest to use the effluent. Most of the users of the reclaimed effluent will likely be situated adjacent to the delivery lines. If there is an insufficient number of contracted users, the City will consider purchasing all or a portion of the 164 acres needed for irrigation disposal. Annual operations and maintenance costs for both facilities and their delivery reclamation lines can nearly be met at a reclaimed water cost of $0.68 per 1,000 gallons. The current City agricultural water rate is $0.68 per 1,000 gallons. At the end of each of these lines will be a rapid infiltration disposal field for periods when irrigation demand is less than the wastewater production rate.

Comment

It appears that the fully contracted use of the reclaimed effluent would be the most most cost-effective means of disposal. However, at a time when agricultural development is poised to emerge as a significant factor in the diversification of Oahu's economy, we ask you to not consider basing the price of reclaimed effluent on heavily subsidizing the entire operations and maintenance costs of the proposed facilities (estimated at $0.68 per 1,000 gallons). We question whether farmers will choose to enter into reclaimed effluent contracts if the cash savings to them is only $0.04 per thousand and they will still need approval from the Department of Health to use it on crops. Instead, we ask that this new source of irrigation water be priced as an incentive for agricultural users to utilize. For instance, the Department's Irrigation Water Development Program offers surface water for irrigation use on over 4,200 acres on three islands at $0.18 per thousand gallons.

As further enticement for landowners adjacent to the delivery reclamation lines to enter into agricultural and horticultural use contracts, the City should consider providing at-cost and to-the-lot lateral service complete with meter.

Should you have any questions, please call me at 973-9551, or Earl Yamamoto of the Planning and Development Office at 973-9466. Thank you for the opportunity to comment.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

James J. Nakatani
Chairperson, Board of Agriculture
1428 So. King St.
Honolulu, HI 96814

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Nakatani:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that there are other possible reclaimed water pricing structure which could make the reclaimed water more attrative to farmers. The Facility Plan only developed the scenario of pricing reclaimed water using the existing Board of Water Supply agricultural rate as an example of possible cost recovery. Many of the suggestions in your letter are excellent and need to be considered as the plan proceeds toward implementation.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

J. CAYETANO
OF HAWAII

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

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

January 6, 1995

Jared Lum
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

LOG NO: 13588
DOC NO: 9501TD03

Dear Mr. Lum:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities
Kawailoa, Pa'ala'a, Kamananui, Mokule'ia, 'Auku'u, Kikahi, Kawaihapai, Kealia, and Ka'ena, Waialua, O'ahu
TMK: 6-2, 6-6 to 6-9

Thank you for the opportunity to review this EISPN. The proposed Wastewater Treatment Plants (WWTP) are both located in old sugar cane lands where it is unlikely that historic sites will be found. Therefore, we believe that construction of the WWTPs at these locations will have "no effect" on historic sites.

The proposed Rapid Infiltration Sites (RIS) are both located on sandy soils, where the probability of finding historic sites, including human burials, is relatively great. In order to ensure that the RISs and other infrastructure needed to support this project, such as pipelines, do not have an "adverse effect" on historic sites these facilities will require historic preservation review during the planning process, with the first step in that review being an archaeological inventory survey of proposed project areas. In the case of the RISs in particular, planning should be sufficiently flexible that these facilities can be moved if the proposed locations prove to be burial grounds or other historic sites that are significant for multiple criteria.

If you have any questions please call Tom Dye at 587-0014.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

TD:jk

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Don Hibbard, Administrator
State Historic Preservation Division
Dept. of Land & Natural Resources
33 So. King St., 6th Floor
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Hibbard:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Recognizing that the rapid infiltration sites (RIS) are highly probable historic sites, a historic preservation review will occur during the planning process. Historic preservation review will occur at the same time hydrogeological data is acquired at the proposed sites. We have noted that another letter by your department indicates that your Division has no records of historic sites at the treatment plant and rapid infiltration sites. The siting for the RIS is flexible and will allow for moving to alternative sites if significant historic/culture impacts are identified.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

University of Hawaii at Manoa
Water Resources Research Center

MEMORANDUM

3 January 1995

TO: Mr. Felix B. Limtiaco
Acting Director
Department of Wastewater Management
City and County of Honolulu

FROM: Roger S. Fujioka
Director, WRRC

SUBJECT: Comment on EISPN for Waialua-Haleiwa Wastewater Facilities

The proposed plan to build two WWTP plants and to use oxidation ponds, constructed wetlands, slow sand filters, UV disinfection with final disposal of effluent by irrigation and rapid infiltration will be a definite improvement over the existing situation which relies on cesspools. The proposed plan supports existing plans to phase out cesspools and to re-use wastewater. The questions to be addressed in the EIS to be prepared should include:

1) Information on type of aquifer underlying the rapid infiltration field, the possible discharge sites into the ocean and predicted impact on quality of receiving coastal water.

2) Potential problems and solutions related to performance and maintenance of sand filter and rapid infiltration fields.

3) Assurance that effluent will consistently result in expected quality and assurance of less than 1 coliform/100 ml after UV treatment.

4) Some assessment on expected disinfection efficiency of pathogens by UV treatment especially of viruses and protozoa which are known to be more resistant to UV disinfection than indicator bacteria.

5) Assurance that oxidation ponds and especially wetlands are not open to public use since there will be a health risk of pathogens in these waters.

AN EQUAL OPPORTUNITY EMPLOYER

6) Assessment of crops which are suitable for irrigation with reclaimed water as well as means of irrigation to protect health of people and workers.

7) Specific plans for odor control such as size and type of emergency surface aerators, use of odor masking chemicals and wind rose patterns for plant sites.

8) Control plans for use of oxidation ponds and wetlands by insects (flies, mosquitoes) for breeding.

RSF

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WATER RESOURCES & WATER QUALITY SYSTEMS
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(707)822-6674

November 22, 1995

Roger S. Fujioka, Director
Water Resources Research Center
University of Hawaii at Manoa
Honolulu, HI 96822

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Fujioka:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Groundwater aquifers underlying the proposed rapid infiltration (RI) sites are identified in the DEIS. The proposed effluent quality from the treatment site and from the RI sites have been predicted in the Facility Plan and the DEIS. Studies performed on similar soils have shown a high adsorption of phosphorus through shallow soil columns. A prediction will be made of the nutrient levels in the nearshore waters as the effluent commingles with the shallow groundwater flow moving to the ocean.

A facility plan includes factors of treatment process performance and maintenance in evaluating criteria for application. This level of analysis does not include the O/M factors for all the processes included in the evaluation.

Technical data from a wide range of UV installation is included in the Facility Plan and the DEIS. UV pilot study data has also been included in the FAC Plan for an oxidation pond/wetland type system.
UV disinfection efficacy data will be included in the FEIS. DOH reuse guidelines have established UV as a process that meets reuse disinfection standards. The effluent from this system will meet DOH RI reuse guidelines. The oxidation ponds and wetland will be fenced to the public as prescribed by City/County standards.

RI reuse irrigation techniques specify that the reuse installation and all operational requirements are monitored to insure protection to City and County operational staff, agricultural workers, park employees and the public in general.

Odor control for the pump stations, treatment plant influent, and oxidation ponds are covered in the Facility Plan and DEIS. Siting of the treatment plant took into consideration the wind direction and wind speeds as identified by the wind rose found in the DEIS.

Integrated pest management will be employed at the oxidation ponds and wetlands. IPM includes hydraulic control, predatory fish, dragonfly and damselfly habitat, bat habitat, parasitic fungi (BTI), targeted life stage larvicides (methoprene), adulticides (ABATE), etc. Experience has shown than a healthy marsh and open oxidation ponds supports sufficient ecological control for containing nuisance insects. An IPM program will include a wide range of intervention necessary to control targeted insects.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

-421 Waialua Beach Rd.
ialua, HI 96791
ne 19, 1995

RECEIVED
'95 JUN 21 P4:00
DEPT OF WASTEWATER MGT.

. Felix B. Limtiaco, Director
partment of Wastewater Management
ty and County of Honolulu
0 South King Street
nolulu, HI 96813

ar Sir:

on receipt of your letter dated May 24, 1995, I went to the Waialua anch of the Public Library and obtained on loan a copy of the "Draft- pplemental Waialua-Haleiwa Wastewater Facility Plan." All remarks low refer to that Plan. Had I received a copy for my own use to rk, my task would have been easier.

irst and foremost, please do not send out a volume of this type with- it a Glossary. This is very important.

ing the old maps prepared by Belt-Collins in their 1987 study results hard-to-read and out-of-date information. Generally they are poor pies. Use of the color white in Figures 6.2 and 6.3 to denote the e of Cesspools appears to cover more than intended.

ge 134 describing the limits of the centralized system by referring BCA 1957 Facility Plan is of no help, and not justified.

ge 135: Paragraph 3. "The ocean outfall was specified only after e major landowners would not assure the City and County they would dicate land for irrigation." I challenge this statement. Please cument.

ge 147: Wastewater flow to natural wetlands has been a widespread ctice for many years in the United States - more than 50 years. And the United Kingdom it has been used for more than 100 years! Only Hawaii is the method new.

ge 148: "Water hyacinth . . . reported to harbor adult mosquitoes. . . Lemna . . . does a good job in minimizing mosquito populations." od to remember.

ge 150: Arcata, California methods are good examples.

ge 155: Slow Sand Filtration: The Waialua Sugar Co. has been using nd filters for many years to filter out suspended solids. The back sh is automatic. Have you talked to them?

ge 164: Top line: "The use of effluent to irrigate large areas of ops and plants in the planning area is practical if the sugar growers uld allow a dedicated plot to be used." What do you think Waialua gar Co. has been doing for 50 years with the water from the Wahiawa ervoir?

Page 171: Ten thousand square feet (1/4 acre) is too large for a wastewater pump station. Take a look at what the Army has near Kam Highway approximately 300 yards below Dole Packing Plant at Helemano.

Page 174: Table 7.5. Although income from sale of effluent is mentioned on Page 205 and Table 8.13, credit should be shown in Table 7.5.

Page 174: Paragraph 7.2.2.6. Expandability. Note well your statement that the system would be able to expand to treat the wastewater flow for approximately 50,000 people. NOW IS THE TIME TO INCLUDE IN THE PROPOSED SYSTEMS ALL WASTEWATER FROM WAIMEA BAY TO KAWAIHAPAI, for the same reason, i.e., to prevent outflow from cesspools and septic systems to the ocean, thereby preventing pollution of the shoreline.

Page 175: 7.3.1.1. Rural Areas. Environmental impacts will be experienced there. See note above re Page 174, paragraph 7.2.2.6.

Page 181: First paragraph. Flexibility by connecting the WWTP's is an excellent thought.

Page 186: It is interesting to note that the indicated number of cesspools from Waimea Bay to Paumalu (3,152) is exactly the same number as that in Table 5.10 for all of Waialua - Haleiwa. Strange...

Page 188: Design Flows. Conservation of water by use of low-flow toilets and showers fails to consider that most water use is for the irrigation of plants.

Page 196: Paragraph 8.3.11. Staffing Requirement. Sorry to say that in these enlightened times vandals are everywhere. Prudence suggests that at least one person be on duty on weekends with a telephone, at both WWTP's. Waialua plantation experienced vandalism of their irrigation systems.

Page 202: The cost data presented are confusing. Tables 8.9 and 8.11 show land costs of $50,000/acre. Are these realistic costs? Tax office data?

Page 211: Paragraph 10.5.1. Beneficial Effects. The effects are well-presented; however, they should apply to all areas included in the Plan (urban and rural), and that is the reason that the Plan should extend from Waimea Bay to Kawaihapai.

Sincerely yours,

Frederick C. Gross

Frederick C. Gross

Waialua, HI 96791
January 2, 1995

Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Felix B. Limtiaco,
Acting Director, and Mr. Jared Lum

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii.
TMKs 6-2, 6-6 to 6-9

Gentlemen:

In response to your letter WPN 94-1257 dated December 23, 1994, the following comments are submitted:

Pg. 6 Proposed Mitigation Measures should apply to WWPS as well as treating facilities.

Pg. 11 The Proposed Action. Rural area and urban area are not well-defined. What are the criteria for ending collection lines at any particular place?

Pg. 13 Odor control for septage exiting areas should be included here as well as on Page 47, No. 8.

What are the details of the WWPS?

Pg. 14 Effluent disposal. Is all disposal by gravity only? Are take offs to supply effluent for irrigation to be along gravity line and then pumped to the site of use?

Pgs. 23-24, Maps show sewer lines proposed in the Belt Collins's proposal. It is assumed the locations are still valid. However, sizes are not to be the same because of two treatment plants and different direction of collection and disposal.

Pg. 27 Fig. 2.1. The names Kawaihapai and Kawailoa are used in the text (see pg. 26 Par. 2.1 - No Action) but are not located on the map. Residents are keenly interested. See comments above re pg. 11. Where is Kawailoa II?

Pg. 33 2.2.2.1 Size of the proposed pump stations, i.e., 10,000 sq.ft. appears to be much too large. Let's be reasonable.

In paragraph 3 the term SER is used. I cannot find this definition. For convenience, let's include a glossary.

Pg. 38 The first paragraph discusses odor of pumping stations. Odor will not be acceptable. Odor control is not a new problem. It can and must be handled properly - not minimized. You would not permit a "minimized" pump station to be installed up wind of the Mayor's residence.

Pg. 39 The last paragraph on the page says: "Effluent irrigation . . . : . . . the clogging of the irrigation lines is a potential problem." Years ago Waialua Sugar Company had to install sand filters to remove material in the water supply it received from the Wahiawa Reservoir. It is not a new problem.

Pg. 42 The capital cost chart provides for two systems of .7 mgd each. Are the collector trunks sized for expansion?

Pg. 43 Paragraph 2.3.1.5. Monetary. The "No Action" alternative does not discuss legal action by residents for failing to provide adequate "Action." "No Action" might be very expensive, in fact, the most expensive, since it would lead to legal suits followed by actions done in haste to provide a corrective solution.

Pg. 46 Table 2.8. It is believed that No. 8, the energy requirements for WWPS are incorrect.. The longer pumping lines for centralized WWTP should cost more. Please review and rethink what you have here. Also, WWTP are all at the same elevation.

Thank you for the opportunity to present these comments. My telephone number is 637-4056, if you wish to discuss these.

Very truly yours,

Frederick C. Gross
Frederick C. Gross

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 - ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Frederick C. Gross
67-421 Waialua Beach Rd.
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Gross:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Mitigation measures for all identified impacts are discussed in the DEIS. Mitigative features of the collection and wastewater facilities will be further developed during the detailed design phase of the project. The boundary lines for the urban and rural regions of the study area were done in the original Facility Plan and EIS performed by Belt Collins in 1987. This study was not tasked to re-evaluate urban/rural designations and not asked to replan the collection systems. Due to costs, including less populous areas in the system at this time is not advised.

Odor controls for existing septic tank systems are not covered in either the Facility Plan or the DEIS. Septic tanks or cesspools must follow DOH guidelines for maintenance and replacement. Design and operational features for controlling odors are included in the Facility Plan and DEIS.

Wastewater Treatment Plant System details are included in the Facility Plan.

The collection system for the proposed system will be a gravity type system with pump stations and force mains to transport the wastewater to the treatment plants. The treated wastewater gravity flows from the treatment plant to all potential reuse sites below 100 ft elevation. The Belt Collin collection system is the same system as presented in the HRI Facility Plan except for the addition of one new pump station and force mains to the two treatment plants.

Maps in the final Facility Plan and EIS will show Kawaihapai and Kawailoa.

The size of WWPS is dictated by City/County standards. Size includes sufficient space for odor control and operational equipment. Specific site constraints coupled with design modifications can reduce the land requirements for WWPS.

A glossary will be included in the Facility Plan and the FEIS.

The irrigation water used by Waialua Sugar from Wahiawa Reservoir is of considerably poorly quality then the tertiary treated effluent from the system proposed in the Supplemental Facility Plan.

The collection system has expansion capacity built into the pipe sizes and the pump capacity. Since pipes must be designed to handle the peak flows these pipes could handle the increased flow for a greater proportion of time.

The possibility of legal action by concerned citizens will be discussed as it relates to implementability of certain alternatives.

Energy requirements for the proposed alternatives have been made based upon assumptions developed in the Supplemental Facility Plan and DEIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

Jared Lum
Dept of Wastewater Management

...J. CAYETANO
...E HAWAII

'95 JAN -3 P3:03

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DEPT OF ENVIRONMENTAL QUALITY
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 28, 1994

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

DEPUTIES
JOHN P. KEPPELER, II

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

Mr. Felix B. Limtiaco
Acting Director
City & County of Honolulu
Department of Wastewater Management
650 S. King Street
Honolulu, HI 96813

ATTN: Mr. Jared Lum

SUBJECT: Environment Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii, TMKs: 6-2, 6-6 to 6-9, File No. WPW 94-1257

We have received your request for comments for the above subject and have the following comments:

1) The proposed project will not affect the Division of Forestry and Wildlife's programs or projects in the area.

2) Our main concern is the affect of the project on existing wetlands in the area (Ukoa pond, the hasu/taro fields, etc.). The U.S. Fish and Wildlife Service should be consulted in this matter.

Thank you for the opportunity to comment.

Very truly yours,

Michael G. Buck
Administrator

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Michael G. Buck, Administrator
Dept. of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Buck:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The proposed project will not affect any existing wetland sites, including the Ukoa pond. The [illegible] wetland is not impacted by any of the construction requirements associated with this project. A copy of the reports have been sent to the U.S. Fish and Wildlife Service for comments. No comments were received.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

IAIIO

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

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
KANANI HOLT
GLENN M. OKIMOTO
JOYCE T. OMINE
IN REPLY REFER TO:

STP 8.6531

January 6, 1995

. Felix B. Limtiaco
rector
partment of Wastewater Management
ty and County of Honolulu
0 South King Street
onolulu, Hawaii 96813

ttention: Mr. Jared Lum

ear Mr. Limtiaco:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haliewa Wastewater Facilities, Oahu, Hawaii
TMK: 6-2, 6-6 to 6-9

Thank you for your letter dated December 23, 1994, requesting comments on the subject EISPN.

The proposed development is not anticipated to have a significant impact on our State transportation facilities.

Please coordinate the implementation of the development with our Highways Division. Plans for any construction work within the State highway right-of-way must be submitted for our review and approval.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Kazu Hayashida
Director of Transportation
State of Hawaii
869 Punchbowl St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Hayashida:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Plans for any construction work with the State highway right-of-way will be submitted for your review and approval during the design phase of the project. It is noted that the wastewater treatment plants will not impact state highways.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

UNIVERSITY OF HAWAI'I 23 AM 8:43

Sea Grant Extension Service
School of Ocean and Earth Science and Technology
DEPT OF WASTEWAT

DATE: 18 January 1995

TO: Mr. Jared Lum
Department of Wastewater Management
City and County of Honolulu

FROM: Dr. Richard Brock, Researcher
Sea Grant Program, University of Hawaii

SUBJECT: Review of EISPN for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii

The above document was passed on to me for review. I can only comment on the document with respect to ecological impacts. I believe the suggested alternative of the development of a passive wastewater treatment system with water reclamation via irrigation is an ecologically sensible and cost-effective way to deal with wastewater in the Haleiwa-Waialua area. The long term benefit of eliminating most of the cesspool operations in the area by the development of the proposed system is ample reason for its moving forward.

The alternative of using an ocean outfall has the potential for litigation as has been encountered elsewhere.

We appreciate the opportunity to review this document.

Community Outreach and Technology Transfer for the Sea Grant College Program
1000 Pope Road • Room 226 • Honolulu, Hawai'i 96822
Telephone: (808) 956-8191 • Facsimile: (808) 956-2858 • Cable Address: UNIHAW

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Richard Brock, Researcher
University of Hawaii
Sea Grant Extension Service
1000 Pope Rd.
Room 226
Honolulu, HI 96822

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Brock:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS. It is noted that the Sea Grant Extension Service believes the alternative of choice is ecologically sensible and cost-effective.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

JAN 23 9 02

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

LETTER NO. (P)1015.5

JAN 20 1995

Department of Wastewater Management
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Attention: Mr. Jared Lum

Gentlemen:

Subject: Waialua-Haleiwa Wastewater Facilities
Oahu, Hawaii
EIS Preparation Notice

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

RY:jk

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

LETTER NO. (P)1454.5

JUN 20 1995

RECEIVED
95 JUN 21 AM 8:21
DEPT OF WASTEWATER MGT

Mr. Felix B. Limtiaco, Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Attention: Mr. Jared Lum

Gentlemen:

Subject: Waialua-Haleiwa Wastewater Facilities
Oahu, Hawaii
Draft Facility Plan

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 - ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Gordon Matsouka
State Public Works Engineer
Dept. of Accounting & General Services
P.O. Box 119
Honolulu, HI 96810

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2; 6-6 to 6-9

Dear Mr. Matsouka:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the State Department of Accounting and General Services had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

CITY AND COUNTY OF HONOLULU

January 19, 1995

ET 12/94-4737

MEMORANDUM

TO: FELIX B. LIMTIACO, ACTING DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: CHERYL D. SOON, ACTING CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN), FOR THE WAIALUA-HALEIWA WASTEWATER PROJECT

In response to your memorandum of December 23, 1994, we have reviewed the subject environmental impact statement preparation notice (EISPN) and have the following comments to offer:

1. The area being proposed for the Haleiwa wastewater treatment plant (WWTP) is consistent with the sewage treatment plant designation on the North Shore Development Plan Public Facilities Map (DPPFM). Amendments to the North Shore DPPFM would be required to identify the Waialua WWTP, Haleiwa and Waialua rapid infiltration disposal fields, and related wastewater pump stations and sewer mains.

2. Endangered Hawaiian water birds may be attracted to the man made wetlands. The draft supplemental environmental impact statement (DSEIS) should assess if these man made wetlands could negatively impact these endangered Hawaiian water birds and discuss what mitigative measures would be taken to address these impacts.

3. The DSEIS should cite other similarly designed facilities and their operating results.

4. Reference to the Department of General Planning in Section H (I.) of the EISPN should be changed to Planning Department.

5. The DSEIS should elaborate why a 2015 and not a 2020 planning period was used in section 2.2.2.2 of the EISPN. A 2020 planning period would be consistent with the planning timeframe of our upcoming Development Plan revision program. The DSEIS should include the population data used to calculate present and future wastewater flows.

6. Section 1.2.2 of the EISPN should be expanded to include the estimated quantity of sludge that would be generated from the WWTP's operations. The DSEIS should assess what impacts the proposed operation may have on the City's sanitary landfill sites operations.

Should you have any questions, please contact Eugene Takahashi of our staff at 527-6022.

CHERYL D. SOON
Acting Chief Planning Officer

PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU

RECEIVED
'95 JUN 23 A7:56
DEPT OF WASTEWATER MGT

HS 3/95-0989

June 20, 1995

MEMORANDUM

TO: FELIX B. LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: DRAFT FACILITY PLAN FOR THE WAIALUA-HALEIWA WASTEWATER FACILITIES

RECEIVED
'95 JUN 22 P3:14
DEPT. OF WASTEWATER MANAGEMENT

Thank you for giving us the opportunity to comment on your draft Facility Plan for the Waialua-Haleiwa Wastewater Facilities.

The North Shore Development Plan states improvement of wastewater management services as the most important priority for this area. Thus, this proposed project is consistent with the City's planning priorities.

The material presented in the Facility Plan, especially Chapter 5, should be updated to be consistent with the revised Planning Department publications. For example, Table 5.2 can be updated with the September 1, 1994, Development Plan Annual Report (FY 1994) rather than the 1987 Development Plan Status Review. Similarly, the discussion on General Plan population allocation (Section 5.1.2.1) refers to the 1982 General Plan and year 2000 estimates while the 1992 version of the General Plan and 2010 population distribution are available for your use. The enclosed copy of the 1994 Development Plan Annual Report should be helpful. Population projections to the year 2020 are also available to estimate sewage flows. You may contact Steve Young of the Planning Information Branch at 527-6080 for more information.

Please call Rona Suzuki at 527-6076 if you have any questions in this matter.

CHERYL D. SOON
Chief Planning Officer

CDS:lh

Enclosure

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 - ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Cheryl D. Soon, Chief Planning Officer
City/County of Honolulu
Planning Department
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Ms. Soon:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Northshore Development Plan Public Facilities map for the Waialua WWTP will be amended to show all rapid infiltration disposal fields, wastewater treatment sites, pump stations, and sewer mains.

Wetlands do have the potential to attract endangered Hawaiian aquatic fowl. The impact will be viewed as positive in that the wetland habitat afforded by the wastewater treatment system will be an addition to the wetland inventory in the state. Experience has shown no negative impact to wildlife associated with constructed wetlands used to polish secondary effluent from an oxidation pond. Normal water quality tests, dissolved oxygen, temperature, and pH, are used to monitor the status of wetlands. The Facility Plan has operating results from a system similar to the proposed alternative of choice.

Population data is used in the Facility Plan to generate sewage flows (page 100 of the Facility Plan). No sewage sludge will be generated with this alternative. Life-cycle sludge removal from the oxidation pond will on a 30 to 40 year basis.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely yours,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

JAN 25 10:29 FAX 8085234851 HNN AIR QUALITY 001

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

'95 JAN 25 P3:51

DEPT OF WASTEWATER M.

TY HARRIS

DONA L. HANAIKE
DIRECTOR

ALVIN C. AU
DEPUTY DIRECTOR

January 23, 1995

TO: FELIX LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

ATTENTION: JARED LUM

FROM: DONA L. HANAIKE, DIRECTOR

SUBJECT: COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN) FOR THE WAIALUA-HALEIWA WASTEWATER PROJECT

Thank you for providing us with this opportunity to comment on the EISPN for the Waialua-Haleiwa Wastewater Project. We support the efforts of your department to improve the treatment of sewage generated by the Haleiwa-Waialua community.

We have questions about the rapid infiltration disposal fields located at the terminus of the reclaimed water lines that are intended to dispose of the unused reclaimed water. We are interested in a more thorough description of the technology that will be used and the impacts of these fields on the subject property as well as adjacent lands.

We note that rapid infiltration field number 2 appears to be located in very close proximity to our Kaiaka Beach Park. Do you anticipate any direct impact by these fields on the park?

Thank you for the opportunity to review the EISPN. We look forward to continuing as a consulted party in this project.

If you have any questions, please contact John Horihara of our Advance Planning Branch at extension 4246.

For DONA L. HANAIKE
Director

DLH:ef

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Dona L. Hanaike, Director
City and County of Honolulu
Dept of Parks and Recreation
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Dona Hanaike:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS

Details of the rapid infiltration fields can be found in both the DEIS and the Facility Plan. The rapid infiltration field will have no impact on Kaiaka Beach Park as proposed in the Facility Plan. Tertiary effluent (R-1) can be used to irrigate public access areas.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

'95 JAN 31 P3:03

Patrick T. Onishi
DIRECTOR

94-09125(JT)

January 25, 1995

MEMORANDUM

TO: FELIX B. LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: PATRICK T. ONISHI, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
WAIALUA-HALEIWA WASTEWATER PROJECT

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

1. The proposed wastewater treatment plants will require Conditional Use Permits, Type 1 for Utility Installations, Type B and State Special Use Permits.

2. The proposed rapid infiltration sites are located in the Special Management Area (SMA). We concur with the EISPN (page 8) that Special Management Area Use Permits will be required.

3. Portions of the reclaimed water lines installed along existing corridors (roadways) will be located within the SMA, but are not defined as "development" and is therefore exempt (Section 25-1.3 [2][M], Chapter 25, Revised Ordinances of Honolulu) from SMA regulations.

4. We concur with the EISPN (page 8) that the project must conform with the National Flood Insurance Program.

5. The EISPN notes on page 8 that the project will require a Shoreline Setback Variance (SV). Based on the information provided in the EISPN, we are unable to verify this statement. The Draft Environmental Impact Statement (DEIS) should identify whether the project will encroach within the 40-foot shoreline setback. If so, an SV will be required. In addition, if any work is proposed within 55 feet of the shoreline, a certified shoreline survey should also be included.

2 09 89 10:28 FAX 4089231881 WWB WTR QUALITY 2002

FELIX B. LIMTIACO, DIRECTOR
Page 2
January 25, 1995

6. The DEIS should define all abbreviations and explain their significance. For example, SS and NTU appear in the document on page 40, but are not defined.

7. The description of the rapid infiltration fields should include conceptual drawings, including sections, to illustrate their operation.

Thank you for the opportunity to comment on this project. Should you have any questions, please contact Joan Takano of our staff at 527-5020.

PATRICK T. ONISHI
Director of Land Utilization

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Patrick T. Onishi, Director
City and County of Honolulu
Dept. of Land Utilization
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Onishi:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that conditional use permits Type 1, Type B, and state special use will be required. A Special Management Area permit will be required for the rapid infiltration sites. The project will not encroach within 55 feet of the shoreline. All abbreviations are included in a glossary in the DEIS. Drawings of the proposed rapid infiltration system are in the DEIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

95-0097

'95 JAN 24 P1:44

CHARLES O. SWANSON
DIRECTOR

DEPT OF WASTEWATER MANAGEMENT

TE-5712
PL94.1.388

January 13, 1995

MEMORANDUM

TO: FELIX B. LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: CHARLES O. SWANSON, DIRECTOR

SUBJECT: WAIALUA-HALEIWA WASTEWATER PROJECT
ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE (EISPN)
TMK: 6-2, 6-3, 6-7, 6-8, 6-9

This is in response to your memorandum WPW 94-1257 dated December 23, 1994 requesting our comments on the subject EISPN.

Based on our review, we have no objections or comments to offer at this time. Construction plans for all work within the City's right-of-way should be submitted to us for review. A traffic control plan should be included in these plans.

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

CHARLES O. SWANSON

95-1125

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

RECEIVED
'95 JUN 23 A8:19
DEPT. OF WASTEWATER MANAGEMENT

TE-2432
PL95.1.169

June 23, 1995

MEMORANDUM

TO: FELIX B. LIMTIACO, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

FROM: CHARLES O. SWANSON, DIRECTOR

SUBJECT: WAIALUA - HALEIWA WASTEWATER FACILITIES
DRAFT FACILITY PLAN
TMK: 6-2, 6-6 TO 6-9

RECEIVED
'95 JUN 23 A9:24
DEPT OF WASTEWATER MGMT
OFFICE OF THE DIRECTOR

This is in response to your memorandum WMC 95-365 dated May 12, 1995 requesting our comments on the subject draft Facility Plan.

Based on our review, we have no objections or comments to offer at this time.

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

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Charles O. Swanson, Director
City and County of Honolulu
Dept. of Transportation Services
711 Kapiolani Blvd., Suite 1200
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Swanson:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

Construction plans including a traffic control plan, will be submitted for your comments and approval at the appropriate time.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BUILDING DEPARTMENT

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

94-4942

RECEIVED

'94 DEC 29 P4:42

RANDALL K. FUJIKI
BUILDING SUPERINTENDENT

DEPT OF WASTEWATER MGT

PB 94-1341

December 29, 1994

MEMO TO: DEPARTMENT OF WASTEWATER MANAGEMENT

ATTN: JARED LUM.

FROM: RANDALL K. FUJIKI
ACTING DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR THE WAIALUA-HALEIWA WASTEWATER PROJECT

This is in response to your memo dated December 23, 1994. We have reviewed the subject document and have no comments to offer at this time.

Thank you for considering us in your review process.

RANDALL K. FUJIKI
for Acting Director and
Building Superintendent

cc: G. Tamashiro

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Randall K. Fujiki
City and County of Honolulu
Acting Director & Bldg. Superintendent
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu.
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Fujiki:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wallaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Building Department had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

January 26, 1995

RAYMOND H. SATO, Acting
Manager and Chief Engineer

TO: FELIX B. LIMTIACO, ACTING DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

ATTN: JARED LUM

FROM: RAYMOND H. SATO, ACTING MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF DECEMBER 23, 1994 ON THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN) FOR THE WAIALUA-HALEIWA WASTEWATER FACILITIES PLAN

Thank you for the opportunity to review and comment on the EISPN for the proposed project. We have no objections to the wastewater facilities plan.

We have the following comments to offer:

1. The sites that are proposed for irrigation with the treated sewage effluent relative to existing water sources should be specified in the Draft Environmental Impact Statement (DEIS). Although the effluent will be designed to meet State Department of Health (DOH) R-1 guidelines, there is still concern over its possible use in the No-Pass Zone or in areas where there are existing potable groundwater sources. The DEIS should provide supporting discussion assessing the potential for contamination of groundwater supplies. The effluent discharge locations should be coordinated with the State DOH.

2. There should be further discussion on the design of the oxidation ponds and wetlands. Any seepage and or percolation of untreated or partially treated sewage may contaminate the underlying aquifer.

3. We have no water facilities in the vicinity of the proposed wastewater treatment plants. Water mains with fire hydrants should be installed to provide adequate fire protection. The service limit for the area is the 125-foot elevation. The development plans, including the proposed water facilities improvements, hydraulic calculations, and water requirements should be submitted for our review and approval.

Felix B. Limtiaco
Page 2
January 26, 1995

4. Sewage Pump Stations (SPS) #1, 2, 5 - The existing water system is presently adequate to accommodate the proposed facilities.

   SPS #3, 6 - A fire hydrant must be installed within 125 feet of the proposed pump stations.

   SPS #4 - The existing water system can only provide a flow of approximately 1,200 gallons per minute (gpm). Therefore, the necessary water system improvements should be installed to provide 2,000 gpm to the proposed site.

5. There are no Board of Water Supply (BWS) water meters serving the project sites.

6. The availability of water will be confirmed 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.

7. BWS approved reduced pressure principle backflow prevention assemblies are required to be installed immediately after all water meters serving any sewage handling or effluent disposal site(s).

8. Page 46 - BWS Rules and Regulations, not City Ordinance, require the use of nonpotable water for irrigation of large landscaped areas when such a source is available.

9. Page 11 - The replacement requirement is for showerheads using greater than 2.5 gpm, not 2.0 gpm.

If you have any questions, please contact Barry Usagawa at 527-5235.

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

aymond H. Sato, Manager & Chief Engineer
ity/County of Honolulu
oard of Water Supply
0) So. Beretania St.
onolulu, HI 96843

ubject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2; 6-6 to 6-9

ear Mr. Sato:

he following letter is a response to your comments on the Draft Facility Plan/EIS for the ailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Supplemental Facility Plan and DEIS include maps showing the rapid infiltration (RI) sites in elationship to the BWS no-pass line and the caprock aquifer protection UIC line. Cross-sections of he sub-geology in the regions of the proposed RI sites are shown in the Supplemental Facility Plan and DEIS.

A correction will be made stating DOH's authority to regulate the No-pass line. The BWS advisory ole will added to the narrative concerning the No-pass line.

Full design features of the wetlands and oxidation ponds will be include in the next phase of the project. Conceptual plans are included in the Supplemental Facility Plan showing liners under the oxidation ponds and the wetlands. Costs for these components are included in the detailed construction cost estimates in the Supplemental Facility Plan.

A map showing groundwater wells and shafts in the down gradient proximity of the treatment plants will be added to DEIS. The potential impact of the treatment plant and the disposal sites on groundwater will be discussed.

The siting of the plants at the 120-140 ft. contour is based upon an attempt to optimize the cost of pumping. Since wastewater flows continuous and the need for reclaimed wastewater is demand driven the raw wastewater should be pumped while the reclaimed wastewater should be gravity flow. Reclaimed water line installation and construction have a thorough set of conditions to minimize the potential for cross-connections and accidental consumption. UV disinfection technology is highly effective in denaturing Polio Type II virus and the other viruses typically found in wastewater. A discussion of UV efficacy on cysts will be included in the report.

It is assumed pathogenic bacteria and viruses are present prior to UV disinfection. The Uniform Plumbing Code requirements are noted as stated in your letter.

The treatment system is designed to handle rainfall conditions in several ways. The long detention time in pond/wetland volume allows for effluent flows to be modulated. The freeboard on the oxidation ponds allows for up to 3 weeks of no discharge at peak flows.

It is so noted that the BWS formulated Pass/No-Pass line and the State Department of Health administraters the underground injection control line and the Pass/No-Pass lines. The wastewater treatment plants will be lines since they are mauka of the No-Pass and UIC lines. The potential impact to groundwater contamination will be included in the FEIS.

This Supplemental Facility Plan was not tasked to evaluate improvements in the water infrastructure.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

RECEIVED
'95 MAY 23 P4:10
DEPT OF WASTEWATER MGT.

May 19, 1995

Mr. Jared Lum
Division of Water Quality
Department of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Subject: Draft Facility Plan for the Waialua-Hale'iwa Wastewater Facilities
Oahu, Hawaii
TMKs 6-2, 6-6 to 6-9

The staff of the U.S. Geological Survey, Water Resources Division, Honolulu, Hawaii, has reviewed the subject Draft Facility Plan, and we have no comments to offer at this time.

We are returning the document for your future use.

Thank you for allowing us to review the Draft Facility Plan.

Sincerely,

William Meyer
District Chief

Enc.

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

William Meyer
District Chief
US Department of the Interior
U.S.G.S
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Meyer:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that USGS had no comments.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

RECEIVED 95-0110 — DK
To: WA/HA/RN

BENJAMIN J. CAYETANO
GOVERNOR
HELEN F. MAYA
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

'95 JAN 24 P1:22

DIRECTOR'S OFFICE
Central Pacific Plaza, 220 South King Street, 11th floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 586-2355
Fax: (808) 586-2377

12. 1/31/95
N fo
KS

January 10, 1995

'95 JAN 13 9:28

Mr. Felix B. Limtiaco, Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Limtiaco:

The Department of Business, Economic Development and Tourism is pleased to submit the enclosed comments on the Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii, TMK Nos.: 6-2, 6-6 to 6-9.

The comments were provided by the Land Use Commission. Questions regarding these comments may be directed to Esther Ueda, LUC Executive Officer at 587-3826.

Thank you for the opportunity to comment.

Sincerely,

Rick Egged
Interim Director

Enclosure

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4409 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

Rick Egged
Interim Director
State of Hawaii
Dept. of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Egged:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the sites for the two WWTPs, rapid infiltration site 1, wastewater pump station 1. 2, and 6, and various gravity sewers/force mains are in a designated agricultural district. It is also noted that rapid infiltration site 2, wastewater pump station 3, 4, and 5, and various gravity sewers/force mains are in a designated urban district. A map will be provided to show these areas. A special use permit will have to be approved from the State Land Use Commission for the two WWP sites.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

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

RECEIVED
'95 FEB 14 P2:35
DEPT. OF WASTEWATER

PETER A. SYMINGTON, PH.D.

958100

February 1, 1995

Mr. Felix B. Lintiaco
Acting Director
Department of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Attn: Jared Lum

Dear Mr. Lintiaco:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Waialua-Haleiwa Wastewater Facilities, Oahu, Hawaii
TMK Nos. 6-2, 6-6 to 6-9

The following documents were submitted to the Department for review and comment:

A. Letter, dated December 23, 1994; and

B. Environmental Impact Statement Preparation Notice for the Waialua-Haleiwa Wastewater Facilities.

The Wastewater Branch staff reviewed and evaluated the above-mentioned documents on their conformance to Chapter 11-62 Of the Hawaii Administrative Rules and the Guidelines for Use of Reclaimed Water dated November 22, 1993. The following are the Departments comments.

1. Page 14. Effluent Disposal. The following are the requirements for R-1 Water:

"R-1 Water (Significant reduction in viral and bacterial pathogens)" means reclaimed water that is at all times oxidized, then filtered, and exposed, after the filtration process, to a disinfection process that limits the concentration to the following criteria:

A. The median number of fecal coliform values shall not exceed 1 per 100 milliliters as determined from the bacteriological results of the last seven days for which analyses have been completed; and

B. Any one sample shall not exceed a fecal coliform value of 4 per 100 milliliters.

2. Page 15. Implementation Schedule. Engineering reports and submittals for Reclamation Treatment Facility shall conform with the provisions of Chapter VI of the DOH Guidelines for the Treatment and Use of Reclaimed Water dated November 22, 1993.

If you need additional information or clarification, please call Tomas Sou at 586-4298.

Sincerely,

JAMES K. IKEDA

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 - ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

November 22, 1995

James K. Ikeda
Acting Deputy Director of
Environmental Health
State Department of Health
P.O. Box 3376
Honolulu, HI 96801

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan/EIS
Waialua, Oahu, TMK:6-2:6-6 to 6-9

Dear Mr. Ikeda:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS. It is noted that the R-1 water reclamation guidelines are:

1) "mean reclaimed water that is at all times oxidized, then filtered, and exposed, afater the filtration process to a disinfection process that limits the concentration to the following."

   a. median numbers of fecal coliform values shall not exceed per/100ml as determined from the bacteriological results of the last seven days.

   b. any one sample shall not exceed a fecal coliform value of 4/100 ml.

2) Engineering reports and submittals for reclamation treatment facility shall conform with the provisions of Chapter 11 of the DOH Guidelines for the Treatment and Use of Reclaimed Water dated November 24, 1993.

The treatment alternative as described in the Facility Plan will meet R-1 guidelines.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jaren Lum
Dept. of Wastewater Management

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Gregory G. Y. Pai, Ph.D.
Director
Office of State Planning
P.O. Box 3540
Honolulu, HI 96811-3540

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu,
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Pai:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the author states that the proposed wastewater facility will be an improvement over existing conditions and will protect and preserve coastal resources while minimizing potential health problems.

It is recognized that in 1992 the state completed a review of all lands in the state as to their compatibility to urban development and sensitive natural resources. The areas of reclassification and highlighting are areas which are covered in the existing EIS.

The concept of a closed-loop system is an excellent suggestion and should certainly be considered as the system is fully developed. The liquid side of the system has a closed-loop component reclamation. The solids separated from the raw wastewater will accumulate and digest in the deep section of the first oxidation pond. At present no processes are in line to separate and treat these.

The full details on the relationship between the DOH R-1 guidelines and the No-pass line conflicts have been discussed in detail with the two agencies. The R-1 reclaimed water allows for indirect groundwater recharge. The irrigation guidelines require that only the agronomic water application rate can be applied to crops. The agronomic applicatoin rate allows only for supplying sufficient water to meet the evapotranspiration requirements. If, for some reason, water moves past the root zone the water is of high enough quality to allow for groundwater recharge (with the treatment of moving through 10' to 100' of soil).

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

Ref. No. Z-0020

February 1, 1996

The Honorable Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Soon:

We reviewed the Draft Environmental Impact Statement (DEIS) Supplemental Waialua-Hale'iwa Wastewater Facility Plan and offer the following comments.

The proposed wastewater facility will definitely be an improvement over the existing cesspool operations in the area. The facility would protect and preserve coastal resources and minimize potential health problems in this heavily used recreational coastline. However, a discussion of the potential growth-inducing impacts of this project should be provided. With the demise of sugar cultivation statewide, investments in infrastructure development in proximity to prime agricultural lands need to consider whether urbanization is desirable in these locations or consistent with existing planning documents.

In 1992, we completed a comprehensive review of all lands in the State, which culminated in a report that identified lands suitable for future urban expansion as well as areas containing sensitive natural resources. However, the DEIS does not reference this review. A number of recommendations in the report (see enclosed excerpts) relate to streams and wetlands. Therefore, the Final EIS should recognize the State Land Use District Boundary Review recommendations, the effects the proposed project might have upon the identified resources, and mitigation measures that may be necessary.

The Final EIS should consider the costs and benefits of creating a closed-loop system for the proposed wastewater treatment facility. Can the design of the facility be changed to produce products such as liquid plant food, organic fertilizer, potting soil, and fuel in the form of a methane hydrogen gas? Energy will continue to be a growing concern. Fuel generated by the facility to power the operation would ensure a closed system and lessen the chance of sewage backup in the event of power failures. Other by-products could help decrease the cost of fertilizer in this agricultural region and perhaps generate revenue through direct sales to the public.

The Final EIS should also provide more detail about the reuse and application of treated effluent from the project and the location of application sites. Further, clarification is needed on the relationship between State Department of Health (DOH) R-1 guidelines for treated effluent and County concerns over possible use in the No-Pass Zone or in areas where there are existing potable groundwater sources.

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) Supplemental Waialua-Hale'iwa Wastewater Facility Plan. If there are any questions, please contact Chris Meller at 587-2845.

Sincerely,

Gregory G.Y. Pai, Ph.D.
Director

Enclosure

cc: Office of Environmental Quality Control
Department of Wastewater Management
Hydro Resources International

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Stewart Ring
68-703 Crozier Drive
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Ring:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

This letter confirms your support of the oxidation pond/wetland/reuse alternative for treating wastewater on the North Shore.

It is also noted that you urge appropriate government agencies to construct this system to protec the North Shore's quality of life.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Stewart A. Ring
68-703 Crozier Drive
Waialua, HI 96791
(808) 637-9241

21 April 1996

Mr. Felix B. Limtiaco, Director
Department of Wastewater Management
650 South King Street, 3rd. Floor
Honolulu, HI 96813

Dear Mr. Limtiaco,

As a follow up to the Notice of Public Hearing in the 14–15 March 1996 "Honolulu Advertiser" which gave notice of the 30 April 1996 meeting to solicit comments about the recommended amendment to the Waialua-Hale'iwa Facilities Plan, I submit the enclosed.

Since I do wish to present a statement in person, please accept the enclosed as my proposed comments. I have a request to make of you: I would very much prefer to offer my comments towards the end of the statements portion of the meeting, rather than at the beginning. Thank you in advance for your consideration.

With best wishes,

Sincerely,

Stew Ring

Bcc: Mike Bailey
Bob Gearheart ←
Larry McElheny
Ken Newfield

Bob –
Thought you might like to have a copy.
Best regards,
Stew

TALKING POINTS OF STEW RING, MOKULEIA COMMUNITY ASSOCIATION, 30 APRIL1996

We have serious sewage problems on the North Shore - which will likely get worse

Three alternatives have been considered to deal with our sewage problems:

1) No Action - Live with our overflowing cesspools - with increased hazards to public health and increased pollution of our near-shore waters. This is clearly not an acceptable choice

2) Construct a Standard Urban WWTP - and use a sequential batch reactor and an ocean outfall, like the ones already on O'ahu - which discharge raw sewage into our streams and ocean waters If it rains too hard or If there's an operator error or If there's an equipment malfunction or If there's a power outage and emergency generator failure

3) Support the Alternative recommended by the City & County's Department of Wastewater Management in the Amendment: to use oxidation ponds, constructed wetlands and irrigation and rapid infiltration

It's probably useful to make a quick comparative assessment of the pluses between the standard batch reactor and the C&C's recommended alternative in the Amendment:

The batch reactor system

- Uses less land
- With its ocean outfall can better handle massive amounts of wastewater from other uphill locations, such as Schofield Barracks and Wheeler and Wahiawa

The recommended wetlands alternative

- Costs considerably less, even including the acquisition of additional land
- Conserves our precious, and limited, fresh water for agricultural reuse
- Better preserves and improves the Quality of North Shore life because it:
  - Is more reliable and less likely to result in sewage spills and discharges
  - Better protects public health from disease and infection
  - Is friendlier to the environment concerning air, water and "smell" pollution
  - Preserves beaches and water for surfing, swimming, fishing and other sports
  - Improves the North Shore as a world-class tourist and sports attraction

I believe the reasons are compelling why all of us – and why everyone who cares about the North Shore – should strongly support the Amendment to the 1987 Waialua-Hale'iwa Facilities Plan and that we should urge appropriate governmental agencies to construct, as a matter of priority, wetlands wastewater treatment plants on the North Shore as the best means to resolve Hale'iwa's and Waialua's wastewater problems and to protect the North Shore's quality of life. Thank you very much.

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Castle Cooke Land Company
P.O. Box 2990
Honolulu, HI 96802

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu,
TMKs: 6-2: 6-6 to 6-9

To Whom It May Concern:

The City and County will make every effort to negotiate with land owners for land to be used for the wastewater treatment plants and the rapid infiltration sites. A wide range of alternatives exist in terms of the benefits derived by the City and County of Honolulu and any proposed land owners. Condemnation of land for public service is considered only when all other means have been thoroughly exhausted. The proposed alternative system (14,000 population) can be easily and inexpensively upgraded to handle a greater capacity. Aerators can be added to the lagoons, doubling the population proposed to be served in the Facility Plan (28,000 people for both systems). Additional treatment capacity can be added on the footprint of the proposed system allowing for further increased capacity. The lagoons can be used for irrigation storage and equalization if these scenarios materialize. An informal survey was made of individual land owners/leasees in the service region as to their willingness to use reclaimed wastewater for irrigation purposes. Approximately 60 acres was identified in this cursory field sample. It is not appropriate at this level to develop formal or informal relationships with potential users of the reclaimed wastewater.

The City and County requires the use of reclaimed wastewater, when available, for irrigation purposes. It is important to differentiate between poorly designed and operated wastewater treatment plants and properly designed and operated treatment plants when it comes to odor production. Most odors are produced at WWTP in the solids separation, handling, treatment, storage, and disposal processes. The oxidation pond system incorporates all of the steps into one step. Once the sewage (with solids) enters the ponds below the surface, the solids are then concentrated and reduced in volume by decomposition. A layer of oxygenated water overlies this process converting odoriferous gas to salt. The design of the system allows for recycling oxygenated waters from the final pond to the influent pond, if needed. Also see reply to Bishop Estates - CH2M-Hill concerning this issue.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

2196-0359

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Gary S. Bignami
68-205 Waialua Beach Rd.
Waialua, HI 96791

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu,
TMKs: 6-2: 6-6 to 6-9

Dear Mr. Bignami:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Supplemental Facility Plan/EIS was not tasked to re-evaluate the collection system proposed by Belt Collins in the initial documents. The original Facility Plan included the areas of your concern based upon existing and proposed land use patterns and based upon their proximity to the central areas of concern. There are always situations, when sewering an existing community, where cost effectiveness issues arise. Commities normally view these inequities as shared environmental and health benefits.

The pump station design details concerning exact location, archetectural style, nois abatement, and odor control will be handled at the desing phase of the project.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

CPO / Dept Corres

Gary S. Bignami
68-205 Waialua Beach Rd.
Waialua, Hawaii 96791

February 6, 1996

Mr. Jared Lum
City and County of Honolulu
Department of Wastewater Management
650 S. King St. - 3rd floor
Honolulu, HI 96813

Dear Mr. Lum:

I am a resident and homeowner in the Waialua-Mokuleia community. In reference to the Waialua-Haleiwa Wastewater facility draft EIS, I believe that there are a few areas that are not adequately addressed.

My view of the proposed plan is that portions of the system may not be required, and that substantial cost savings could be incurred by eliminating the sewering of the Mokuleia Agricultural Subdivision and Crosier Drive. This area is sparsely populated, and the cost of upgrading sewerage by requiring the use of septic tanks (as opposed to cesspools) would be far less costly to the individual homeowners and taxpayers-at-large than installation of an additional pumping station and miles of sewering. This area has sandy soil and good drainage for such systems. Furthermore, it appears that the pumping station proposed for the end of Waialua Beach Rd./beginning of Crozier Dr. would not be necessary if the region beyond Waialua Beach Rd. were not sewered.

Regarding the aforementioned pumping station, I am concerned that there has been inadequate discussion of the means of odor control and the potential for noxious odor release; noise control and noise potential; and sewage spill control in an emergency. Would sewage spillage occur, for example, if a backup generator failed following a power outage?

There is no doubt that there are many areas of the North Shore that desperately need improved means of sewerage. However, I believe that the sewering of the Crozier Drive area is not needed, and eliminating this portion of the plan would lead to reduced environmental impact and substantial cost savings.

Sincerely yours,

Gary S. Bignami

cc: City and County of Honolulu, Planning Department
Hydroresources International

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Stephen T.C. Ching
Chief
Dept. of Wastewater Management
City and County of Honolulu
Division of Planning & Service Control
650 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'Iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Ching:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'Iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Department of Land Utilization should confirm the land cost used in the Facility Plan/DEIS. These costs were arrived at by the consultant in discussions with several major land owners in the area. It is hoped that the costs are conservative and reflect the highest cost.

The no-action proposed for the rural areas still requires replacement of failing cesspools and the gradual installation of septic tanks as ownership changes.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

DEPARTMENT OF WASTEWATER MANAGEMENT
CITY AND COUNTY OF HONOLULU
DIVISION OF PLANNING & SERVICE CONTROL
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

96 JAN 25 A10:30

JEREMY HARRIS
MAYOR

DEPT OF WASTEWATER MGMT
DIVISION OF WATER QUALITY

FELIX B. LIMTIACO
DIRECTOR

STEPHEN T.C. CHING
CHIEF

WPP 96-46

January 25, 1996

MEMORANDUM

651

TO: MR. ELDON FRANKLIN, CHIEF
DIVISION OF WATER QUALITY

FROM: STEPHEN T.C. CHING, CHIEF
DIVISION OF PLANNING AND SERVICE CONTROL

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE SUPPLEMENTAL WAIALUA-HALEIWA WASTEWATER FACILITY PLAN

Our review comments on the subject draft EIS are provided as follows:

rel

Table 2.6, the unit cost used in the acquisition of private land in the estimated breakdown of 1995 total capital costs should be confirmed by Department of Land Utilization. The breakdown should also include the cost of 70 acres for the WWTP sites, 2 acres for rapid infiltration disposal sites and 1.5 acres for the wastewater pump stations sites.

The no-action proposal for the rural areas is contrary to the State DOH long range goal of eliminating use of cesspools by the year 2000.

The above no-action proposal requires installation of low flow indoor plumbing and removal of garbage grinder to optimize operation of the existing facilities. How will this change be implemented?

Should there be any questions, please contact Carl Arakaki of the Planning Branch at extension 4871.

for STEPHEN T.C. CHING
Chief

WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Jerry Vresenga
President
Dole Food Co. Hawaii
1116 Whitmore Ave.
Wahiawa, HI 96786

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Vresenga:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that Dole Food Company Hawaii feels that the alternative proposed in the DEIS will have a beneficial effect on the Waialua community. It is also noted that you feel the loss of the land required for the facility will not have a negative impact on agriculture in the community. It is noted that vegetable producers have leased land in the vicinity of the proposed facilities and would have a less costly water supply from the water reclamation facility compared to the existing well water.

The comment about the process is well taken. Field maps identifying the location of the proposed treatment facility and rapid infiltration site were not available at the time of the preparation of the Facility Plan. Considerable leeway exists for the exact siting of the treatment plant and the rapid infiltration site.

Specific locations of these areas will be the first task in the pre-design phase of this project. The rapid infiltration site requires approximately 1 acre, but can be configured in a variety of geometric configurations.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert Gearheart

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

Dole Food Company Hawaii
1116 Whitmore Avenue • Wahiawa, Hawaii 96786

WR 96-027

January 29, 1996

Mr. Felix Limtiaco
Dept. of Wastewater Management
City and County of Honolulu

Subject: Comments on Draft EIS Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Oahu, Hawaii TMK's 6-2, 6-6 to 6-9

Dear Mr. Limtiaco,

What follows are the comments from Dole Food Co. Hawaii and the Waialua Sugar Company on the above subject. We would like restrict our comment to the Waialua Facility since this Facility and the disposal site is located on Dole Food Co. land.

1. In general we feel that such a facility would have a beneficial effect for the Waialua community.

2. While we are in a transition from sugar cane to diversified agriculture, we do not feel that the loss of these lands would have a negative impact on agriculture in our community. In fact, we are leasing lands to vegetable producers in the vicinity of the proposed facility and tertiary water could be less expensive than well water currently used.

3. My only problem with the project is that of process. Trying to the facility plan and TMK's to our field maps is not an easy task and we lease land and make our plans based on our field maps. We need more and better communication. The site of the treatment plant appears to be in a field we have programmed for fruit production and the rapid infiltration site looks to be located on land we have already leased to a third party. If rapid infiltration does not take a large area this will not be much of a problem. This uncertainty would not exist with proper communication.

Once we resolve the minor problems brought up in item 3, we will be happy to help you in any way to promote the project. If you have any comments or questions please feel free to contact me at 621-3200 or contact Mr. George Wada at 621-3201.

Sincerely,

Jerry D. Vriesenga
President

cc: GTWada

Phone (808) 621 - 3200 Fax (808) 621 - 7410

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 - ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Xavier Martin
66-189 Waialua Beach Road
Hale'iwa, HI 96712

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Martin:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

It is noted that the Paalaa-Kai Community and Home Owner's Association support the proposed alternative in the DEIS. It is also noted that the Association is not in favor of expanding the Paalaa-Kai wastewater treatment plant.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jaren Lum
Dept. of Wastewater Management

Xavier J. Martin ... 12/29/95 10:25 AM

66-189 Waialua Beach Road
Haleiwa, HI. 96712
December 29th, 1995

Mr. Jared Lum
Dept. of Wastewater Management
659 S. King Street
Honolulu, HI. 96813

Aloha Mr. Lum:

On behalf of the Paalaa-Kai Community and Home owners Association I would like to thank you for NOT expanding our "plant".

Having read the original proposal earlier this year, my only comment is; "we should have started this last week". Although there may be some refinements to the EIS for the Waialua-Haleiwa Wastewater Facilities, this project should receive the highest priority. I noticed that the Wahiawa-Schofield area is also looking into the "Wetland" concept...."its time is here and now" and we should proceed as fast as possible.

I look forward to meeting you again when you have additional meetings involving this project, please keep us informed, as the Chairman of the Paalaa-Kai Community & Home owners Association Wastewater Committee (of one), thank you again for not expanding the Paalaa-Kai plant.

Warmest regards,

Xavier J. Martin
cc:Richard Gallus, Pres.
Paalaa-Kai Community &
Home owners Assn.

XJM/XJM

12/29/95 10:26 TX/RX NO.3289 P.001

HYDRO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(707)822-6674

May 22, 1996

Roy S. Oshiro
Executive Director
Dept. of Budget & Finance
Housing Finance & Devel. Corp.
677 Queen Street, Suite 300
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Oshiro:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Wailaua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

The Facility Plan/Draft EIS are planning tools which develop the most environmental sustainable/economic solution to wastewater management issues of Hale'iwa and Waialua. Full implementation of this plan will require a more indepth financial plan to determine the phasing of the project, the cost distribution, and other financial issues.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

96:PPE/496

February 5, 1996

The Honorable Cheryl D. Soon
Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Supplemental Waialua-Haleiwa Wastewater Facility Plan
Draft Environmental Impact Statement

We have reviewed the subject Draft Environmental Impact Statement (DEIS) and have the following comment:

With the impending closure of Waialua Sugar Company, any special assessments and cost burdens would impact the families in the area. The DEIS states that "Property owners may be required to pay an improvement district assessment, to arrange and pay for connecting existing structures to the wastewater collection lines, and backfilling their abandoned cesspools." What happens if the owners cannot afford the assessment? Have possible alternatives been considered?

Thank you for the opportunity to comment.

Sincerely,

ROY S. OSHIRO
Executive Director

c: Mr. Jared Lum, Department of Wastewater Management
Dr. Robert A. Gearheart, Hydro Resources International

HFDC

RO RESOURCES INTERNATIONAL
WATER RESOURCES & WATER QUALITY SYSTEMS
P.O. BOX 4489 · ARCATA, CALIFORNIA, U.S.A. 95521
(787)822-6674

May 22, 1996

Gary Gill
Director
State of Hawaii
Office of Environmental Quality Control
220 So. King St.
Honolulu, HI 96813

Subject: Draft Supplemental Waialua-Hale'iwa Wastewater Facility Plan, Waialua, Oahu, TMKs: 6-2: 6-6 to 6-9

Dear Mr. Gill:

The following letter is a response to your comments on the Draft Facility Plan/EIS for the Waialua-Hale'iwa Wastewater Facility. Thank you for your comments on the FAC Plan/EIS.

While it is important in the EIS process to discuss the inter-relationship of this project and other projects in the area, we had no success in obtaining any information from land companies concerning their future plans. The only other EIS in the area, of direct concern, was the Kam Highway By-Pass.

A list of abbreviations and acronyms will be included in the final EIS.

A copy of your letter will be appended to the Environmental Impact Statement. If there are any questions contact Jared Lum at 523-4654.

Sincerely,

Robert A. Gearheart, Ph.D., P.E.

cc: Jared Lum
Dept. of Wastewater Management

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813

January 19, 1996

Felix Limtiaco
Department of Wastewater Management
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Attention: Jared Lum

Dear Mr. Limtiaco:

Subject: Supplemental Draft Environmental Impact Statement (EIS) for Waialua - Haleiwa Wastewater Facilities, Oahu; TMK 6-9, 6-8, 6-7, 6-6, 6-2

After a review of the supplemental draft EIS, we recommend that you include the following in the Final EIS:

1. A discussion of the interrelationships and cumulative environmental impacts of this project and other projects in this area.

2. A definition of abbreviations used throughout the text and in tables and figures, before or as they occur or perhaps listed on the "Common Acronyms" sheet, including: LS, lf, ID, TCNPS, CDP, GPM, gpcd, NTU, MBtu and O&M.

3. A definition and discussion of the significance of *isochlor measurement* (page 69).

If you have any questions please call Nancy Heinrich at 586-4185.

Sincerely,

Gary Gill
Director

c: Gail Kaito, Planning Department
Robert Gearheart

GLOSSARY

ACRONYMS AND ABBRIEVATIONS

ASCE	American Society ofl Civil Engineers
BCA	Belt Collins and Associates
BOD	Biochemical oxygen demand-measure of degradable organic matter and oxygen requirred to convert ammonia to nitrate
BP	Beach Park
BWS	Board Water Supply
CBOD	Carboneceous Biochemcial Demand-degradable organic material
CDP	Community Development Plan
CFR	Congressional Federal Record
Chl-a	Chlorophyll-a - measure of algal density
CT	Census Tract
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources-State
DOH	Department of Health-State
DP	District Park
DWWM	Department of Wastewater Management-City and County of Honolulu
EIS	Environmental Impact Statement-State
EPA	Environmental Protection Agency-Federal
FC	Fecal coliform-public health indicator organism
FEIS	Final Environmental Impact Statement
FS	Fecal streptococcus-public health indicator organisms
FWS	Free Water Surface-type of constructed wetland to treat wastewater
GAC	Granular Activated Carbon
GPM	gallons per minute

gpcd	gallons per capita per day
HECO	Hawaiian Electric Company
HRI	Hydro Resources International
HUD	Housing and Urban Development-Federal
	light under controlled conditions
I	Isochlor
MBtu	Millions of British thermal units
MGD	Millions Gallons per Day
MPN	Most Probable Number
N	as nitrogen
NP	Neighborhood Park
NPDES	National Pollutant Discharge Elimination System-Federal permit for wastewater treatment discharges to the waters of the United States
NSDP	North Shore Development Plan-City and County of Honolulu
NTU	Nepholometric Turbidy Units-measure of colloidal and suspended solids
O&M	Operation and Maintenance
Ortho P	Dissolved phosphorus
RP	Regional Park
SBR	Sequencing Batch Reactor-type of biological wastewater treatment
SCFM	Standard Cubic Feet per Minute-measure of airflow
SS	Suspended solids-measure of filterable solids
SRA	State Recreational Area
TAC	Technical Advisory Committee
TCNPS	Total coliform non-point source
Total P	Total phosphorus - dissolved plus particulat phosphorus
TR	Technical Report
UIC	Underground Injection Line-delineation for subsurface wastewater disposal

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey-Federal
UV	Ultraviolet-type of disinfection system using generated ultraviolet
WQPO	Water Qualty Program for Oahu-State
WWTP	Wastewater Treatment Plant
WWTS	Wastewater Treatment System

PUBLIC
HEARING

Comments and Responses from the Public Hearing

A public hearing was held April 30, 1996 at 7:00 PM at the Hale'iwa Elementary School. Approximately thirty people were in attendance at the meeting. This included four representatives from the Wastewater Management; Cheryl Okuma-Sepe, Depute Director, Eldon Franklin, Division Chief of Water Quality, Jay Hainat, the Assistant Chief for Planning, and Jared Lum of the Planning Division. Dr. Robert Gearheart, of Hydro Resources International, a consultant for the City and County for the project presented the findings and responses to comments and questions. A summary of questions and responses from the public hearing is found in the following paragraphs.

Fred Gross - Questioned why the public hearing is necessary; why doesn't the City/County just use the comments the citizens have been submitting all along.

Response - The public hearing is required for the potential use of Federal funds. The public hearing is different in that a court reporter transcribed the proceedings. The other meetings, both formal and informal, are part of a process to insure that a maximum opportunity for public participation is afforded those citizens affected by the project. The formal meetings were different only in form not in context of issues associated with the project.

Mr. Cole - Questioned the reasons for removing Pupukea and Sunset areas from the project.

Response - Initial efforts did include these areas but were removed early in the process based upon a geographical barrier, Waimea Bay, as a natural separation for the service areas. The Pupukea and Sunset areas will be included in the North Oahu Facility Plan.

Mr. Leinau - Mr. Leinau was concerned about whether everyone will want to hook up to the treatment plant.

Response - City Ordinance, Section 14-15 requires all lots accessible to a public sewer to connect to the sewer. The City may consider exceptions to the ordinances. Most community members accept the shared cost as a trade-off for the shared community benefit of improving health and environmental conditions in the service area.

Chris Hong - Questioned why SBR and wetlands were not considered separately as an alternative, from the disposal options.

Response - The Supplemental Facility Plan/EIS was directed to look at the pond/wetland/reuse alternative compared to the SBR/ocean outfall alternative. The economics alone would argue that SBR's wetlands or reuse systems would cost more than a pond/wetland/reuse system. More important is the fact the SBR system affords no storage which is important for meeting variable irrigation demands. The pond/wetland system minimizes the amount of effluent which would be disposed of at the RI sites.

Meryl Anderson/Bob Laineu - Concerned about the siting, the design, and the operations of proposed pump station number 5.

Response - A disclaimer will be placed in the Facility Plan and EIS to guide the consultants at the next phase of the project, the detailed design phase. Considerations for water level,

architectural features, odor control, proximity to existing homes, noise control, and landscaping will be considered at that time.

Bob Laineu - Ask for more details, in the documents, on how reuse will be done.

Response - The reuse plan is conceptual at the facility plan stage, as are the collection, and treatment aspects of the project. The reuse plan is based upon the fact that within the project period, next twenty years, that institutional, hydrological, and economic factors will make wastewater reuse and reclamation as a matter of choice for individual land owners, public agencies, and agricultural interest on the northshore. The concept is to insure that no opportunities are closed out in the planning and design phase of this project. The reuse line will have outlet connections located approximately every quarter of a mile for practical reclaimed water redrawals. Some of the critical user policies to be developed at the next phase of the project is how the reclaimed water will be accounted for and the pricing structure, and the water right distributions between the various users.

Bob Laineu - Need to treat the two reuse cities separately as each will need different amounts of acreage.

Response - Each of the systems will be treated as different systems, both the treatment and the reuse. In all probability this will be a phased project which will result in an uneven production of reclaimed water for irrigation.

Mr. Cole - Consider locating pump stations underground.

Response - Design details for pump stations will be considered at the next phase of the project, the detailed design phase.

Xavier Martin - Concerned about having to connect to the city system after spending $10,000 on a septic tank/leach field system.

Response - Same as response to Bob Laineu concerning sewer hookup.

PUBLIC HEARING

WAIALUA-HALEIWA WASTEWATER FACILITIES PLAN

APRIL 30, 1996

HALEIWA ELEMENTARY SCHOOL

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BOARD PARTICIPANTS:

Cheryl Okuma-Sepe, WWM Deputy Director

Jared Lum, WWM staff

Eldon Franklin, Division Chief of Water Quality

Dr. Bob Gearheart, consultant

PUBLIC PARTICIPANTS:

Fred Gross

Lucky Cole

Sue Fujioka

Chris Hong

Bob Leinau

Ross Moody

Meryl Anderson

Carole Collins

Stew Ring

Xavier Martin

-o0o-

MS. OKUMA-SEPE: Good evening, everyone. I'm Cheryl Okuma-Sepe, Deputy Director from Wastewater Management. With me tonight I have Eldon Franklin, the Division Chief of Water Quality; Jay Hamai, the Assistant Chief for Planning; and Jared Lum, sitting right here; and Kathy Molle in the back.

Tonight we have the public hearing for the Mokuleia Wastewater Study. Let me just make a few comments in terms of how we got to where we got to. What we're having a hearing on tonight is an amendment to the Facilities Plan and Environmental Impact Statement that was completed originally in 1987.

Subsequent to that report, it was determined that it was probably an innovative technology in terms of the wetlands concept. And in addition to some concerns with regard to one of the alternatives mentioned in the 1987 Fac Plan pertaining to the proposed ocean outfall, the City re-evaluated the situation and decided that what needed to be done was an amendment to the facilities plan and to the Environmental Impact Statement in order to more fully develop and evaluate this wetlands concept. So this is where we are tonight.

Generally the planning area that we're talking about is the area of Waialua, Haleiwa, Mokuleia, which covers from Kaena Point up to Waimea Bay and covers an area of approximately 70 acres.

The facilities plan, the planning process, was originally a requirement under the Federal Construction Grant Program, and some of you may know that the grant program ran out sometime in the late '80s. But in spite of that, our department has continued the facilities planning process, the purpose of which is to determine the needs of the community and to evaluate all of the feasible alternatives in terms of treatment and disposal.

On the agenda tonight, I'm going to be turning this over to Jared Lum, who is the project engineer here. He will give you a summary of the project and the status and the issues. We have Dr. Bob Gearheart, who will then go into the details of the project and respond to the issues. And he is the one who did the amendment to this Facilities Plan and Environmental Impact Statement. And then we will generally open this up to questions and answers.

With respect to what's to happen tonight, for those of you who have any oral comments you would like to make, we would ask that you identify yourself

first with your full name and, if you wouldn't mind, come up to the speaker phone to make your comments. The reason for that is we have Jan Floate here, who is a court reporter, and as you notice, she will be recording everything that is said tonight.

In addition to your oral comments, if you haven't submitted your written statement to us, we would ask that you do that at this time. Okay?

MR. GROSS: How could we submit our written report? We haven't seen what you plan to talk about tonight. We have been submitting reports right along as we've -- we've had a meeting since the last time we submitted reports. You puzzle me when you make a statement like that.

MS. OKUMA-SEPE: We have had the amended facilities plan available, I believe. Is that right, Jared?

MR. LUM: Only in draft form.

MS. OKUMA-SEPE: Draft form. Has that been released to people?

MR. LUM: Yes.

MS. OKUMA-SEPE: If Jared had been asked for the report, we could have certainly released that to you for comment. If you haven't received the report, you can certainly let Jared know and get you

a copy of that.

Jared, would they be able to submit comments after this hearing tonight?

MR. LUM: I will give them some time.

MS. OKUMA-SEPE: We can give you some time to submit your comments. The comments then will be considered and will be addressed and possibly included as well in this amendment.

Okay, Jared.

MR. LUM: My name is Jared Lum. I'm with the Department of Wastewater Management.

I want to provide a brief review of the project, what's gone on so far, where we are right now. Cheryl had mentioned we had -- the City had hired a consultant a while back to do a study of the feasibility for providing wastewater treatment out on the North Shore.

Back in '87 the facilities plan came out by Belt Collins & Associates. The recommended plan from Belt Collins & Associates was -- let me backtrack. Belt Collins & Associates was tasked with the collection system for wastewater treatment and also -- what the final product they came out with was they recommended a sequencing batch reactor for treatment of wastewater. For those of you who are not familiar

with that, it's pretty much a high tech type of wastewater treatment in which you use computers to optimize microbiological treatment.

What Belt Collins & Associates also recommended was an injection well for temporary disposal of the treated effluent. And for the long-term disposal, they recommended an ocean outfall.

What happened, as Cheryl had mentioned, is that there were some concerns by citizens out here as to this type of treatment process, and people wanted something which was perhaps more in line with the rural nature out here. Of course, there was some, to put it mildly, sentiment against ocean outfalls. I guess I heard the motto here, no kukae makai.

I'd like to say that in spite of all the publicity you've heard, we haven't really -- I'm not an expert in ocean outfall, but what I have seen working with the Department of Wastewater Management, hasn't really been any studies which show harmful effects from ocean outfalls. However, that kind of decision as to what type of treatment you want to provide, what kind of risks you want to take and how we just want to dispose of the wastewater is something that I think citizens as well as the City

have to decide, and that's one of the reasons why we have a public hearing like we do here.

Dr. Bob Gearheart was brought in in 1987, and he had explained what they were doing out in California using wetlands to treat sewage. And, coincidentally, he was also chosen as our consultant for this looking at how to dispose of the effluent, how to treat wastewater and dispose of it on the North Shore.

What the City had done was they tasked Dr. Gearheart to take a look at the wetlands treatment versus sequencing batch reactor treatment. He was also asked to look at effluent readings versus ocean outfall for disposal of the wastewater. What he was not tasked to do -- I'd like to emphasize he was not asked to revise the collection system that Belt Collins & Associates had come up with, and he was also not asked to compare all of the alternatives. Instead, we asked him to just compare the wetlands treatment and the effluent reuse disposal with the selected process from the Belt Collins & Associates report.

Actually it was Belt Collins & Associates who looked at all of the different options, and whatever they selected we just asked Dr. Gearheart to

compare his alternative with that particular selection.

This project has been going on for a long time, and I'm sure that you all want it to be completed as well as I think the people in the City and our consultant. The project has actually evolved quite a bit since I've been involved with it.

First of all, one of the things that we did do eventually was remove the Wahiawa, Schofield, Pupukea, Sunset Beach areas from the plan from this project. We originally -- yes?

MR. COLE: Wahiawa and Schofield have a -- I don't know that they have cesspools or anything that would be requiring -- I know Pupukea has cesspools, et cetera. Is there some sort of a difference between Wahiawa, Schofield and Pupukea? I'm a little confused.

MR. LUM: Yes, there is a difference, but what you were asking Dr. Gearheart to do is look at long-term treatment for the Wahiawa area.

MR. COLE: Could I make it a point for the record that the waste treatment plan originally was to address the effluent requirements from central Oahu and the needs of Sunset, Pupukea, and you've changed the scope to only address -- you get what I'm

getting at here? I'm a little concerned.

MR. LUM: That's correct. We discussed it with Dr. Gearheart. He recommended that those other areas be taken out and be put into their own plan. The Pupukea and --

MR. COLE: Wahiawa and Schofield currently are serviced with a waste treatment system. As I understand, the City & County provided a waste treatment system. Pupukea is not. Isn't there some sort of a difference between the two categories of removal?

MR. LUM: Yes, that's true. What happened with Wahiawa is that right now we're discharging -- the City is discharging to a reservoir, and there were some concerns if we should continue doing that. That's one of the reasons we're asking Dr. Gearheart to look into the Wahiawa wastewater.

MS. OKUMA-SEPE: Let me just say that currently the City is addressing the Wahiawa, Schofield, Central Oahu disposal issue as part of some ongoing discussions we have been having with the army. I just want to say that Dr. Gearheart will address the issue that you've raised in terms of the shift of the scope.

MR. COLE: What about the Sunset Beach,

Pupukea; is that being addressed? I'm trying to make a point here that --

MS. OKUMA-SEPE: Right, right, we understand.

MR. COLE: -- there's a big difference in those three areas relative to the project definition.

MS. OKUMA-SEPE: Okay.

MR. LUM: The Pupukea and Sunset Beach areas are now, I believe, under the North Shore Facility Plan, so it's being planned under another project right now.

Also, as the project progressed, we found a couple of major problems. First of all, Dr. Gearheart had difficulty finding an agreeable site which would be agreeable to various landowners, although he did have a lot of meetings with the landowners. Also, Dr. Gearheart had a difficult time proving the reliability of the effluent reuse; that is, there's enough users who would take the effluent and use it for irrigation. So those two problems were making it difficult to complete this project.

What we did was we finally decided -- we told Dr. Gearheart to go ahead and select what he felt was the best site, and that would be based upon scientific, sociological and economic reasons,

whatever he felt would be the best area for the treatment plants.

The second thing we asked him to do is to provide 100 percent backup for the effluent reuse. In other words, if there isn't enough users to use that effluent for irrigation, we want to make sure that the wastewater would be disposed of and wouldn't spill over onto roadways and so forth.

In terms of 100 percent backup, what Dr. Gearheart did was he came up with a rapid infiltration site. Rapid infiltration site is similar to an injection well, except I think it's spread over a wider area. Basically any effluent which is not used for irrigation would be allowed to seep into the ground.

I would like to also mention that we did meet with Bishop Estate and also Dole Foods at the beginning of March to try and work out where they would find it feasible for us to put the treatment plants. We haven't really gotten enough feedback yet from Bishop Estate, although Dole Foods seems to be pretty happy with where we're siting the facilities.

The last issue that I would like to mention as far as the project evolving was that the state Department of Health came out with suggested

guidelines for people who wanted to reuse effluent for irrigation. So Dr. Gearheart had read those guidelines when they came out and tried to assure compatibility between our project and the Department of Health requirements or guidelines.

I'd like to emphasize that we did go through an extensive participation process. In the beginning there were many preliminary community meetings or meetings out in the community. You'll recall coming out here on Saturdays and watching the people ride horses and so forth. We have had meetings not only on Saturdays but at night in conjunction with the neighborhood board meetings.

We're also going through the EIS or Environmental Impact Statement process, and in that process what we did first is we put out an EIS preparation notice and asked people and different agencies to provide comments as to what they wanted to see in the Environmental Impact Statement amendment.

Based partly on those comments, Dr. Gearheart produced a draft EIS, and we had published notice of the draft EIS, I believe, around Christmas of last year. We hope to come out with the final EIS maybe in about a month or so of this public hearing.

Of course, we're going through a facility plan process right now. We're required to have two public meetings, which we did, and also this public hearing. Through this public participation process we found that there were several common issues that were coming up. I'd like to go over some of them, and Dr. Gearheart will go into more detail about them.

First of all, one of the issues that came out is the question about what is urban versus what is rural areas, because in the project the urban areas would be hooked up to the treatment plant while the rural areas would continue to use individual treatment, wastewater treatment and disposal systems. Basically we continued to follow the recommendation of the Belt Collins & Associates, which defines urban versus rural based upon population. In other words, how much benefit would you get for the amount of money that you spend.

I'd like to also emphasize again, for those of you who are concerned, that Sunset Beach and Pupukea areas are not considered rural under this project but are being handled by another project, and the North Shore Facilities Plan and the recommendations under that plan is independent of

this particular project.

The collection system itself, I think we brought out in various public meetings, is very expensive. So we probably would have to construct it by increments, and we would want to hook up as many people as we can. So as far as urban versus rural, we feel right now that we are doing the best we can as far as determining who to hook up to the system. And as more people hook up, eventually we can consider other areas to hook up.

Another issue that came out is one of the pumping stations, one of the Haleiwa pumping stations. There was some concern as to whether that pumping station would fit in with the character of the area, whether it would cause aesthetic problems and so forth. Conceptually, if a pumping station is acceptable and it is needed in that area, we would like to continue with the project and address the aesthetics doing the more detailed design fitting of the project. At that point we can determine where to actually site the pump station, and we could be hiring architects, for example, to help work with the aesthetics of having a pump station in this area. Of course, we would like to work with such organizations as Main Street in order to address concerns and make

sure that the pump station does indeed fit the character as best it can for the area.

The third issue that came out was whether the wetland should be expanded for recreational use. In other words, somehow should we make it a park and so forth. Right now the area is probably as small as it can be for treatment alone, but considering the problems we're having as far as getting commitment for land and just the cost of the land, until the land issues are resolved, we would continue on this track to just have enough land to treat the wastewater. Dr. Gearheart, I guess, can expand a little bit more upon what to expect at the site.

The fourth set of problems that came up were concerns about the technical aspects of the project: Disinfection, would it work? Odor control, will it control odors? Will the effluent somehow harm the water supply? I think Dr. Gearheart has addressed those issues, and we will leave it to him to continue to address those issues. Dr. Gearheart, I would like to mention, is very confident in his design.

A fifth issue that came up was the potential for expansion of the plant. Will the plant -- if the population increases, will the plant, as

designed, be able to accommodate more people? And I think there's perhaps some people who might feel opposite to that. Maybe they don't want the plant to bring in more people. So there's some question as to what is the expandability of the plant.

The design, this wetland treatment system is designed as a low technology land-intensive process, which means it uses a lot of land and not too much energy to provide the treatment. Basically what Dr. Gearheart has told us can be done is if the plant does need expanding in the future, additional technology can be added into the plant. For example, in the area if it gets overrun out there, we can always put in the sequencing batch reactor in the same area and provide more through put for the wastewater. So there's some flexibility involved in this particular design which would allow additional expansion, if it is needed.

The last issue that I have was that of the cost of effluent; in other words, how much would the people who are irrigating have to pay for the effluent. That was a concern both by people and agencies such as the Department of Agriculture, as well as some potential users. Right now it's really impossible to predict because I think it depends upon

the market, what people are willing to pay, perhaps how much funding might be necessary. So that question I think we're going to keep open and going to have to address later on.

For further details about the project, I would like to now call Dr. Gearheart.

DR. GEARHEART: Thanks, Jared.

Thank you for attending this meeting of the public hearing process related to the EIS and the Facilities Plan, this projects that's been going on since, I think, 1991. Jared said something about 1987, but I don't think I was involved quite that early. I think it's about '90 or '91, when the opportunity was given to us to kind of look at the alternatives to the ocean disposal SBR selection that had been actually sorted out in the facility plan done by Belt Collins.

I might start off with maybe a philosophical difference that's reflected in the facility plan, and that's basically what I said when I first came here. And that is, this particular alternative was to look at this process in a reverse order. The idea was to look at the potential reuse first, then the disposal, then the treatment system. That's different than the normal way facility plans

are developed. And you can compare them. They can be put into comparison. But that was kind of the idea.

The idea was that effluent has value. That value might not be realized at the present time, but at some point it will be realized. It will probably be realized within the near future of this particular community. The idea is to allow that alternative to be a cost-effective possibility when it develops, as well as meeting all the other state guidelines in terms of treatment, disposal and collection.

So this system was developed kind of like that, so it's a little different model than I think you will see other places, and there might not be many other places in Hawaii that you could do this, that you actually look at it this way. So that's kind of the option that existed.

I'm not sure how much of the whole thing to go through. I think maybe I'll do a quick run-by of the process for those of you who have not seen at least what the alternatives are and how we separated those, and then I know the questions and your comments are probably the most important thing at this meeting. So I'll try not to make it like a long presentation here.

The project area was to look at these community areas within the North Shore, looking at what the population would do. As it turns out, there's been a couple of population changes in the period of this project and a couple of census. The latest was the 1990 census. So we've basically brought the Belt Collins data up to date as well as the census data and projected this out to 2015. So these are the areas, both the residents and the seasonal people who would be here, and that's kind of the starting point of a process like this, to come up with a number of people.

The next process is to come up with how much wastewater -- the screen looks fuzzy to me here.

Basically what this is looking at is the population changes, and you can see this particular area is going to have a relatively small -- has been predicted very low population growths over the planning horizon, which has actually been 30 years, but we're looking now at the years 1995 to 2015, which is the period we looked at, with the peak populations out here being somewhere around 15,000 people.

We did a couple of scenarios even though we

had to follow the state -- I mean the City & County guidelines. We tried to factor in something else, and the fact that water use is actually going to be going down in the same period, per capita water use, and we found that to be true other places with the replacement of certain water saving devices, low flush toilets, shower heads, issues like this. This is the number that's commonly used, 90 gallons per capita per day, non-conserved.

The City & County requires us to use that number and looking at hydraulics, how much is produced. But in reality, that unit rate will come down. What that does by using a number like that, it gives you some excess capacity by using that kind of number. So when we look through there -- or increased treatment capability. But we had to use a number like this.

The treatment system that we looked at, when we went through those calculations, we came up with about 1.4 million gallons a day for those 15,000 people for design flow at 2015. And we looked at configurations of waste treatment. The SBR is the system that was the choice in the Belt Collins, and it was a technology that was actually new at that period of time. It's now in place and it's been

around, but it was relatively new. In fact, I think it was an alternative innovative technology in '87. Wasn't it? It was in one of those EPA groups. It was a new technology at that point, but it's now one of the systems that's available.

These are kind of listing the processes that were involved in that, the various units in the headworks, which is the primary part of the treatment, preliminary treatment, the secondary treatment, the solids handling and the liquid disposal. The liquid disposal, of course, was part of the issue that was exfiltration wells and ocean discharge, down at the bottom here.

The treatment system that we proposed was actually based upon this working backwards. If you're going to think about reuse and maximize your reuse, you have to think about storage, because you can't irrigate all the time. So one of the ideas, even though a pond wetland and pond system does require space, it also affords you some storage. So one of the principal reasons we looked at that is to take advantage of that. So the particular system we looked at then had the ability to handle septage. Over here. Bar screens, grid chambers, rotary screens, very similar to the other alternative.

Of course, the key difference between the oxidation ponds, the wetlands still have to be coagulated and filtered to meet the R1. And then the biggest issue, of course, is that there is no significant, at least in the short-term, solids handling problem associated with an oxidation pond.

One of the things that happened with the oxidation pond, when it's properly designed, is that solids settle, they digest, and there's very small accumulation of this material over the long period of time.

You're shaking your head. I'm curious to know --

MR. LEINAU: Well, I'll tell you why I'm shaking my head.

DR. GEARHEART: I'm sorry. Your name?

MR. LEINAU: My name is Bob. The liquid disposal -- the SBR unit is going to have the same kind of liquid disposal as you have with the oxidation ponds. Granted, the plan said it was going to be an ocean outfall, but in reality, if the exercise is cleaning up the wastewater, doesn't really matter how you clean it up. What we're really talking about is where it goes afterwards. So the basis of comparison there I find not very

academically creative. But that's beside the point. What I'm saying --

DR. GEARHEART: I appreciate the comment.

MR. LEINAU: What I was shaking my head about was the need for all of the solids to go through all those exercises. Indeed in SBR units they can go in a digester. An awful lot of that stuff that happens in a digester is the same thing that happens in an oxidation pond, only it happens a lot faster.

DR. GEARHEART: The difference with the oxidation pond is you don't have to get rid of the solids after it's digested.

MR. LEINAU: Well, if it's thoroughly digested, a lot of the solids become liquid anyway, and there's always some solid residue even in the oxidation ponds.

DR. GEARHEART: Right, but it's a very small amount. It's just a question of retention time.

MR. LEINAU: Anyway, I'm not qualified to argue with you. I am enjoying your discussion.

DR. GEARHEART: I want your comments, too. I want to know what the issues are, because that's the point.

One of the things that happened, like I

say, these were all listed in the Belt Collins, and we were not asked to look at changing that or any of the collection systems. We were asked to look at something different than that. But one of the key issues again is reuse, because that was not the option, and so that's one of the issues that would have sorted an SBR versus a pond. If reuse is not in, then the storage component is not necessarily in this item. So that would have made a difference if reuse wasn't a possibility.

MS. OKUMA-SEPE: Excuse me. Bob, could you state your last name for the record, please? Just as a reminder, the people who want to make comments, we have a court reporter here. She is recording everything. So it's really important that you identify yourself by your full name and then proceed to make your comments.

MR. LEINAU: Bob L-E-I-N-A-U.

DR. GEARHEART: In the EIS process, we looked at the two alternatives. The centralized SBR system, by the way, was a centralized system. There was one system; there was one treatment plant; as opposed to the centralized subregional waste treatment plant, which we will get into in just a minute. The option that we looked at because of the

reuse was to have two subregional sites that were treating about half the 1.4 MGD. So each subregional system will be treating about 0.7 MGD, and so that's why I'm using that term there, subregional. This was one system that was listed in the Belt Collins.

By going through -- and this is our screening of this, using the same kind of criteria they used in looking at -- I can't remember how many alternatives they had, six or seven, in the original facility plan that they went through initially and just sorted these out, and, of course, these are -- this is just kind of the first cut of this. We had other criteria that we looked at, but we were rating these relative to each other in terms of issues of land requirements, inconvenience, visual impacts, public health risks, water pond degradation, reliability, implementation, energy requirement, present cost to users for expandability and reclamation. These are unweighted, strictly taking a look at these systems in terms of these criteria.

UNIDENTIFIED VOICE FROM THE AUDIENCE: What is the title of the second column?

DR. GEARHEART: This one? The centralized subregional wastewater treatment. Ponds and wetlands having two systems.

UNIDENTIFIED VOICE FROM THE AUDIENCE: We can't see that.

DR. GEARHEART: I'm sorry, Chris. I can't get that focused any better.

UNIDENTIFIED VOICE FROM THE AUDIENCE: We really can't see it.

MS. OKUMA-SEPE: Excuse me, sir. Could you please state your name for the record? We have a court reporter. Her job is to record everything that's happening.

UNIDENTIFIED VOICE FROM THE AUDIENCE: I didn't talk. I just asked a question, made a statement. She doesn't need my name.

MS. OKUMA-SEPE: She can't make an accurate record of who is speaking if --

MR. HONG: Chris Hong, H-O-N-G as in Hong Kong.

DR. GEARHEART: In the facility plan we were also asked to look at what's considered the urban and the rural areas and determine the appropriateness of either collecting or not collecting, making it a part of either of these systems. So this particular table is just kind of again a first cut in kind of sorting these out. The idea was to say what would happen if you left the

urban area like it is right now, cesspools, with some septic tanks, with a package treatment plant, collecting for some of the community, a centralized SBR, ocean, which is the alternative over here, and then the pond wetland which is subregional. And looking at these criteria, environment, reliability, implementation, energy and cost.

Then we did the same thing with the rural. What if you left the rural the way it is or optimizing the existing system. And optimizing the existing system came out of Belt Collins, and it's the issue of collecting the septage, repairing those cesspools or replacing those cesspools with septic tanks in critical areas, doing a combination of upgrading the on-site treatment, basically, with no collection. And those determine what the service area was going to be.

In sorting through that, there wasn't that much difference at least in both the Belt Collins and our analysis with what's considered the rural area. You'll see that on the map, what we consider the rural areas. It's outside the higher density areas in the service area.

We've kind of looked at these options, and I think it might be important now for me just to --

I'm going to go through just very quickly what the system looked like that we looked at.

This is not going to focus.

The pond wetland system had these components to it. It has a septage receiving station because septage would be taken to these two sites because it's collected locally, and that would be a cost savings as opposed to taking existing solids handling. Micro-screen basically takes out about ten percent of the large solids and some of the organic matter. Goes through three oxidation ponds. An oxidation pond is a passive treatment system. As Jared had said, it uses no energy, does require space for these three ponds. But more importantly, in our concept it serves as storage on the up gradient side. In other words, you can hold it. You can do different things. You don't have to release the effluent. You have periods of maybe two weeks or three weeks where you cannot discharge anything. So it gives you flexibility like a reservoir, like a small reservoir.

Two, wetlands. Wetlands polish the effluent. At the time that we first started this, there were probably a couple hundred wetland systems of various types in the United States. Now

there's probably over 800 wetland type treatment systems. So it's become a technology that's in the mix with other options.

MR. HONG: Can you clarify the storage design for a million gallons? Ten in, ten out, or are you depending on various levels in the pond?

DR. GEARHEART: You mean what about the storage in here?

MR. HONG: Yes.

DR. GEARHEART: Okay. There's about 13 acres.

MR. HONG: But what I'm saying is, once the ponds are full -- or are you counting on the ponds not being full?

DR. GEARHEART: That's called the operating pool that you work on. You work with anywhere from three to four feet of operating pool to be able to handle that.

MR. HONG: But is that due to infiltration in the ground, the levels, or is it due to evaporation?

DR. GEARHEART: Actually neither one. We can't allow anything -- that's a good point. We can't allow anything to infiltrate. It has to be lined. There will be some ET, but there will be some

precipitation on top at the same time. So those kind of wash. But the way you would operate is you have the capability to take care of daily, weekly, even maybe monthly changes in the irrigation demands by changing elevation two to three feet over 13 acres. That's about 48 per feet, about 10 MGD for any one of these. That's about 12 days of flow. If you had three feet of storage, you can essentially let it sit for twelve days and not discharge, if you couldn't irrigate or if you had some other problem.

But you're right; it would have to be at that level. That's called the operating pool.

MR. HONG: You have a variable overflow.

DR. GEARHEART: Right. You have an operating pool, just like a reservoir, like Corps of Engineers reservoir.

MR. LEINAU: You know, they have one big pond up at Turtle Bay where they have about a 30-day retention time. They grow some mighty fine strains of algae that's not very clear effluent. What are you going to do with the retention of this much acreage of water and algae blooms in there?

DR. GEARHEART: Well, the algae blooms we need. That's what makes an oxidation pond work. That's exactly what we want to happen in that system,

because Turtle Bay has aerators --

MR. LEINAU: But they have --

DR. GEARHEART: -- and we're going to do away with aerators in this option, you know, if this one is constructed. There's enough surface area for the algae to supply the oxygen. The next step, though, is exactly that problem, is to get rid of the algae. That's what the wetlands will do. And the wetlands have the capability of taking the solids down by themselves to very close to the R1 standard for reuse, which is five parts BOD suspended solids.

In the State of Hawaii that has not been approved by itself as a tertiary process. Therefore, coagulant will have to be added and then a slow sand filter to polish either -- if it doesn't meet the five or to actually get it lower. And this would be required in any process, something like this, in any R1 alternative.

Laie, for example, has a system like that with their tertiary effluent. Then disinfection with UV light instead of chlorine. Then the option of -- this right here (indicating). After it's disinfected -- and you'll see the system later, but the idea is that the rapid infiltration sites are at the terminus of the collected community. There's

another pipe that has to go in in this system that would take reclaimed water to the furthest terminus of the service area. And if people wanted to use the water, it would be R1 water at that point, and they could use it for any of the reuse options, which is as high as parks and recreation, pastures, horticultural processes. There's a wide range. In fact, R1 is the highest level of reuse in the state at the present time and is equivalent to other standards that we have in the United States, like California and Florida with their reuse.

So what we would imagine when this first started is that there probably would be very few takers of this reuse effluent, but the reuse here will have to grow and be developed as water prices and as opportunities come up.

MR. COLE: Lucky Cole.

Presumably there's 0.7 million coming into this system. After evaporation and everything else, how much is coming out?

DR. GEARHEART: On an average basis, it's probably about seven -- it's about the same. The precip here just about equals the evaporation. Doesn't occur at the same time of year, but in this particular range, between 40 and 60 inches of precip.

So it's a net zero.

MR. COLE: Maybe I'm overly simplistic, but let's assume that we have 500,000 gallons really coming in from everybody flushing their toilets in Waialua and Haleiwa, and then it goes through this system, and then 500,000 gallons comes out to be reused, and that has to be transported to the reuse sites, either agricultural or parks and rec.

DR. GEARHEART: Right.

MR. COLE: But essentially --

DR. GEARHEART: That's right. You have to basically reuse every -- well, you don't have to because the guidelines -- Jared kind of gave me a little more credit than I deserved because the guidelines, the R1 guidelines, said no matter what your reuse plan, you always have to have a backup disposal plan because there's always options like high rainfall, a lot of problems where you can't reuse. So you always have to have a disposal option in a reuse plan.

MR. COLE: So what is that? Doubling the capacity of the wetland so it gets absorbed into the ground or --

DR. GEARHEART: No. Actually everything in this system has to be totally lined. There can't be

any discharge to the ground water at the treatment plant. Everything has to be lined, because all of this is going to be mauka of the no pass line.

MR. COLE: So now let's assume that we've got 500,000 gallons a day coming out the other end. Where does it go?

DR. GEARHEART: If there were no reuse, the infiltration, rapid infiltration gallery, which there's two of them, as explained, at the terminus -- and maybe I should have started with that. They are designed to take all of the flow, but as reuse options come in, they'll start taking all that seasonally. Seasonally they might be taking 75 percent of it; in the wet period none.

MR. COLE: But these things coming off the end, do they take acreage and --

DR. GEARHEART: Not very much. They're like an acre.

MR. COLE: They're not an injection well.

DR. GEARHEART: No, no. They're --

MR. COLE: They're just a drain.

DR. GEARHEART: They're called infiltration wells. They look like -- there's several types. There's several types we talk about, and one is the basins that look like this. This is probably about

an acre of space. This is one type where you actually have a basin. You have to site this in very poor soils that are in the right area in terms of the Board of Water Supply siting, and those have been sited accordingly under the soils that have high permeability. Instead of injecting it straight down, you're injecting at the surface.

The advantage is if there is a problem with clogging, you have a better opportunity to take care of it. That's probably the biggest option, as opposed to the well where you --

MR. COLE: But because you didn't have a firm commitment on the reuse, you double -- you essentially provided this capacity --

DR. GEARHEART: No. That's a good point. We would need to have that size, no matter what, because you have to have a backup that will handle 100 percent of your waste flow regardless of whether I had everybody on board.

MR. COLE: So effectively it's not an additional cost. All you're doing, then, is essentially providing low cost and -- presumably low cost water for irrigation.

DR. GEARHEART: That was the idea.

MR. LEINAU: On the reuse water, are you

trying to locate lands that would let it be a gravity exercise so that the cost won't have to be raised through a pumping exercise?

DR. GEARHEART: That was part of our siting criteria in looking at the sites. Maybe this is a good time to look at the system.

UNIDENTIFIED VOICE FROM THE AUDIENCE: Push it over a little bit so we get the site right in the middle of the picture. No. Go to the -- no, no. A little more yet. No, not down. Up. There you go. No. Get that down. The top of the picture doesn't tell you anything.

DR. GEARHEART: Well, I wanted to just give you the overview real quick.

The two subregional sites would be located, one, in this area up above Haleiwa, the other one over by Waialua. This elevation was chosen so that there would be gravity feed to the terminus.

Here's one disposal site by the airport, by the strip. The other one would be right here. These are about between a half- and one-acre sites. So this is relatively small compared to this. This area here is a much greater area. You'll see it in a blowup in a minute.

But the idea was to locate this at an

elevation -- the wastewater is pumped up. The waste treatment plant has to be out of certain flood zones anyway, so pumping it to those elevations would allow it to sit there and then gravity feed to any potential sites in here and along here.

Now, this was looked at as probably the first potential site just because of the activity out there, but there are some potential sites in here also.

MS. FUJIOKA: Where is that infiltration site number two?

DR. GEARHEART: At the end?

MS. FUJIOKA: No, no, no. The number two one, the one in Haleiwa.

DR. GEARHEART: Up here? It's out here in the park area, right here, because this is actually viewed as one of the potential sites for reuse if water is needed.

MR. LEINAU: So if that's government land and it's already dedicated a park, what's the exercise in requiring it? The only reason I'm kind of getting into that is right now there's a lot of archaeological considerations about this area. They're talking about reconstructing Pupuhomea (phonetic) and a there's a lot of stuff that

complicates this thing even if you are walking into this thing with your eyes wide open.

DR. GEARHEART: Well, at the next stage all of these things -- there's been an initial study looking at archaeological concerns here, and there was nothing found at least at the reference level and one field level because those sites -- this site had already been looked at. So that the next thing that would happen -- I mean this point could move all over, depending upon what you find out there. So that's a good point.

Same way with this one. This is the kind of concept issue -- this was enough information that we could cost it, because we needed information about distances.

For example, if we zero in on this site -- this has been through several public hearings. You can see the treatment site has been rubbed out a little bit. But here's Waialua. Here's the proposed site. It's a similar location actually to where the SBR site was going to be located. It's within this 150 to 140 elevation, which is more than enough head to drive it to the terminus.

As it turns out, putting in a second pipe is not as costly when you put the system in. That's

part of the economics. If you're going to go ahead and collect it, you might as well put a reuse line in. Even if you didn't use it for ten years, you'd be ahead with that kind of an investment.

Next, this one. By the way, this one is on Dole land, and there doesn't seem to be any problem, like Jared said at the meeting we had in March, about that particular site in terms of availability.

This one is a little different. There was some concern expressed. We've gone through several people, I guess, different careers, I guess, in this period of time talking to people about the site. And this particular site, at least at the March meeting, someone indicated that this field was not the best field because of high sugar production and that other fields might be better, and that map was supposed to be given to me and I haven't got it yet. But when I get it -- that's the other thing. These sites could move around, too, if there are issues like that. We hadn't heard this issue until March, and so that could move around a little bit.

MR. COLE: Where is this high sugar production?

DR. GEARHEART: That higher yield -- I'm trying to remember the term. I think they said

higher yield.

MR. GROSS: There's not going to be any sugar production up there.

DR. GEARHEART: Well, that's what they told us at the meeting

MR. MOODY: M-O-O-D-Y.

The lift station, it seems to me that's the biggest problem between the power going off and getting a spillage. Are you going to be beside streams or how are you going to handle disasters? The generators don't work. You know, it all happens.

DR. GEARHEART: Right. All the guidelines for pump stations are those that are in place now with the new City & County regulations. They include storage backup, alarm systems. We didn't -- except for one pump station that we changed because of the configuration of two systems, the pump stations that Belt Collins came up with, we kept where they were because we weren't asked to re-evaluate the site.

But I think the standard, the City & County could talk to the standards of pump stations because that's something that is very important. I'm sure that it has those criteria. It has storage volume, backup power, alarm. Trying to think of the other. To answer your question, those are standards that are

in the City & County.

MR. MOODY: Seems to me that if the system -- is there fail safe where it goes into a stream and clean it up later or something? What happens then?

DR. GEARHEART: That's always a problem with pump stations, and they try to put the technical components of the pump back up with power, alarms, even storage. I think I know one of them was involved here that they had to have 24 hours or 12 hours of storage in the pump station? Something like this? So that there is a volume also in case, but you're right, if everything fails, it's got to go somewhere to protect the equipment.

Just to give you some idea of physically what the oxidation pond system looks like -- this is maybe to answer some of the questions about the solids. There has been a lot of work done on ponds. Even though they are low tech, they do have the capability of saving a lot of money in the solids handling. There's no question about that. And one of the reasons is you make one pond deeper so it becomes a digester that sits there and allows the material to break down.

So, for example, in Arcata we have gone 40

years without emptying our pond. We're not overloaded. If you overload it, you can cause a problem, but we have a lot of experience with pond solids loading and keeping up with digestion rate. In this environment you would keep up with it very fast.

The second two ponds are not as deep. They are allowing the algae to supply the oxygen. Then it goes into the wetland system where we have something completely different. We don't want the sunlight to hit the water to create algae, so they're shallow. The wetlands are maybe as high as this, two to three feet, allowing plants that are already found here, typical bulrush Scirpus species to come up out of the water so they intercept the sun so the algae die and the solids flocculate and settle out and other biogeochemical cycles occur, and you get very good removal. Again, all these systems have to be lined.

This is just a typical cross-section, not meant to be a plan view, but they can look a little more interesting if you would like to have habitat. We found out that combining open water and closed water creates actually higher water quality in many cases and increases habitat, if that's an interest, if it's an interest of restoring habitat.

MR. GROSS: Don't your plants pick up the nutrients?

DR. GEARHEART: To a certain extent they take up the nutrients, convert the nitrogen, the ammonia and nitrates into gas. So you do take the nitrogen out, which if you're irrigating with it, that's the wrong direction you want to go. If you're going to the ocean via any other options, if you're going to surface water or even ground water because of nitrate contamination.

The nitrates, for example, coming out of the system will be less than ten. So there will be no potential problem of contaminating ground.

MR. GROSS: Don't you meet your R1 better that way?

DR. GEARHEART: As it turns out, nitrate is not in the R1 guidelines. It just says you can't -- other regulations say you can't contaminate a ground water aquifer, and nitrate is one of the contaminants.

MR. GROSS: But you pick up other chemicals that are in it.

DR. GEARHEART: We do take out phosphorus and metal. You do take things that are really not identified. Actually one of the

options with wetlands is we're finding they do a lot of other things that we haven't given credit for. So as standards change, it's an option that gives you a little bit of a future in terms of contaminant removal.

Vegetation accumulates in certain periods of time, maybe in orders of -- depending upon the type of plant, anywhere from five to eight years. Certain amount of vegetation has to be selectively taken out. So that's an O&M cost associated with that to take the material out. This material can be composted and used as a soil additive or soil amendment. So that's basically what the system looks like.

In terms of comparing the costs, these are 1994 dollars. We kept bringing this up to date, depending upon the four to six percent, whatever you want to use as an increased cost rate. Here's what the cost looks like between the two alternatives. The collection systems are just about the same. The difference is we had to put a different pump station in because of the subregional. So this goes up a little bit compared to the SBR.

The treatment plant itself; that's the biggest difference in the cost. This includes land

cost at $50,000 an acre -- excuse me -- here's the land cost right here.

The effluent disposal was using -- again, we didn't re-evaluate it. We just brought their numbers up to 1995 dollars. So we didn't re-evaluate that. And that was 33 million, as opposed to four million for the reuse pipe and the infiltration at the end.

Total cost difference being about 130 million, compared to 100 million. So about $30 million difference. Probably the biggest reflection over the long-term is the estimated O&M costs, the annual O&M cost for the SBR ocean discharge. Now, a lot of this O&M was associated with the ocean discharge, water treatment requirements and a series of other factors that were already in the Belt Collins study. This was about one and a half million as opposed to about 380,000. So this is about a factor of four, one fourth less to operate and maintain annually.

That reflects -- that would reflect itself in the way the City & County does their rates. It would dilute, I guess, the user rate because you're not charged independently, but it would help the cost of the total system holding it down.

MR. GROSS: You make no allowance there for selling any of your effluent after being treated.

DR. GEARHEART: Good point. Maybe they can't hear you. Fred said that we didn't factor in the fact that this effluent would have some value. In fact, there's a Board of Water Supply -- I don't know what they call it. Not a requirement. It's like a -- it's not a law either or a rule. About reuse -- if reuse water is available for these options, they have to be reused or something like that.

MS. OKUMA-SEPE: I think that pertains to golf courses; if reuse is available, you have to go to the option.

DR. GEARHEART: Only to golf courses. Okay. But what that would do is there would be a value associated with the reuse, which we didn't include in that because we didn't have anything firm, and we didn't want to overstate that option. But that would reduce the cost, too.

Lucky.

MR. COLE: Lucky Cole.

I have two questions. One is with the 15,000 people, does that relate to about three people per house or 5,000 homes or is it more like 3,000

homes?

DR. GEARHEART: I think it's about 3,700. That's in the facility plan.

MR. COLE: Then the second question I have is -- or the second part of the question is: Why is your collection system more expensive? Is that because you have two sites?

DR. GEARHEART: No. Actually the grid was the same, the actual pipes going to the houses, the service collection. The difference was because we had two treatment plants we had to put the different pump stations in and pump up to those. So we actually had to add the cost to the Belt Collins because of this option.

MR. COLE: Then following on that, you're talking about somewhere around $30,000 per home, something like that, to build this system. And then maybe six or eight dollars a home per month to maintain it on your system.

DR. GEARHEART: On this option?

MR. COLE: On this option, ballpark.

DR. GEARHEART: That's about right. We've analyzed it in a different table, but that's just about correct.

MR. COLE: The only reason I'm mentioning

this is because there's been some discussion about individual waste treatment system alternative versus this and economics. And a typical individual waste treatment system would cost, at a minimum, $10,000, but the operating cost presumably might be higher. Septic tanks, let's assume it's not a septic tank but aerobic. An aerobic system would be maybe half as much money to build, but the operating cost would be maybe three or four times as much to maintain. Maybe more than that.

DR. GEARHEART: That sounds about right. I think one of the differences you have to look at because of the service areas is the effluent disposal issue and whether that's available and how you would handle that. There are ways to do that by having neighborhood disposal sites and things like that.

MR. COLE: Last question on this issue. You do not have -- at 371,000 I don't think you have the interest on the debt in that O&M expense. In other words, the capital expense has a certain interest cost associated with it.

DR. GEARHEART: Right. Actually this is a summary table. I can show you how we annualized this with the cost of money. It's in a different table.

MR. COLE: But is the cost of money --

DR. GEARHEART: It's associated with this. So we can compare apples and apples. It's eight percent.

MR. COLE: I guess what I'm trying to say is: Is that eight percent or whatever it is in those two numbers?

DR. GEARHEART: Yes, it is.

MR. COLE: So it's buried either in the capital cost or in the operating cost.

DR. GEARHEART: Yes. I just went to the final summary.

MR. COLE: But it's a true total cost number.

DR. GEARHEART: Yes, and that's required in the facility plan process to put apples and apples.

MR. LEINAU: Since we're talking money, it's interesting that Waimanalo has a wastewater treatment plant, and the community has a pretty strong sentiment that a lot of them don't want to hook up. Their cesspool works fine; they just got a septic system or whatever. What's interesting is some of the legislators are going back to the Department of Health saying, you know what, sure, you got to comply with the federal regs, but maybe not everybody needs to. Maybe we could have some

exceptions to the rule. And the bottom line is there's quite a bit of resistance from the general public in that community, and I would anticipate the same from this community. I don't know whether it's right or wrong, but let's walk into this with our eyes wide open. I'm real serious if that's adequately been addressed in the EIS based on what's going on right now today in other communities.

DR. GEARHEART: I probably don't have the one that I need here to maybe respond a little bit to that question. But in the facility plan, the important thing, just looking at these darker areas, the City & County spent quite a bit of time and effort over the last ten years actually trying to pinpoint where the potential water quality problems are to answer that question. The first cut was to separate what we considered rural, where even if it was failing, the density was so low it wouldn't make a difference. So that was the first cut, the rural versus urban.

The next cut would be if you would look at targets for implementation is where the soils aren't allowing cesspools or septic tanks to work. You can see it doesn't cover the whole service area either, but I think what happens is at some point the

community and the City & County have to decide where you can get some economy of scale. And there are some places where you can get economy of scale and some places where you can't. And at that point is where those decisions have to be made, because these -- if these have to be treated and their unit cost goes up, all these numbers change if the flow -- if the flow drops to half of that, the unit cost is going to go up. So those are considerations.

I think at least at the first planning level there's been enough cuts to try to identify where that economy can be best felt. It's still a very dispersed area under all conditions, except for a few areas, at least for most wastewater planning purposes.

MR. GROSS: I have a question.

DR. GEARHEART: Yes, Fred.

MR. GROSS: At your disposal site out by the airport they are growing or will be growing very soon 370 acres of bananas. Bananas use a lot of water. Have you talked to the people who are operating that as to whether they would be customers?

DR. GEARHEART: We've heard about that. That's happened just since we made the initial contacts with the airport people and the park people,

I think.

MR. GROSS: This is only half a million gallons a day. That's a very small flow in terms of agriculture. I would think they could use all that and more.

DR. GEARHEART: There's some really good data being created with the Laie treatment plant. They actually have demonstration projects where they are irrigating bananas determining what the rates are going to be for at least that location. So there is data on controlled irrigation for treated effluent. Same quality we're talking about here, just using Laie for bananas.

MR. HONG: The cost of the effluent disposal, was that including treatment and disposal or just disposal?

DR. GEARHEART: This one here?

MR. HONG: Yes.

MR. GEARHEART: That's including everything. That's treatment and disposal. That's the whole cost.

MR. COLE: That's included in outfall, in the case on the left.

DR. GEARHEART: The outfall is right here, but the O&M -- like I said, much of the O&M is

actually associated with water treatment plants for an ocean discharge --

MR. HONG: Hold on a second. If you say that effluent disposal on the left needed an ocean outfall, what was the difference in effluent we use between the two as far as the treatment of the effluent where reuse is concerned? Why would it have to go into an outfall?

DR. GEARHEART: It wouldn't have to.

MR. HONG: But that's what his question was.

DR. GEARHEART: I'm trying to go back to -- well, Jared was very specific about what we were tasked to do. We weren't tasked to look at all different combinations. We were tasked to look at an alternative to that.

MR. HONG: Yeah, well, my question is: Why is it $30 million versus four million?

DR. GEARHEART: Because this is the best shot. This is what was going to be done in '91 or -- this was the end -- they were actually going to do this. So what you're talking about is the effluent from an SBR with tertiary effluent could be used for irrigation. You just wouldn't have the option, from my standpoint, of having the ability to optimize the

use of it. That's a simple answer. But we weren't asked to mix and match.

MR. HONG: I understand that. I understand what you're telling me. I'm just a little bit at this point asking a question. If you're going to reuse effluent, I assume on the right column that the treatment of the effluent is less expensive than on the left column. You make it ready for reuse.

DR. GEARHEART: Right.

MR. HONG: I'm confused as to why it cost 33 million on the left for effluent disposal if it's also -- I mean you're saying it's not your job to study it at that time, but I'm just raising the question why it cost so much even with that system.

MR. GROSS: Most of that cost was related to the outfall pipeline, the pipeline cost. They got some real problems out there.

MR. HONG: But that's not comparing apples to apples in the end analysis. What we're seeing is with the ponds we get the effluent for four million bucks. With the SBR we pay 30 some odd million.

DR. GEARHEART: But look at the total. If you take this out, say take that option out, there still has to be something in there for effluent disposal. You don't take it all out because you

still have to have infiltration wells. If you take 33 million from this, you're still in the same ballpark. You still got all the advantages of this. So there's no cost difference, if you do what I wasn't asked to do but what you're proposing.

MR. HONG: Well, to make it clear to everybody, what I'm saying is that we're talking about 30 some odd million bucks for effluent disposal, but the question is if you use that effluent disposal for water reuse, that's not 30 million bucks.

DR. GEARHEART: No. It will be some number less than that, three to four million, whatever the exfiltration cost was. It's actually in this option. I mean there still has to be exfiltration, even with this system as a backup to that.

I don't know if it's critical, but we got -- oh, here it is. This is the one I was headed toward. The question came up -- and I know there's a lot -- this goes either way, but we were asked to look at this. What about upgrading it? What does it take to upgrade it? One of the advantages of --

MR. HONG: Can't see that one at all.

DR. GEARHEART: Yeah, I know.

Well, let me go through it. Basically what

it says is if you have a large footprint to begin with and you want to increase the flow, for example, from 16,000 people to 24,000 people, I can add certain processes on that large footprint to handle that flow. And that's the advantage of having the larger footprint. And it would allow you to take almost the same area. You have to add a few more acres to get up to this level, up to about 30,000. And long-term there probably will be flows out here within the next 40 to 50 years in that level. But it will allow you to kind of implode on the site. The site will be large enough to allow you to implode on. This wasn't necessarily true with the SBR site. It was a relatively small site. It could have been landlocked, in essence, by where it was sited.

MR. HONG: Wait, wait, wait, wait, back up. That's where I disagree. If you folks can get 33 acres for ponds, you're telling me you can't get three acres for SBR just as a comparison?

DR. GEARHEART: Oh, you can.

MR. HONG: Why not?

MR. COLE: He said you can.

MR. HONG: You can?

DR. GEARHEART: Yes.

MR. HONG: Well, why did you say we're

landlocked then?

DR. GEARHEART: No, no. I'm saying where it would be sited because it would be a small site you'd be --

MR. HONG: Well, why won't you guys program that to a larger site initially?

DR. GEARHEART: That's an option. That's what planning is all about.

MR. HONG: That's what I want to hear. It was sounding like it's impossible.

DR. GEARHEART: Well, I'm saying that you always have the site when you have the larger site. You know you've got it. And you don't know you have it when you have the small site.

I think that's basically the full system. Most of the other information I have is just the detailed economics. All of the detail of this information is in the facility plan. So if you want more information on that, on the cost, I'll be glad to give it to you now, but you can find it in there. We have compared this cost with other treatment systems in the City & County system, and this is very inexpensive. So it would tend to dilute or reduce the total cost within the City & County by distributing.

UNIDENTIFIED VOICE FROM THE AUDIENCE: Is that the map that shows the area that's going to be covered?

DR. GEARHEART: It's showing the area that would -- actually this is just a zoning map. This is the land use district boundaries. The actual -- it's a very -- I could show you, but it's got a lot of information on it. Probably couldn't read it. But basically it includes the major areas, urban or the higher density areas like this. These are land use maps, where these are various residential, agriculture, public, whatever. And we're talking about sites located here and here in terms of exfiltration -- or the infiltration. And the other site is in here. Infiltration out there.

UNIDENTIFIED VOICE FROM THE AUDIENCE: Are you going to pick up the effluent from the airport?

DR. GEARHEART: No, because the collection system doesn't go as far as reuse, but the option was -- because it looked like there would be more reuse options, to take it as far out as you can.

UNIDENTIFIED VOICE FROM THE AUDIENCE: How far is the collection --

DR. GEARHEART: It's right in here. I'll show it here.

MR. GROSS: The map you sent out earlier shows to the two acre sites are going to be included.

DR. GEARHEART: Let me put this on the overhead. It's an overlay. Here's the Waialua section of this, and it shows -- you guys have to tell me what this area is right out here. But here's the western extreme right here on the Crozier Drive.

MR. GROSS: Those are the two acre parcels in Mokuleia just off Crozier Drive.

DR. GEARHEART: Oh, here.

MR. LEINAU: You drive, you go west.

DR. GEARHEART: There's the head that went up here. Service this one. Again, this was what was in Belt Collins. Basically it's the same coverage.

Yes.

UNIDENTIFIED VOICE FROM THE AUDIENCE: This whole extensive system and only two pump stations?

DR. GEARHEART: No. Six pump stations.

UNIDENTIFIED VOICE FROM THE AUDIENCE: My question is, you haven't studied that. Are they in areas where it could be offensive? They're the ones with the odor.

DR. GEARHEART: Well, they're located where they have to be in terms of the gravity flow. They haven't necessarily been sited on anybody's property

or close to any -- I mean they have been put in areas based upon the hydraulic grade line, sited to take maximum advantage of gravity. So that's basically the --

MR. COLE: One of them is located next to an admiral's house on Crozier Drive, I believe.

DR. GEARHEART: I think maybe I can stop there. We've at least explained the system.

Want me to open it up for questions?

MS. OKUMA-SEPE: I'm going to turn it over to Eldon Franklin. We're now at the public testimony stage. This is the opportunity for those of you who signed up for public testimony. To make sure that we can get to everyone, we ask that you limit it to three minutes, if you can. Thank you.

MR. FRANKLIN: I'm Eldon Franklin from the Division of Water Quality with the Department of Wastewater Management. We're now open for public comments on the Facility Plan and the Environmental Impact Statement. We don't have that many people, but again as our Deputy Director mentioned to you, we'd like to keep it to three minutes for consideration of everybody that's present here. It is getting late.

The first person on the list is Meryl

Anderson.

MS. ANDERSON: I'm Meryl Anderson. Did I not hear you right about pump station number five? You're not doing anything on it? You're going to leave it as it is? You're not concerned about it? You are? That's down there by the Chart House, diagonally across from where I live. My concern is and I'm very concerned about it because you're in a 100-year flood zone, a tsunami area, a very well recreated used area and right on the highway where you're planning to put the ten-foot you said, but I think you're going to have to go higher. I just am very concerned. I wrote you a letter, which this is the same testimony; I just xeroxed it. I did not hear anything back, but I assumed that tonight would be -- it would be answered maybe. But I did not hear what I wanted to hear. You're not going to even look at an alternate place?

I'm concerned about the odor, too. If you have a malfunction, it'll go right to the river into the bay.

MS. OKUMA-SEPE: We will address that issue. That's the purpose of this portion of the meeting. We will address that issue for you. That's the purpose of this portion of this public hearing.

MS. ANDERSON: So when will you address it?

MS. OKUMA-SEPE: As part of this process. We're taking public comments now, so we will address it as part of this process. But I understand that we will look at that issue as part of our detailed design work.

MS. ANDERSON: So tonight you're not going to give any answers?

MS. OKUMA-SEPE: I understand that as of today what I can tell you is we will address that as a part of our detailed design work. But we are taking public comments. It's part of this process. We will address that.

MS. ANDERSON: I'll give you back my letters. Thank you.

MS. OKUMA-SEPE: Thank you.

MR. FRANKLIN: Thank you, Mrs. Anderson.

A lot of people are thinking this all set in concrete, but we're just doing the environmental preliminary broad planning stages here. Things have to go into what we call a preliminary engineering report. They have to go into the different stages of design, long before it goes into construction. So there's a long, involved process before anything is set down as far as actual specific siting before it

actually goes into construction. So there's a long period here that will evolve long before you see anything coming out of the ground.

The next person is Dan Gora. You want to make a statement? Oh, okay. Bob Leinau, you want to make a statement?

MR. LEINAU: Bob Leinau.

Actually what I have to say in particular but certainly it's for emphasis added. That lift station, we have addressed it, we have addressed it, and we keep hearing we're going to take a look at it. But, you know, we had these kind of exercises with the Haleiwa bypass, and everybody said don't worry, we're going through the process. And we've spent several years now trying to get things rectified after the fact, and the time to do it is up front. The community really deserves to have a look at an honest to god blueprint, a -- I don't know if it's flat -- an elevation of how you're going to build a lift station if it's going to be 20 feet in the air out of the floodplain and be a big concrete thing and be compatible with the city design district. In a lot of people's mind's eye, that isn't going to work very well. So I really hope that this isn't an exercise. I mean we want to trust you,

but somehow the process doesn't always serve the community interest, and I just want to add emphasis to what Meryl said.

The other thing is on the water reuse, if we're not timely in creating a commitment to that water reuse, we will pay the piper. And we have done that before on land acquisition and stuff through City & County parks. We'll say we want that and then four or five years later we end up paying five or ten times what it was five years ago when we maybe should have locked it in.

I strongly urge a 100 percent understanding of how that reuse is going to happen before those commitments are made, and if it turns out that we have to buy the land to get it dedicated, maybe that's a better choice. I would think that with Castle & Cooke or Dole Foods wanting to make electricity to have reuse water would be extremely valuable to their long-term plans, but I think it's not fair if you're a landowner to switch shoes and say make a commitment to use our water, but I can't tell you what it's going to cost. What I heard tonight really isn't a very -- how are you going to strike a deal and get realistic commitments if you can't give real numbers?

If nothing else, maybe you can say it's going to be X percent less than the City & County water use or something, but I hear reasons why that can't be locked in, and reasonable planning says it is locked in. I strongly suggest you go for 100 percent firm commitments on that. The way it was addressed in the EIS was in sort of a nefarious sort of total way, and each one of the two plans needs to be addressed individually as it relates to the amount of acreage dedicated.

EIS sort of smooshed them together, and they don't deserve to be smooshed together. They're two separate plans, two separate reuse exercises. Thank you.

MR. FRANKLIN: Thank you.

Carole Collins.

MS. COLLINS: I don't have anything written down. I'm just here to say that finally it's happening, and I'm really grateful to Bob Gearheart for all of the time and sweat and blood and energy he has put into doing this.

Eight years ago when this whole thing started, it was something unheard of, at least in Mokuleia and Haleiwa, to have a wastewater treatment plant, and today it seems to me like the only common

sense thing to do, and I'm really proud of the fact that it's being done by a government agency, and I'd like to acknowledge Rene because she heard us and I like this sort of listening that she has done to continue in the City Council.

I'd also like to acknowledge Alec Santiago, Stew Ring, Mike Daily and this community and all of its people. Thank you.

MR. FRANKLIN: The last public comment will be made by Stew Ring.

Stew.

MR. RING: Stew Ring from Mokuleia Community Association.

Good evening. I think everybody here will agree that we do have a wastewater problem on the North Shore, and the problem is worse in Haleiwa than it is anywhere else. I think most people will agree that unless we do something with the wastewater, the problem is going to get worse.

From what I've heard, in a very simplistic way we have heard three alternatives. One is to do nothing and live with our current situation. That's unacceptable. Two, to go along with sort of the standard wastewater treatment plant, the urban model, the standard batch reactor, which, if memory serves

me correctly from reading the headlines, works fine as long as there's not a big storm, as long as there's not a power failure, as long as there's not a personal error in operating the machinery, as long as there's not an emergency generator that fails to trip on line and carry the load. But if it doesn't work fine, we're dumping a bunch of stuff in the ocean. And the ocean is very important to us out here.

Now, Bob Gearheart has shown us another alternative to that ocean outfall, and I think it's the alternative that we have been hoping for and looking for, and it's been our objective for the eight years we've been working with the alternatives. I think it's probably useful to make a very quick assessment of the pros -- not the cons but the pros of the two alternatives we're considering here tonight.

The standard batch reactor has a very positive advantage; it requires less land. The wetlands oxidation pond infiltration well alternative has couple of pros also. It costs considerably less even including acquisition of the land. It costs considerable less for year-to-year operation and maintenance costs. It conserves our precious and

limited fresh water for agricultural reuse. But perhaps most importantly, it preserves and improves our quality of life on the North Shore.

And how does it do that? Because it's more reliable and less likely to result in sewage that spills and discharges. Consequently, it better protects the public health from disease and from infection. It is friendlier to the environment concerning air and water and, I'll call it, smell pollution. It preserves beaches for surfing, swimming and fishing and other sports. And the bottom line is I think it improves the North Shore as a world class tourist sport attraction and good place to live.

So I think the reasons are compelling why all of us who care about the North Shore should strongly support the City & County amendment to the 1987 Waialua-Haleiwa Wastewater Facilities Plan, and I think that, as a matter of priority, we ought to encourage all government agencies to implement this alternative, first with Haleiwa where the problem is worse, but then Waialua, to protect our quality of life for us and for our kids.

Thank you very much.

MR. FRANKLIN: Thanks very much, Mr. Ring.

That was very eloquent. We could use a public relations person like yourself for the department.

Dr. Gearheart has kindly agreed to address some of the concerns that were brought up previously and then during the public comment period.

So, Dr. Gearheart, go ahead.

DR. GEARHEART: I realize some of you responded to these multiple times because there's been a Facility Plan, a draft EIS. And, Meryl, we have -- as best I can respond to it, we have responded to that issue. What we have been told is that that is the next level of planning that occurs. There are standards that go along with the lift station, but exactly where it goes and those kind of issues have to be covered at the next step because this is really just a hydraulic drain line location, not a lot location in terms of site.

In the Facility Plan, Bob, there was a Table 813. There's the value of reclaimed water. One of the things that we did is we actually made a calculation. Bob, trying to respond to your question. In table 813 in the Facility Plan we actually calculated the cost of reclaimed water, and at 65 cents a thousand gallons, if you reuse all of the 1.4 million gallons, you would recoup your

operating cost. You'd recoup $322,000 at 65 cents a thousand. We couldn't put that in because those are not guaranteed, but we did do a survey, and we found we can't include this either because these are not commitments. But we did spend the time to survey people, and we found 14 people who were at that time -- this was about two and a half years ago -- who were willing to use reclaimed water. I think this amounted to, if I remember right, about 50 to 60 acres. We needed about 100 acres.

If we had to buy the land, which was your suggestion, the alternative would still be cheaper at 50,000 an acre. It would still be cheaper than the other alternative.

MS. OKUMA-SEPE: Thank you, Dr. Gearheart.

MR. GROSS: May I make a comment on one thing? There have been several comments about the odors from pumping plants. When I was a student in college -- and this was a long time ago -- we visited the pumping stations in the city of Atlanta. I was a civil engineer, and this was part of the course we took, and this was a large pumping station, and you could walk around this place. It was a large building, and there was absolutely no smell of any kind from it. If they could do that 60 years ago, we

can sure do it today.

Now, the City & County has not done that on their own stations. Right over in Kaneohe, right in front of an apartment complex, it was just out of this world, it was terrible. They have corrected that. They've had to correct it. But if it's built right in the first place, there's not a problem. And I would like to see this place -- I hope I live long enough to see that this one is built properly because I'll be looking over the City's shoulder the whole time.

MR. LEINAU: Is that a threat?

MR. GROSS: That's a promise.

MS. OKUMA-SEPE: Are there any other questions at this point?

MR. COLE: I had one question. Why couldn't the pumping station be located underground in areas of aesthetic concern and in areas of flood zone, concern about a tidal wave going through or a wave going through.

MS. OKUMA-SEPE: I'm not sure if we ever considered that, but it's part of our next planning efforts. That's certainly something we can take a look at to determine the feasibility of that.

MR. MARTIN: Xavier Martin.

My question is I spoke to -- combination statement and a question. I spoke to Felix recently at one of the previous meetings. I am a homeowner who recently spent about $10,000 in putting in a septic leach field system. Now, am I going to be required to hook up with this system? Because Felix said they were looking at it, and it probably would not be required of homeowners who have a viable system, a working system that is currently acceptable. Is this still the position of the board?

MS. OKUMA-SEPE: I believe that if you heard that from Felix, I am sure that's still the current position, but I imagine what would happen is many of these issues that people are bringing up we're going to have to take a look at in terms of will we require these certain homeowners to hook up. I don't know whether at this stage we're able to answer that definitively.

Any other questions?

Okay. We certainly appreciate the opportunity to be here tonight and certainly appreciate hearing the comments that you have to make. What I'd like to say is that if any of you would like to submit written comments and haven't had the opportunity to do so, we would extend the comment

period for one week. So you will have until the close of business on May 7th, which is next Tuesday, to submit your written statements to Jared Lum. And if you have any questions, you can give Jared a call at 523-4654. Thank you very much.

(Proceedings concluded at 8:57 p.m.)

C E R T I F I C A T E

STATE OF HAWAII)
) SS.
CITY AND COUNTY OF HONOLULU)

I, JANIS K. FLOATE, Notary Public, State of Hawaii, do hereby certify:

That on April 30, 1996, the foregoing proceedings were taken down by me in machine shorthand and thereafter reduced to typewriting under my supervision; that the foregoing represents to the best of my ability, a true and correct transcript of the proceedings had in the foregoing matter.

I further certify that I am not an attorney for any of the parties hereto, nor in any way concerned with the cause.

DATED this 14th day of May, 1996, in Honolulu, Hawaii.

Janis K. Floate

JANIS K. FLOATE, RPR, CSR 254
Notary Public, State of Hawaii
My Commission Exp: December 12, 1997